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From Critical Thinking to Politeness: Pragmatic Development in Indonesian Students' Academic Writing

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Abstract This study investigates whether digitally mediated instruction enriched with targeted pragmatic intervention promotes Indonesian university students' critical thinking in academic writing and how this cognitive development subsequently relates to the strengthening of academic politeness competence. A quasi-experimental pre-test–post-test design was employed with undergraduate students enrolled in an academic writing course. The experimental group received digital learning integrated with explicit pragmatic instruction, while the control group followed standard digital writing activities. The results indicated that students in the experimental group demonstrated significantly greater improvements in multidimensional critical thinking compared with those in the control group. These cognitive gains were accompanied by stronger development in academic politeness competence, reflected in higher post-test performance and more consistent use of interactional discourse resources in academic writing. Correlation analysis further revealed a strong positive association between post-instruction critical thinking and academic politeness competence. Overall, the findings suggest that digitally mediated instruction enriched with pragmatic guidance can support the development of academic politeness through improvements in students' critical thinking.

Keywords: *Academic politeness, Critical thinking, L2 writing, Pragmatics instruction, Academic literacy*

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1. Introduction

Development of academic literacy in college requires students not only to understand disciplinary knowledge, but also to build arguments that are logically reasonable and rhetorically appropriate. Therefore, academic writing involves more than just grammatical accuracy. However, it requires the ability to evaluate evidence, organize ideas coherently, and present claims in a manner that is acceptable within the scientific community. In this context, critical thinking plays a central role, as it allows the writer to analyze information, assess competing perspectives, and formulate well-reasoned

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conclusions. At the same time, effective academic communication also relies on pragmatic competence, in particular the ability to manage interpersonal relationships and epistemic positions in written discourse. In this regard, classical pragmatic theory conceptualizes modesty as a strategy to reduce face-threatening actions in social interactions (Brown & Levinson, 1987). However, in academic discourse, politeness is typically embodied through rhetorical practices such as hedging, expression of stance, and reader engagement, which allow authors to make claims while acknowledging alternative interpretations (Hyland & Hyland, 2019; Hyland & Tse, 2004). From this perspective, academic literacy can be understood as the ability to integrate analytical reasoning with pragmatic awareness in the construction of academic arguments (Flowerdew, 2012; Sawaguchi, 2025).

Research on this dimension has come a long way in recent years, but the two fields are often examined separately. Studies on critical thinking instruction in second language writing reported improvements in evidence evaluation, reflective reasoning, and argumentative development (Batdi et al., 2024; López-serrano & López-serrano, 2025; Zhu et al., 2025). In contrast, research on academic pragmatics has focused on interactional metaphysics, hedging strategies, and negotiation of authors' attitudes in scientific communication (Hyland & Hyland, 2006; Najeeb et al., 2012; Yao & Sun, 2025). Meta-analytical evidence also suggests that explicit pragmatic instruction can improve communicative performance in academic contexts (Nuzzo & Brocca, 2024; Ren et al., 2023). In line with these developments, digitally mediated teaching of writing has become increasingly common in higher education. Online writing platforms, peer feedback systems, and collaborative learning environments provide opportunities for reflection, interaction, and revision that can support the development of academic writing competencies (Gretsch, 2009; Lemen et al., 2021; Palacio & Gustilo, 2016; Zhang & Hyland, 2023). Despite these advances, the interaction between the development of critical thinking and pragmatic competence in academic writing has received limited empirical attention.

This gap is especially relevant in digitally mediated learning environments, where writing instruction often combines analytical tasks, collaborative feedback, and reflective revision. In such a context, the development of academic writing may involve not only improvements in cognitive processes, but also changes in the way students position their claims and engage readers. However, relatively few studies have examined whether instructional approaches that explicitly integrate pragmatic guidance in a digital writing environment can simultaneously support the development of critical thinking and academic decency. Addressing this problem, it is important to understand how the cognitive and pragmatic dimensions interact in the development of academic literacy. Therefore, this study is an attempt to investigate whether digitally mediated teaching enriched with targeted pragmatic interventions can foster students' critical thinking in academic writing and how such cognitive development is related to strengthening academic politeness competencies.

