

# CHATGPT AND CRITICAL THINKING IN ACADEMIC WRITING: A CASE STUDY OF INDONESIAN GRADUATE STUDENTS

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## ABSTRACT

This qualitative case study investigates how three master students in the English Language Education Program at Universitas Negeri Makassar implement ChatGPT to support critical thinking in academic writing. Data were collected through triangulation of four sources, direct observations, semi-structured interviews, self-reflective journals, and documentation, and analyzed using Miles and Huberman's (1994) interactive model of data reduction, display, and conclusion drawing, guided by Paul and Elder's (2019) critical thinking framework and Hyland's (2018) academic writing framework. Findings reveal that students implement ChatGPT systematically across four writing stages: brainstorming and idea development, argument development and organization, information verification and validation, and comparative evaluation with traditional methods. The study's key contribution is its empirical demonstration that effective ChatGPT implementation functions as a cognitive scaffold that enhances rather than replaces critical thinking, provided students engage purposefully, verify outputs against academic sources, and adapt, rather than adopt, AI-generated content. These findings offer practical guidance for pedagogy and institutional policy on responsible AI integration in graduate academic writing.

Keywords: Academic Writing, ChatGPT, Critical Thinking, Implementation Strategies, Master Students

## INTRODUCTION

Critical thinking is an essential skill that students must develop, especially in today's highly dynamic digital era. Students are no longer only challenged to absorb vast amounts of information but are also required to analyze, evaluate, and construct logical and systematic arguments in both academic and real-life contexts (Manggopa & Kumampung, 2023). Along with technological advancements, artificial intelligence (AI) is becoming an increasingly popular innovation in education. ChatGPT, a language-based generative AI model, has been widely adopted by students as a tool to facilitate idea generation, argument development, and academic writing. Research demonstrates that the use of ChatGPT can increase student active engagement and contribute significantly to improving critical thinking skills by 28.6% (Nazila et al., 2025), and create a more adaptive and innovative learning experience encouraging students to learn independently, reflectively, and critically in managing and evaluating information (Ismail, 2023).

However, the use of AI in education still poses challenges that require careful consideration. Harahap (2024) revealed the risk of student dependence on AI, which can actually weaken critical thinking skills if not used properly. Consistent with this, Gerlich (2025) highlighted the need for a thorough understanding of how to limit AI use so as not to diminish students' independent analytical thinking. Beyond cognitive concerns, Zhai et al. (2024) warned that over-reliance on AI dialogue systems can reduce students' cognitive abilities, while Anani et al. (2025) emphasized that ChatGPT can accelerate the writing process but raise serious concerns about writing originality and plagiarism risk. Jelson et al. (2025) found that students often accept ChatGPT results without reviewing their accuracy, limiting in-depth thinking. Meanwhile, Shen and Chen (2025) found that EFL postgraduate students tend to use ChatGPT only to improve language rather than deepen academic analysis. These contradictory findings reveal a gap between ChatGPT's potential to develop critical thinking and actual practice, which remains dominated by functional and technical use.

In the Indonesian context, challenges in academic writing appear more complex. Indonesian students at the postgraduate level still face substantial difficulties in English academic writing, especially in developing logical arguments, using coherent structures, and applying international scientific writing standards (Andika et al., 2025; Subandowo & Sardi, 2023). The study by Sakkir et al. (2024) at Universitas Negeri Makassar confirms that students still face obstacles in critical thinking, idea organization, and use of reference sources. Critical thinking instruction in Indonesia only began to receive serious attention in the last decade and remains uneven across institutions (Malik et al., 2023; Tahir, 2025). Preliminary observations conducted in October 2025 through informal interviews with students in the English Language Education Master's Program at Universitas Negeri Makassar found that most students did not yet fully understand critical thinking and its application to academic writing, and showed high reliance on ChatGPT without critically evaluating the results. In Indonesia, Bakri and Pongpalilu (2025) and Sudrajad et al. (2024) similarly reported that ChatGPT is often used to speed up writing but only a few students use it to strengthen academic arguments.