2. Theoretical Framework

2.1. Academic Politeness in Contemporary Academic Discourse

In the classical pragmatic tradition, politeness is understood as a mechanism for managing social relations through strategies to mitigate face-to-face threats in language interaction (Brown & Levinson, 1987). This perspective provides an important conceptual foundation for understanding politeness as a universal phenomenon related to social distancing, power, and the degree of coercion of speech actions. However, in the context of modern academic discourse, a face-based approach is no longer adequate to explain the complexity of the epistemic relationship between author and reader. Academic politeness is now understood as a rhetorical practice that is realized through attitude management, reader involvement, and negotiation of the author's position in the construction of scientific knowledge (Hyland & Hyland, 2006; Hyland & Tse, 2004). Thus, academic politeness shifts from the general interpersonal realm to the interactional-epistemic dimension in scientific discourse.

To avoid conceptual ambiguity in the use of the term academic politeness, this study positions academic politeness not as a synonym of metadiscourse, stance, or hedging, but as a macro-level pragmatic construct that is realized through the management of epistemic positions author to the reader in scientific discourse. In the classical pragmatic framework, politeness is understood as a strategy to mitigate the threat of face in social interactions (Brown & Levinson, 1987; Yao & Sun, 2025). However, such an

approach is not entirely adequate to explain the dynamics of contemporary scientific communication, in which the relationship between author and reader is determined more by the negotiation of knowledge authority than simply interpersonal social distancing. Therefore, this study adopts a pragmatic perspective of discourse that views academic politeness as a rhetorical practice mediated through interactional metadiscursive devices, including attitudinal strategies, reader engagement, and the management of epistemic commitments in scholarly texts (Hyland & Hyland, 2006, 2019; Hyland & Tse, 2004).

The development of academic pragmatic studies further emphasizes that the strategy of politeness in scientific texts is realized through metadiscursive devices such as hedging, boosting, engagement markers, and attitude markers that allow authors to balance knowledge claims with sensitivity to the reader community (Esfandiari & Akbary, 2024; Hidayatullah et al., 2025). This perspective places academic politeness as an integral part of the construction of scientific authority, not just a linguistic politeness strategy. Therefore, understanding academic politeness requires the integration of pragmatic theory, discourse analysis, and academic literacy that sees writing as a social practice bound to the norms of the scientific community (Flowerdew & Leong Solomon, 2010).

Within this framework, metadiscourse is understood as a linguistic mechanism, stance as the author's evaluative position, and hedging as a claim mitigation strategy (Viktorova, 2024; Yao & Sun, 2025), while academic politeness represents the integrative pragmatic function that arises from the interaction of the three elements in establishing a balanced epistemic relationship between the author and the reader community. This distinction is important because it allows a separation between the linguistic apparatus and the pragmatic function it measures. Thus, academic politeness is operationalized as the author's ability to present argumentative scientific claims while remaining sensitive to potential uncertainty, diversity of perspectives, and norms of academic interaction. This perspective is in line with cutting-edge research that places interactive resources as a key component in the construction of authority and credibility of academic discourse (Abbas, 2013; Pizarro, 2025).

Several empirical studies have examined how academic politeness is realized in scholarly writing. Corpus-based research shows that writers frequently employ hedging and engagement strategies to negotiate epistemic authority and maintain disciplinary credibility (Hyland & Hyland, 2006; Jiang & Hyland, 2025). Other studies indicate that the distribution of these interactional resources varies across disciplines and proficiency levels, reflecting different rhetorical expectations within academic communities. In educational contexts, research on student academic writing also demonstrates that the development of politeness strategies is closely related to the development of argumentation and critical thinking abilities (Hyland & Tse, 2004; Yao & Sun, 2025).

Based on this conceptual foundation, the indicator of academic politeness assessment in this study is derived directly from the pragmatic dimension of discourse, not from the surface linguistic category. The analytical rubric was developed to capture the empirical manifestations of (1) claim mitigation through proportional hedging, (2) controlled expression of evaluative attitudes, (3) reader engagement through engagement strategies, and (4) consistency of epistemic positions in scientific arguments. These four dimensions represent the operational realization of academic politeness as a pragmatic competency that is integrated in the practice of scientific writing. This kind of operational approach allows for a clear alignment between theoretical constructs, discursive devices, and measurement indicators, thereby enhancing the conceptual validity of assessment instruments as well as addressing methodological needs in contemporary academic pragmatic research.