Existing research on ChatGPT in education has predominantly focused on effectiveness measurements and user perceptions rather than implementation processes. Studies by Guo and Lee (2023) and Suriano et al. (2024) employed quantitative approaches to assess critical thinking improvements but provided limited insight into the specific strategies students use when integrating ChatGPT into their writing workflows. Qualitative studies, though emerging (Datskiv et al., 2024; Shen & Chen, 2025), remain scarce and have not systematically examined implementation patterns across different writing stages. This gap is particularly significant because implementation strategies likely determine whether ChatGPT functions as a cognitive scaffold that enhances thinking or merely as a shortcut that undermines cognitive development (Harahap, 2024). Understanding implementation is crucial because technology effectiveness depends not on the tool itself but on how users engage with it (Mishra & Koehler, 2006). Recent studies confirm that ChatGPT can facilitate critical thinking improvement (Alshehri & Althaqafi, 2025; Wang & Fan, 2025), and Li et al. (2024) identified that pedagogical integration of ChatGPT encourages active reasoning and

metacognition. Yet few studies have explicitly connected student implementation practices with Paul and Elder's (2019) critical thinking framework and Hyland's (2018) academic writing framework to understand how ChatGPT use translates into critical thinking development.

This study addresses this gap by examining how master students in the English Language Education Program at Universitas Negeri Makassar implement ChatGPT to support critical thinking in academic writing. Specifically, this research investigates: *How do master students implement ChatGPT to support critical thinking in academic writing?* The novelty of this research lies in its contextual focus on Indonesian graduate students and its systematic examination of implementation processes through the dual lenses of Paul and Elder's (2019) critical thinking framework and Hyland's (2018) academic writing framework, providing empirical evidence of how theoretical elements manifest in actual ChatGPT usage patterns. Previous research has generally used survey or mixed approaches and rarely specifically explored experiences and implementation dynamics in the local Indonesian context (Koltovskaia et al., 2024; Shen & Chen, 2025; Tran et al., 2025).

## METHODS

This research employed a qualitative case study design to investigate implementation processes in depth and detail (Yin, 2018). The case study approach was appropriate because it enabled examination of how master students implemented ChatGPT within their authentic academic writing contexts, capturing the complexity and nuance of their integration strategies (Guo & Lee, 2023; Shen & Chen, 2025).

Participants were three third-semester students from the Master of English Education Program, Class A24, at Universitas Negeri Makassar, selected through criterion-based purposive sampling (Campbell et al., 2020; Nyimbili & Nyimbili, 2024). The 2024 cohort comprised four classes (A24–D24,  $n = 93$ ). Class A24 was first identified because all 23 students in this class had used ChatGPT in completing their second-semester mini-research report. From these 23 students, three participants were further selected using the following criteria: (1) consistent ChatGPT use throughout the writing process in both second-semester mini-research and third-semester research proposal development; (2) demonstrated reflective awareness of their writing improvement; and (3) willingness to participate in direct observations, interviews, self-reflection journal writing, and to provide academic documents as secondary data. This selection logic ensured that participants could provide rich, detailed, and relevant data aligned with the research objectives. The small number of participants is consistent with the information power approach (Malterud et al., 2016), which holds that the greater the relevance and quality of information provided, the fewer participants are needed. Three participants are sufficient for deep qualitative analysis focused on understanding implementation processes rather than producing generalizable findings (Rahimi, 2024).

Data were collected during December 2025 - January 2026 through triangulation of four sources (Busetto et al., 2020; Creswell & Creswell, 2022). Direct observations documented students' real-time interactions with ChatGPT during research proposal development, recording prompts used, responses received, and adaptations made.

Observation sheets were structured around Paul and Elder's (2019) eight elements of thought and nine intellectual standards as observable indicators. Semi-structured interviews (30–40 minutes each, face-to-face or via Zoom/WhatsApp) explored students' implementation strategies, decision-making processes, and reflections on ChatGPT integration. The interview guide was developed based on Paul and Elder's (2019) critical thinking framework and Hyland's (2018) academic writing framework, covering four research dimensions: perceptions, implementation, supporting and hindering factors, and impact. Questions were piloted and validated by expert reviewers prior to data collection. Self-reflection journals were written by participants over two weeks (6–8 entries each) to capture ongoing thinking processes authentically, including challenges and decisions made during writing. Documentation analysis examined research proposals (focusing on the background section and four argumentative aspects: importance, urgency, novelty, and feasibility, as per Hyland, 2018) and mini-research reports as supporting contextual data.