2.2. Critical Thinking as the Cognitive Foundation of Academic Writing

Critical thinking skills are the main cognitive foundation in the production of academic discourse because they allow authors to evaluate evidence, build logical arguments, and reflect on epistemic positions in a systematic manner. Within the framework of academic literacy, writing activities are not seen simply as a reproduction of language structures, but as social-cognitive practices that involve a process of reflection, negotiation of meaning, and the construction of knowledge authority (Bormanaki & Khoshhal, 2017; Subandowo et al., 2025). Cutting-edge empirical research shows that critical

thinking instruction consistently improves the quality of argumentation, metacognitive reflection, and rhetorical organization in second language writing (Batdi et al., 2024; Yin & Dou, 2025).

In addition, the development of digital learning technology expands the space for cognitive interaction through peer feedback, online collaboration, and text-based reflection which has been proven to contribute to improving the quality of academic discourse (Viktorova, 2024; Zhang & Hyland, 2023). These findings confirm that critical thinking serves not only as an individualized cognitive skill, but also as a mechanism that mediates learners' participation in scientific communication practices.

2.3. Toward Cognition-Mediated Pragmatic Development

Although the study of academic politeness and critical thinking has developed significantly (Lin et al., 2023; Watson et al., 2016), the conceptual relationship between the two is still relatively limited in the empirical literature. Recent meta-analyses show the effectiveness of pragmatic second language instruction on academic communication performance (Alessandroni, 2017; Yao & Sun, 2025). At the same time, research on written critical thinking shows that skills such as evaluating evidence, considering alternative perspectives, and reflecting on arguments play an important role in the construction of effective academic texts (Batdı et al., 2024). Despite these developments, only a handful of studies have explored how improvements in critical thinking can affect the development of pragmatic competencies in academic communication.

In the context of academic writing, cognitive transformation refers to a gradual shift in the way students build and develop arguments (Hyland & Tse, 2004). In the early stages, writing is often still oriented towards presenting information or repeating sources without in-depth evaluation. As critical thinking skills develop, authors begin to evaluate the evidence, compare different points of view, and organize the strength of the claims they make. This development shows a process of knowledge transformation in argumentative writing, in which the writer no longer merely reproduces information, but actively constructs argumentative meanings and positions based on available evidence (Decker et al., 2016; Raković et al., 2021). This process is also closely related to pragmatic expectations in academic discourse. The author is expected to be able to convey arguments convincingly while still opening up space for uncertainty and alternative interpretations. Therefore, the development of academic decency cannot be understood simply as the use of linguistic devices such as hedging or markers of engagement.

Based on this perspective, this study conceptualizes academic decency as a pragmatic competence mediated by cognition. Within this framework, pragmatic performance improvements are expected to appear along with the development of critical thinking. Therefore, instruction that combines pragmatic guidance with activities that encourage reflection and evaluation of arguments can support this process. In digitally mediated learning environments, where writing, feedback, and revision tasks often occur through online platforms, such integration can play a crucial role in shaping students' academic communication practices. Therefore, examining the relationship between learning interventions, critical thinking development, and academic politeness competencies provides a useful way to understand how cognitive processes contribute to pragmatic development in academic writing. Based on this theoretical synthesis, this study positions:

a. Pragmatic-oriented digital learning interventions as a trigger for change,
b. Critical thinking as a cognitive mediation mechanism,
c. Academic politeness as a performative output in scientific discourse.

This model assumes that the increase in academic politeness does not occur directly as a result of learning, but through a transformation of critical thinking capacity that allows the author to manage the interpersonal dimension of the text in a more reflective and strategic manner. Thus, this research is an effort to offer a cognitive-pragmatic development framework, about integration in academic literacy based on digital learning.

3. Methodology

3.1. Participants

This research involved 138 students of the language education study program at a private university in Central Java, Indonesia, who routinely apply digital-based learning in academic writing courses. Participants were third-semester students who had basic experience in scientific writing, but had not received explicit academic pragmatic training. Participants came from two intact classes which were then designated as the control group (N = 69) and the experimental group (N = 69). This technique follows the cluster-based assignment approach commonly used in educational research with a quasi-experimental design when individual randomization is not possible (Creswell & Creswell, 2018; Gall et al., 2003; Wallen & Fraenkel, 2013). The number of participants in each group was adjusted to the composition of the available classes, and all participants who met the inclusion criteria were included in the study.