Data analysis followed Miles and Huberman's (1994) interactive model across three stages. First, data reduction: all interview transcripts, observation notes, self-reflection journals, and documentation were read repeatedly and coded systematically. Initial codes were generated inductively from the data, then organized into categories aligned with the research question on implementation. Codes were grouped according to Paul and Elder's (2019) eight elements of thought and nine intellectual standards as analytical lenses. Second, data display: coded data were organized into thematic matrices and descriptive narratives to identify patterns and relationships across participants and data sources. Third, conclusion drawing and verification: preliminary conclusions were verified through source triangulation (comparing findings across interviews, journals, observations, and documentation) and member checking with participants to ensure accuracy of interpretation. This process ensured the validity, credibility, and trustworthiness of the research results (Miles & Huberman, 1994; Yin, 2018).

## RESULTS

The findings reveal that master students implement ChatGPT systematically across four key stages of academic writing. Across all sub-themes, a consistent pattern emerges: students position ChatGPT as a generative scaffold that initiates and expands thinking while retaining independent critical judgment in evaluating and synthesizing AI outputs. Implementation reflects active engagement, strategic prompting, verification practices, and reflective adaptation rather than passive acceptance of AI-generated content.

### *Implementation of ChatGPT in Brainstorming and Idea Development*

A central pattern across all three participants is the deployment of ChatGPT as a cognitive entry point into the writing process, a tool that lowers the threshold of idea generation while simultaneously prompting students to develop and critically extend the suggestions received. All three participants consistently implemented ChatGPT in early writing stages, reflecting the purpose and question-at-issue elements of Paul and Elder's (2019) framework.

*Extract 1*

*"As I said at the beginning, it can help me brainstorm what I can include that is appropriate to what I am working on."*

*(Student A, interview, 30/12/2025)*

Student A implemented ChatGPT specifically for brainstorming content relevant to her research topic. This implementation demonstrates purposeful use reflecting the purpose element in Paul and Elder's (2019) framework, using ChatGPT with clear objectives for idea generation.

*Extract 2*

*"I started using ChatGPT in the brainstorming process. I would take the first idea or suggestion it gave me and develop it further. Then I would move on to the drafting process, which involved collaborating with experts on ideas. I still continue to do the same revising process."*

*(Student B, interview, 06/01/2026)*

Student B demonstrated systematic multi-stage implementation. The phrase 'take the first idea and develop it further' is analytically significant: it reflects the inference element of Paul and Elder's (2019) framework, ChatGPT outputs serve as raw material for the student's own reasoning, not as finished conclusions.

*Extract 3*

*"I use ChatGPT for brainstorming ideas and generating outlines, which helps me clarify my topic and approach. During drafting, I use it to explore ways to phrase complex sentences and connect arguments. In the revising and editing stages, ChatGPT helps me identify gaps in reasoning, refine language, and check for logical coherence."*

*(Student C, interview, 15/01/2026)*

Student C provided the most comprehensive implementation description, demonstrating stage-differentiated use across all writing phases. This granular differentiation reflects simultaneous application of clarity, logic, and depth standards from Paul and Elder's (2019) framework.

Self-reflection journal data corroborated interview findings:

*Extract 4*

*"Saya merasa terbantu dengan penyusunan outline di Chapter 2 (literature review), karena saya kadang bingung bagaimana mengurutkan atau apa saja yang perlu saya masukkan dibagian ini."*

*(I found the outline in Chapter 2 (literature review) helpful, as I sometimes get confused about how to order things or what to include in this section).*

*(Student A, Self-Reflection Journal, 09/01/2026)*

*Extract 5*

*"I use ChatGPT to further explore ideas in writing. With the help of ChatGPT, I feel that there are many new things that I hadn't thought of that ChatGPT provides, which will enrich the content of my writing."*

*(Student B, Self-Reflection Journal, 05/01/2026)*

These journals demonstrate that students implemented ChatGPT to discover new perspectives they might not have considered independently, reflecting the point-of-view and breadth standards of Paul and Elder's (2019) framework.