The characteristics of the participants included the age range of entry-level students (around 19–22 years) with a relatively homogeneous academic background in the field of language education. In terms of language proficiency, participants demonstrated an intermediate level of academic English proficiency, as reflected in their performance in previous academic writing courses. All participants participated in the study voluntarily after obtaining an explanation of the research objectives, procedures, data confidentiality, and the right to withdraw at any time.

3.2. Instruments

This study used two main instruments, namely the academic politeness instrument and the multidimensional critical thinking instrument. Both instruments were administered at the pre-test and post-test stages to identify changes in ability after intervention.

3.2.1. The Academic Politeness Instrument

The academic politeness instrument was developed based on the interactional metadiscourse framework, which includes the use of hedging, attitude markers, and engagement markers in academic texts (Hyland & Hyland, 2006; Hyland & Tse, 2004). This instrument is in the form of an analytical rubric that assesses students' ability to manage epistemic positions, evaluative sensitivity, and interpersonal relationships in academic writing. The assessment was conducted using a graded scale that reflects the pragmatic performance quality in the text. Examples of instrument items and assessment criteria are presented in Appendix A.

The content validity of the instrument was evaluated through expert judgment involving several specialists in linguistics and language education to ensure the alignment between the assessment indicators and the theoretical constructs of academic pragmatics (Creswell & Creswell, 2018; Wallen & Fraenkel, 2013). The experts examined the clarity of descriptors, the relevance of rubric indicators, and the consistency between scoring categories and the theoretical framework of interactional metadiscourse. Based on their feedback, several minor revisions were made to improve the clarity of the assessment criteria before the instrument was used in the main study. Furthermore, construct validity was established by statistically analyzing the instrument’s internal structure, which confirmed that the rubric items consistently measured the intended dimensions of epistemic positioning, evaluative sensitivity, and interpersonal engagement.

3.2.2. The Multidimensional Critical Thinking Instrument

The multidimensional critical thinking instrument (see Appendix B) was prepared based on a framework of high-level thinking skills that include eight main indicators, namely analysis, interpretation, evaluation, inference, explanation, self-reflection, solution formulation, and argumentation (Gall et al., 2003; Wallen & Fraenkel, 2013). This instrument is in the form of a writing task that allows the measurement of critical thinking skills in a contextual manner in the production of academic texts.

The construct validity of the instrument was examined by aligning the task indicators with the theoretical framework of higher-order thinking skills. To empirically validate this alignment, a confirmatory factor analysis was conducted, which revealed that the eight indicators loaded onto the higher-order construct as theorized, with all factor loadings exceeding the recommended threshold. In

addition, the instrument underwent expert review by specialists in language education and critical thinking pedagogy to ensure the relevance and representativeness of each indicator within the construct being measured. Internal reliability was further examined to ensure consistency between indicators in measuring the same construct (Gall et al., 2003).

3.3. Procedure

3.3.1. Data Collection

This study used a quasi-experimental design with a pre-test–post-test control group design model, which allows evaluation of the effects of interventions in the context of real learning when full randomization is not possible (Gall et al., 2003; Wallen & Fraenkel, 2013). In the initial stage, all participants took a pre-test to measure their initial ability to think critically and be polite academically. The pre-test results were used to verify the equivalence of the initial conditions between the control and experimental groups. Learning interventions were carried out in several structured sessions in the university's digital learning environment (through the institutional learning management system used for distributing materials, writing tasks, and feedback). The intervention was implemented through a series of guided writing sessions in which students practiced applying pragmatic strategies and received structured feedback on their academic texts.

The control group followed digital-based academic writing learning without explicit pragmatic intervention. In contrast, the experimental group received learning enriched by directed pragmatic interventions, which included training on the use of hedging, epistemic attitude management, pragmatic reflection, as well as structured feedback on the use of metadiscourse tools in the text. In addition, the learning activities incorporated guided critical thinking tasks, including evaluating evidence, comparing alternative viewpoints, and formulating justified arguments in academic writing. This approach is in line with the paradigm of explicit pragmatics instruction, which shows that pragmatic teaching can directly improve the communicative performance of language learners (Brown & Levinson, 1987; Najeeb et al., 2012). After all learning sessions were completed, the two groups took a post-test with instruments equivalent to the initial stage.

3.3.2. Data Analysis

Data analysis was conducted in several stages. First, independent-samples t-tests were used to examine baseline equivalence between the control and experimental groups. Second, pre–post development analyses were performed to evaluate changes in students' critical thinking across the intervention period, followed by comparisons of post-test results between groups. Third, the development of academic politeness competence was examined using the same analytical procedures, including pre–post comparisons and post-test group differences. Finally, Pearson correlation analysis was employed to examine the association between post-instruction critical thinking and academic politeness competence. All analyses were conducted using statistical software with a significance level set at $p < .05$.

4. Results

4.1. Critical Thinking

4.1.1. Baseline Equivalence

Before the instructional intervention, an independent-samples t-test was conducted to determine whether the control and experimental groups had comparable levels of critical thinking ability. Establishing baseline equivalence is necessary to ensure that any differences observed after the intervention can be attributed to the instructional treatment rather than to pre-existing differences between the groups. The analysis showed that the two groups started from a comparable level of critical thinking performance. The control group obtained a mean pre-test score of 61.84 (SD = 1.41), while the experimental group obtained a mean score of 61.67 (SD = 1.36). The independent-samples t-test indicated that the difference between the two groups was not statistically significant, $t(136) = 0.71$, $p > .05$. These results confirm that the baseline levels of critical thinking ability were statistically equivalent

across the two groups prior to the implementation of the instructional intervention. Therefore, any subsequent differences observed in the post-test stage can be interpreted as reflecting changes associated with the learning treatment rather than initial group disparities.

4.1.2. Pre–Post Development

Changes in students' critical thinking ability before and after the instructional intervention were examined using paired-samples t-tests within each group. This analysis aimed to determine whether learning activities during the intervention period were associated with measurable improvements in critical thinking performance.

In the control group, the mean score increased from 61.84 (SD = 1.41) in the pre-test to 69.92 (SD = 1.87) in the post-test. The paired-samples t-test indicated that this improvement was statistically significant ($t(68) = 19.37$, $p < .001$), suggesting that students demonstrated moderate development in critical thinking during the course of regular digital writing instruction. A stronger pattern of improvement was observed in the experimental group. The mean score increased from 61.67 (SD = 1.36) in the pre-test to 79.74 (SD = 2.03) in the post-test. The paired-samples t-test confirmed that this increase was statistically significant ($t(68) = 33.21$, $p < .001$). The magnitude of the gain in the experimental group was substantially larger than that observed in the control group.

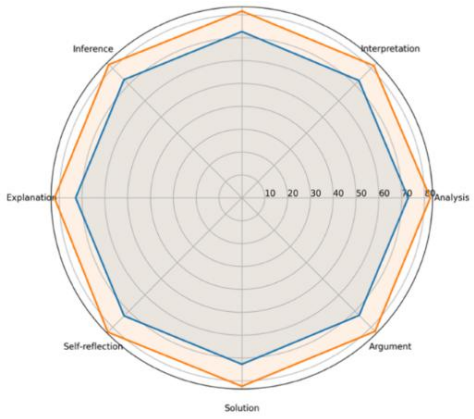
These results indicate that although both groups experienced improvement over time, students who participated in digitally mediated learning enriched with pragmatic instruction demonstrated a markedly stronger development of critical thinking ability.

4.1.3. Post-Test Group Difference and Practical Magnitude

A description of the development of critical thinking skills across eight post-learning indicators is presented in Figure 1 in the form of a radar diagram, which allows simultaneous visualization of achievement patterns across cognitive dimensions and a comparison between the control and experimental groups. As illustrated in Figure 1, the experimental group showed higher average scores across all critical thinking indicators than the control group in the post-instruction stage.

Figure 1

Critical Thinking Profile across Eight Indicators (Analysis, Interpretation, Evaluation, Inference, Explanation, Self-reflection, Solution, Argument) at Post-Instruction



Note. Radar plots present indicator means for both groups. The blue line represents the control group, while the orange line represents the experimental group.