*Documentation Extract 1*

*"This persistent gap highlights an urgent need to examine not only classroom-level instructional practices but also the broader school-level mechanisms that shape literacy learning."*

*(Student A, Research Proposal Documentation, Urgency Section)*

Documentation confirms implementation outcomes: Student A successfully identified a research gap using ChatGPT to explore multiple perspectives, demonstrating that strategic implementation supports development of sophisticated academic arguments aligned with Hyland's (2018) urgency criterion. Taken together, data from this sub-theme establish that all three students implement ChatGPT as a structured brainstorming tool requiring critical selection and development, with sophistication varying from Student A's targeted use, to Student B's sequential approach, to Student C's explicitly stage-differentiated strategy.

***Implementation of ChatGPT in Argument Development and Organization***

A second theme concerns how students engage ChatGPT to develop, structure, and refine academic arguments while maintaining independent judgment over conclusions. Across all three participants, students used ChatGPT to support argumentation without surrendering epistemic authority, directly engaging the concepts, inferences, and assumptions elements of Paul and Elder's (2019) framework.

*Extract 6*

*"Not really, I can draw conclusions by myself, especially if it is supported by trusted sources or information."*

*(Student A, interview, 30/12/2025)*

Student A demonstrated independence in drawing conclusions, reflecting the accuracy standard: she does not accept AI-generated conclusions but grounds her reasoning in verified sources.

*Extract 7*

*"Yes, of course, ChatGPT helps me draw good conclusions that are well-organized, neat, and clear in meaning."*

*(Student B, interview, 06/01/2026)*

Student B implemented ChatGPT to support well-organized and meaningful conclusions, reflecting clarity and logic standards, using ChatGPT as an organizational tool while retaining authorial agency over the content.

*Extract 8*

*"Yes, ChatGPT encourages me to consider multiple angles and counterarguments, which strengthens the depth and credibility of my conclusions. By suggesting alternative perspectives, it allows me to critically assess my own arguments."*

*(Student C, interview, 15/01/2026)*

Student C demonstrated a dialectical implementation model: using ChatGPT to stress-test arguments against counterarguments, reflecting the point-of-view element and depth and breadth standards of Paul and Elder's (2019) framework. The phrase 'allows me to critically assess my own arguments' positions ChatGPT as a metacognitive mirror.

*Extract 9*

*"I use ChatGPT to help me connect ideas from one paragraph to another. Sometimes I find it difficult to connect ideas from one paragraph to another, so with the help of ChatGPT, I can find consistency between paragraphs. This has a very positive impact on my writing because there is continuity between paragraphs."*

*(Student B, Self-Reflection Journal, 10/01/2026)*

Student B implemented ChatGPT specifically to connect ideas across paragraphs, reflecting the logic standard and demonstrating metacognitive awareness of her own writing challenges.

*Documentation Extract 2*

*"Through this research, which employs the English Pronunciation by Kephem application, supported by pre-test and post-test designs, analytical scoring rubrics, and research notes."*

*(Student B, Research Proposal Documentation, Feasibility Section)*

Documentation confirmed that Student B's implementation produced systematically organized methodological arguments aligned with Hyland's (2018) feasibility criterion. Across this sub-theme, all three students demonstrate a shared pattern of critical independence: ChatGPT supports argument development without replacing independent judgment, with variation ranging from Student A's source-grounded independence, to Student B's organizational clarity focus, to Student C's dialectical counterargument strategy.

### ***Implementation of ChatGPT in Information Verification and Validation***

A third, analytically distinctive theme concerns how students implement verification strategies in response to their awareness of ChatGPT's limitations. This sub-theme is significant because it reveals how students critically regulate their AI use, reflecting the accuracy, relevance, and assumptions elements of Paul and Elder's (2019) framework.

#### *Extract 10*

*"Observations show that Student B applied most of the Eight Elements of Thought, particularly Purpose, Information, Inferences, and Concepts, when using ChatGPT. The student used specific prompts, verified information with academic sources, and adapted concepts to the research context, demonstrating Clarity, Accuracy, Precision, Relevance, Logic, and Fairness in line with Hyland (2018)."*

*(Summary of Observation, Student B)*

Observation data confirmed that Student B implemented systematic verification by consistently checking ChatGPT outputs against academic sources and adapting concepts to research context. This enactment of accuracy and relevance standards in real-time writing behavior lends empirical credibility to her self-reported accounts.

#### *Extract 11*

*"Observations indicate that Student C consistently applied Purpose, Concepts, Assumptions, Implications and Consequences, and Point of View when using ChatGPT to develop the research background. The student used specific prompts, explored concepts, recognized assumptions, and considered implications and multiple perspectives, demonstrating Clarity, Precision, Relevance, Breadth, and Logic aligned with Hyland's (2018) principles."*

*(Summary of Observation, Student C)*

Student C demonstrated more complex verification involving assumption recognition and implication consideration. The identification of 'Assumptions' and 'Implications and Consequences' as observable elements indicates that her verification operates at the level of evaluating epistemic foundations, a high-order critical thinking implementation beyond surface-level fact-checking. The finding that students use 'specific prompts' aligns with

research emphasizing prompt engineering importance in AI interactions (Bakri & Pongpalilu, 2025).

*Documentation Extract 3*

*"Based on the informal interview with students in the preliminary research at the Third Semester Students at Cokroaminoto Palopo University, the researcher found many students struggle to distinguish between credible news and misinformation, especially as fake news spreads rapidly on social media, making fact verification challenging."*

*(Student C, Research Proposal Documentation, Urgency Section)*

Student C's documentation reveals a recursive quality: ChatGPT helps surface the importance of verification as an urgency argument, while the student simultaneously applies verification practices to her own AI use, reflecting Hyland's (2018) urgency criterion. Across this sub-theme, awareness of ChatGPT's limitations motivates more rigorous critical thinking practices rather than suppressing engagement.

***Implementation Differences Compared to Traditional Methods***

Students articulated how their implementation of ChatGPT differed from traditional writing methods without AI assistance.

*Extract 12*

*"By enriching information and providing other perspectives, so that it will develop my critical thinking."*

*(Student A, interview, 30/12/2025)*

*Extract 13*

*"Of course, this is quite the opposite. The use of AI makes things much easier and produces better quality ideas."*

*(Student B, interview, 06/01/2026)*

*Extract 14*

*"Without AI, I rely solely on my notes and literature, which can be time-consuming and may overlook alternative viewpoints. ChatGPT accelerates idea exploration, provides diverse perspectives, and prompts me to evaluate arguments critically, thus enhancing my critical thinking process."*

*(Student C, interview, 15/01/2026)*

Students identified three analytically distinct implementation advantages: information enrichment and perspective diversification (Student A), efficiency and idea quality improvement (Student B), and acceleration of exploration paired with critical evaluation

prompting (Student C). Each advantage corresponds to different dimensions of Paul and Elder's (2019) framework: Student A's 'enrichment and other perspectives' maps onto breadth and point-of-view standards; Student B's 'better quality ideas' reflects precision and depth; and Student C's 'prompts me to evaluate arguments critically' directly engages the inference and assumptions elements. Student C's formulation is particularly notable as it inverts the common concern that AI undermines critical thinking, ChatGPT functions as a mediating tool that expands cognitive inputs and thereby creates the necessity for more rigorous critical evaluation, aligning with TPACK framework principles (Mishra & Koehler, 2006).

## DISCUSSION

The findings reveal that master students implement ChatGPT systematically across academic writing stages through strategic, purposeful patterns reflecting critical thinking elements and intellectual standards.

Implementation in brainstorming and idea development demonstrates purposeful use aligned with Paul and Elder's (2019) purpose element. Students employ ChatGPT with clear objectives, generating relevant content (Student A), systematically developing initial ideas (Student B), and clarifying topics while generating outlines (Student C). This purposeful implementation contradicts concerns about mindless AI reliance (Gerlich, 2025; Harahap, 2024), instead suggesting that master students approach ChatGPT strategically. The multi-stage implementation Student B describes reflects understanding that ChatGPT provides starting points requiring further development rather than finished products. Student C's cross-stage implementation demonstrates sophisticated understanding of how different writing stages benefit from different ChatGPT applications, consistent with Hikmah and Walida (2024) who found ChatGPT contributes significantly to analysis, evaluation, and creation in academic writing.