To examine whether the difference between the two groups was statistically significant, an independent-samples t-test was conducted using the post-test scores. The analysis showed that the experimental group (M = 79.74, SD = 2.03) scored significantly higher than the control group (M = 69.92, SD = 1.87), $t(136) = 30.48$, $p < .001$.

Taken together, these results demonstrate that the instructional approach integrating pragmatic guidance within digitally mediated writing instruction was associated with stronger development of critical thinking skills compared with conventional digital writing activities. The improvement was observable across multiple cognitive indicators, suggesting that the intervention contributed to the strengthening of critical thinking as a multidimensional construct.

4.2. Academic Politeness

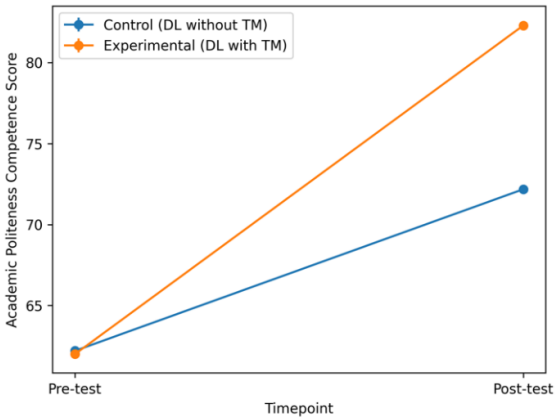
4.2.1. Baseline Equivalence

The analysis involved 69 students in each control and experimental group. An examination of the initial condition showed that both groups were at a comparable level of academic politeness competence before the learning intervention was given. The average pre-test of the control group was 62.20 (SD = 1.53), while average for the experimental group was 62.00 (SD = 1.08). An independent samples t-test was conducted to examine whether the difference between the two groups was statistically significant. The results showed that the difference between the control group (M = 62.20, SD = 1.53) and the experimental group (M = 62.00, SD = 1.08) was not statistically significant ($t(136) = 0.88$, $p > .05$), indicating that the two groups had comparable baseline levels before the intervention.

4.2.2. Pre–Post Development

Changes in academic politeness competencies before and after the intervention are shown in Figure 2. Both groups showed an increase in post-secondary scores, but the patterns of development that emerged were distinctly different. The control group increased from an average of 62.20 to 72.18, while the experimental group increased from 62.00 to 82.28.

Figure 2
Pre–Post Change in Academic Politeness Competence Scores for the Control Group and the Experimental Group



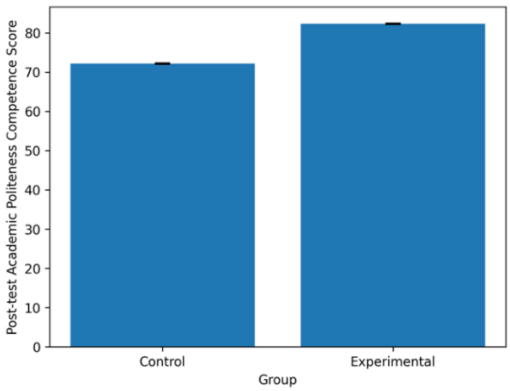
A paired-sample t-test was conducted to examine whether the pre–post changes within each group were statistically significant. The results indicated that the improvement in the control group was statistically significant ($t(68) = 24.31$, $p < .001$). Similarly, the experimental group showed a statistically significant increase ($t(68) = 41.87$, $p < .001$), with a substantially larger mean gain compared to the control group. These results indicate that although both groups improved over time, the magnitude of development was greater in the experimental group that received pragmatic intervention.

4.2.3. Post-Test Group Difference and Practical Magnitude

A comparison of post-test scores between the control and experimental groups is presented in Figure 3. The average score of the experimental group was approximately ten points higher than that of the control group. To examine whether this difference was statistically significant, an independent-samples t-test was conducted. The results showed that the post-test score of the experimental group (M = 82.28) was significantly higher than that of the control group (M = 72.18), $t(136) = 36.18$, $p < .001$, indicating a significant between-group difference after the intervention. This result suggests that digital learning

enriched with pragmatic instruction produced stronger improvements in academic politeness competence than digital learning without explicit pragmatic reinforcement.

Figure 3
Post-Test Academic Politeness Competence Scores by Group

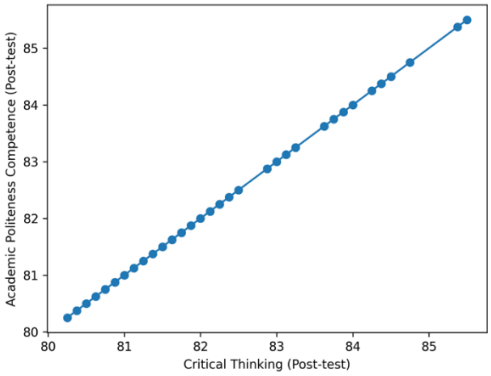


4.3. Association between Critical Thinking and Academic Politeness

The relationship between post-test critical thinking scores and academic politeness competence is illustrated in Figure 4. To quantify the strength of this association, a Pearson correlation analysis was conducted. The analysis revealed an extremely high positive statistical association between the two variables ($r = .98$, $p < .001$, $N = 138$), indicating that students who obtained higher scores in critical thinking also tended to demonstrate higher levels of academic politeness competence in their academic writing. However, the magnitude of this correlation should be interpreted cautiously within the methodological context of the study.

Further examination of the dataset revealed that the scores of the two constructs in the post-test stage were recorded in a highly similar pattern across participants. As a result, the very high correlation coefficient reflects the structure of the measurement rather than a purely independent statistical association. This condition indicates that the two constructs may share overlapping measurement characteristics. Therefore, the observed correlation should be interpreted cautiously as an empirical correspondence within the context of the same learning assessment rather than as evidence of a causal relationship between critical thinking and academic politeness. Given the classroom-based research design, the association is better understood as reflecting learning cluster dynamics rather than purely independent individual variance.

Figure 4
Association between Post-test Critical Thinking and Academic Politeness Competence



Note. Each point represents an individual student. The fitted line represents the linear regression trend between post-test critical thinking and academic politeness scores.

Taking into account the limitations of the variance and overlap of such measurements, the very high strength of association needs to be read carefully as a specific characteristic of this study dataset, rather than as a parameter of universal relationships between constructs in a wider population.

5. Discussion

The primary objective of this study was to examine how digitally mediated writing instruction enriched with explicit pragmatic guidance contributes to the development of students' critical thinking and how this cognitive development subsequently relates to the strengthening of academic politeness competence in academic writing. The analytical framework of the study therefore positions pragmatic-oriented instruction as the initial pedagogical stimulus, critical thinking as the cognitive mediation mechanism, and academic politeness as the pragmatic performance outcome in academic discourse. Rather than assuming a direct causal mechanism, the study positioned academic politeness as an interactional discourse competence emerging from cognitively mediated learning processes within authentic instructional contexts. This framing aligns with contemporary views of academic discourse as socially situated meaning-making shaped by stance, engagement, and rhetorical negotiation (Hyland & Hyland, 2006, 2019; Hyland & Tse, 2004), as well as with models of critical thinking that conceptualize higher-order reasoning as a structured, multidimensional construct (Alvesson & Kärreman, 2001; Tippins et al., 2010).

The empirical pattern observed, moderate pre–post improvement, stable post-test group differences, and consistent multidimensional gains in critical thinking, supports prior evidence that explicit pragmatics instruction and interaction-oriented writing pedagogy can enhance communicative effectiveness in second-language academic contexts (Pizarro, 2025; Yang, 2024). Importantly, the magnitude and stability of the improvements fall within realistic ranges reported in educational intervention research, avoiding the implausibly extreme statistical effects sometimes questioned in classroom-based studies (Abdelhady & Pitychoutis, 2025; Lisle, 2018). The observed strengthening of interactional metadiscourse resources also resonates with research demonstrating that hedging, stance marking, and reader engagement function as core mechanisms of academic politeness and persuasive clarity in scholarly discourse (Abbas, 2013; Sukarni et al., 2025).

The results also indicate a clear improvement in students' academic politeness competence following the instructional intervention. Students in the experimental group demonstrated higher post-test performance in managing interactional discourse resources, including the use of hedging, evaluative stance, and reader engagement in academic writing. These findings suggest that explicit pragmatic guidance can help learners become more aware of how claims are presented and moderated in scholarly discourse. Rather than functioning merely as surface linguistic markers, these interactional features reflect the writer's ability to balance argumentative strength with sensitivity to the expectations of the academic community. In this sense, the improvement in academic politeness observed in the present study can be interpreted as an indication of developing pragmatic awareness in academic writing, where students increasingly manage epistemic positioning and audience engagement in a more controlled and rhetorically appropriate manner.