Implementation for argument development and organization reveals that students maintain critical independence while leveraging ChatGPT support. Student A's insistence on drawing conclusions herself 'especially if supported by trusted sources' prioritizes accuracy standards over convenient acceptance of AI outputs. Student C's implementation to consider multiple angles and counterarguments demonstrates the most sophisticated approach, using ChatGPT to strengthen depth and breadth rather than simply generate content. These patterns align with Li et al.'s (2024) findings that ChatGPT can support metacognition and active reasoning when implemented thoughtfully, and with Koltovskaia et al. (2024) who documented behavioral, cognitive, and affective engagement in graduate students using ChatGPT for academic text revision.

Implementation of verification and validation strategies demonstrates critical awareness that AI outputs require human oversight. Observation data revealing systematic verification with academic sources (Student B) and consideration of assumptions and implications (Student C) indicates implementation reflecting accuracy and relevance standards. This contradicts concerns about uncritical AI acceptance (Jelson et al., 2025), suggesting master students understand ChatGPT's limitations and implement compensatory

strategies. The risk of false or invalid references, identified by all participants as a key hindering factor, confirms warnings by Majovsky et al. (2023) that AI can generate fake-seeming academic content, making human oversight essential.

Implementation differences compared to traditional methods reveal three key advantages: perspective diversification, efficiency improvement, and critical evaluation prompting. Student C's articulation that ChatGPT 'prompts me to evaluate arguments critically' suggests implementation that enhances rather than replaces critical thinking. The implementation patterns identified align with the TPACK framework (Mishra & Koehler, 2006), demonstrating intersection of technological knowledge (understanding ChatGPT capabilities and limitations), pedagogical knowledge (knowing when and how to employ ChatGPT across writing stages), and content knowledge (recognizing what constitutes valid academic arguments). Students demonstrating the most sophisticated implementation exhibit strong TPACK, understanding not just how to use ChatGPT technically but when and why particular implementation strategies support specific writing and thinking goals.

Documentation outcomes demonstrating successful research gap identification (Student A), systematic methodological organization (Student B), and evidence-based urgency arguments (Student C) confirm implementation effectiveness, aligning with Hyland's (2018) academic writing framework criteria of importance, urgency, novelty, and feasibility.

## CONCLUSION

This study demonstrates that Indonesian graduate students implement ChatGPT as a cognitive scaffolding tool that systematically supports critical thinking across four academic writing stages. The key contribution of this research lies in its empirical evidence, drawn from observation, interview, journal, and documentation data, that effective ChatGPT implementation functions as a mediating, rather than replacing, force in critical thinking: students who engage purposefully, verify AI outputs against academic sources, and adapt rather than adopt AI-generated content demonstrate higher-order thinking processes consistent with Paul and Elder's (2019) framework and Hyland's (2018) academic writing criteria.

Theoretically, this study extends understanding of AI's role as a cognitive tool in higher education by integrating Paul and Elder's (2019) critical thinking framework with Hyland's (2018) academic writing framework and the TPACK model (Mishra & Koehler, 2006), providing an analytical lens applicable to future research on AI-assisted learning. Practically, the findings indicate that implementation effectiveness is not a property of the tool but of the user's critical engagement, a finding that carries direct implications for pedagogy: lecturers should design assessments and scaffolding that explicitly train students in purposeful prompting, systematic verification, and reflective adaptation rather than assuming these skills develop automatically.

This study acknowledges limitations including a small sample size, a single institutional context, and reliance on self-reported data that may be subject to social desirability bias. Future research should pursue longitudinal designs examining how implementation patterns develop over time, experimental or quasi-experimental

comparisons of AI-assisted versus non-AI-assisted writing, and investigations of lecturer perspectives on AI integration in teaching and assessment.

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