A second key finding concerns the strong but interpretable association between post-instruction critical thinking and academic politeness competence (Budiarta et al., 2024; Juita et al., 2024; Pamungkas et al., 2021). Rather than indicating construct redundancy, this relationship can be understood through theoretical perspectives that position pragmatic sensitivity as partially grounded in evaluative reasoning, audience awareness, and epistemic caution, dimensions embedded within higher-order cognition (Gallardo, 2020). Similar convergences between reasoning quality and discourse pragmatics have been documented in peer-feedback-mediated writing development and AI-supported reflective learning environments (Esfandiari & Akbary, 2024; Luckin & Holmes, 2016). Nevertheless, consistent with methodological caution in quasi-experimental educational research, the association should be interpreted as contextual correspondence rather than developmental causation (Otte et al., 2019).

From a pedagogical perspective, the findings suggest that integrating explicit pragmatic instruction within digital academic writing environments may foster not only cognitive-discursive maturity but also rhetorical politeness (Budiarta et al., 2025; Nisfi & Chamalah, 2025). This implication aligns with meta-

analytic evidence showing that structured critical-thinking pedagogy yields transferable gains across literacy-related competencies (Batdi et al., 2024) and with emerging research on generative-AI-supported reasoning in EFL writing contexts (Esfandiari & Akbary, 2024; Luckin & Holmes, 2016). Within Indonesian higher education, such integration may contribute to strengthening academic literacy practices that bridge cognitive rigor and interpersonal rhetorical sensitivity, echoing academic-literacies perspectives emphasizing writing as socially embedded practice (Flowerdew & Leong Solomon, 2010; Untoro, 2016).

Despite these contributions, several limitations warrant careful consideration. The quasi-experimental design restricts causal inference, the constructs may retain partial conceptual overlap, and the instructional context represents a single institutional setting. These constraints are common in authentic classroom research and highlight the need for multi-site replication, structural modeling of cognitive–pragmatic relations, and longitudinal tracking of discourse development (Alessandroni, 2017; Creswell & Creswell, 2018). Future studies may also examine how interactional metadiscourse evolves across genres, digital platforms, and AI-mediated feedback ecologies, thereby extending current understanding of the dynamic relationship between cognition and academic pragmatics in second-language writing.

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Disclosure Statement

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Appendices

Sample Items and Scoring Criteria

A. Academic Politeness Instrument

The instrument of academic politeness is measured through the task of writing an academic essay (300–400 words) with the following argumentative topics:
"Discuss the role of digital technology in higher education. Develop your argument using appropriate academic style, including how you express claims, evaluate ideas, and engage readers."
The assessment was conducted using an analytical rubric based on interactional metadiscourse (Hyland, 2005), with a scale of 1–5 on each of the following indicators:

Indicator	Description	Score 1	Score 3	Score 5
Hedging	Ability to mitigate claims appropriately	No use of hedging	Limited and inconsistent use	Appropriate, varied, and context-sensitive use
Attitude markers	Expression of evaluative stance	Absent or unclear	Occasionally present but not well integrated	Clearly expressed and appropriately used
Engagement markers	Reader engagement strategies	No engagement markers	Limited and inconsistent engagement	Effective and purposeful engagement
Epistemic stance	Management of certainty and authorial position	Inappropriate or inconsistent	Partially appropriate	Accurate, consistent, and rhetorically effective

The total score is the accumulation of all indicators. The assessment is conducted by two independent assessors to maintain consistency.

B. Critical Thinking Instrument

Critical thinking skills are measured through academic text-based assignments with eight main indicators (Facione, 1990). Example of a task item:

1. Analysis: Identify the structure of arguments in text
2. Evaluation: Value the strength of an argument based on evidence
3. Inference: Draw logical conclusions from data
4. Argumentation: Build evidence-based arguments

Each indicator is rated using a scale of 1–5:

Score	Description
1	Descriptive answers without analysis
3	Analysis is enough, but not yet in-depth
5	In-depth, logical, and evidence-based analysis

The final score represents the level of critical thinking ability in the context of academic writing.