



Integrating Guided Inquiry Learning, Metacognitive Strategies, and LMS Support to Enhance Academic Writing in Higher Education

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Abstract

Academic writing is a core competency in higher education, yet many university students continue to struggle with constructing coherent arguments, synthesizing evidence, and regulating the writing process. Although Guided Inquiry Learning (GIL), metacognitive strategies, and Learning Management Systems (LMSs) have each demonstrated educational benefits, limited research has examined their integrated use to support academic writing. This study investigated the effectiveness of integrating GIL, metacognitive strategies, and LMS support to enhance students' academic writing skills. A quasi-experimental pretest-posttest control group design was conducted with 120 sixth-semester undergraduate students from two Indonesian universities. Students' academic writing performance was assessed before and after the intervention using a standardized writing assessment. The findings showed that both groups had comparable initial writing abilities. After the intervention, students who experienced the integrated instructional approach demonstrated substantially greater improvement in academic writing than those receiving conventional instruction. The integration of inquiry-based learning, metacognitive regulation, and LMS-supported learning promoted more structured writing, reflective learning processes, and stronger academic argumentation. These findings highlight the value of an integrated pedagogical framework for strengthening academic writing instruction in higher education.

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INTRODUCTION

Strengthening academic writing skills is a fundamental competency that should be fostered in higher education, as writing proficiency not only supports students' academic success but also plays a critical role in developing critical thinking, scholarly communication, and graduates' preparedness to address global challenges (Jaja, 2024). Academic writing enables students to articulate ideas in a systematic, reflective, and evidence-based manner, thereby serving as a foundational component of scientific literacy and scholarly publication (Nusivera et al., 2025).

Despite its recognized importance, a growing body of evidence consistently indicates that university students' academic writing skills remain inadequate. Previous studies have reported that only a small proportion of students are able to produce high-quality scholarly writing, whereas the majority continue to experience difficulties in paragraph development, problem formulation,

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literature review, and the selection of appropriate research methods (Setiawan et al., 2024; Yanti et al., 2018). These findings suggest that deficiencies in academic writing extend beyond technical writing skills and are also influenced by factors that shape students' learning processes. Several studies have identified low learning motivation, ineffective learning strategies, and limited self-regulation as key factors contributing to students' poor academic writing performance (Budhayani & Angendari, 2021; Hariri et al., 2020; Hidayat et al., 2026; Juezan et al., 2026; Navio et al., 2023). These findings are consistent with the results of a preliminary study conducted with 120 students from two classes at Universitas Islam Negeri Raden Intan Lampung and two classes at UIN Jurai Siwo. The preliminary investigation revealed that most students experienced difficulties in understanding the stages of academic writing, mastering scholarly writing conventions, and regulating their learning throughout the writing process. In addition, the quality of the learning environment was found to influence students' success in producing scholarly writing. Collectively, these findings underscore the need for an instructional intervention that not only enhances students' academic writing skills but also strengthens their self-regulatory capabilities throughout the learning process.

One of the key factors contributing to the development of academic writing competence is metacognition, defined as an individual's ability to plan, monitor, and evaluate their own cognitive processes (Abdelrahman, 2020; Anthonysamy et al., 2025; Flavell, 1970; Lawson, 1984; Wicaksono et al., 2025). In the context of academic writing, metacognitive competence enables students to formulate effective writing strategies, monitor the progress of their writing, and evaluate the quality of the arguments they produce (Purnomo et al., 2026; Ramadhanti & Yanda, 2021; Wulandari & Prasajo, 2023). A growing body of research has demonstrated that metacognition contributes to improved academic writing performance, reduced writing anxiety, and enhanced reflective thinking and self-regulated learning (Aglina et al., 2020; Awi et al., 2025; Feng et al., 2022; Ohtani & Hisasaka, 2023; Stephanou & Karamountzos, 2020; Teng & Yue, 2022). The effective development of metacognitive competence requires an instructional approach that provides structured and meaningful learning experiences. Guided Inquiry Learning (GIL) represents a suitable pedagogical approach because it systematically guides students through the processes of problem identification, information exploration, evidence-based argument construction, and conclusion drawing (Bilgin, 2009). Previous studies have further demonstrated that integrating Guided Inquiry Learning with metacognitive strategies enhances students' critical thinking, reflective thinking, and learner autonomy (Akyol & Garrison, 2011; Divrik et al., 2020; Hastuti et al., 2020; Hendarman et al., 2026; Luritawaty & Rahmawati, 2024; Rismawati et al., 2019).

Recent advances in educational technology have further strengthened the implementation of metacognitive strategies through the use of Learning Management Systems (LMSs) (Risdianto et al., 2025). An LMS provides a technology-enhanced learning environment that enables instructors to manage instructional materials, facilitate collaborative discussions, deliver formative feedback, and continuously monitor students' learning progress (Johar et al., 2023; Riadi et al., 2024; Susilawati et al., 2025; Triyoga et al., 2025). Previous studies have demonstrated that integrating metacognitive strategies with an LMS enhances learner autonomy, critical thinking skills, and overall learning outcomes (Amien & Hidayatullah, 2023).

Conceptually, Guided Inquiry Learning (GIL), metacognitive strategies, and Learning Management Systems (LMSs) are complementary instructional components. Guided Inquiry Learning provides a structured instructional framework, while metacognitive strategies enable students to plan, monitor, and evaluate their cognitive processes throughout each phase of inquiry (Pratama et al., 2025). Meanwhile, the LMS provides a technology-enhanced learning environment that supports the implementation of both components through the delivery of instructional materials, learning interactions, assignment management, and formative feedback. The integration of these three components is expected to foster a more reflective, structured, and effective learning process, thereby enhancing students' academic writing skills (Mujib & Mardiyah, 2026; Noor et al., 2025; Nurhidayat et al., 2025).

Although the effectiveness of metacognitive strategies, Guided Inquiry Learning (GIL), and Learning Management Systems (LMSs) has been widely documented, previous studies have generally examined these components in isolation. Consequently, empirical evidence regarding the effectiveness of integrating these three components to enhance students' academic writing skills remains limited. Addressing this gap, the present study proposes an integrated instructional

framework that combines Guided Inquiry Learning, metacognitive strategies, and LMS support, positioning metacognition as the core self-regulatory mechanism throughout each phase of the inquiry process within a technology-enhanced learning environment. This integrated approach is expected to provide empirical evidence for the effectiveness of a more comprehensive instructional model in improving students' academic writing skills.

Based on the identified research gap, this study aimed to examine the effectiveness of integrating Guided Inquiry Learning (GIL), metacognitive strategies, and Learning Management System (LMS) support in enhancing students' academic writing skills. Specifically, the study compared the academic writing performance of students who participated in instruction integrating GIL, metacognitive strategies, and an LMS with that of students who received conventional instruction. Accordingly, the study hypothesized that students exposed to the integrated GIL, metacognitive strategy, and LMS approach would demonstrate significantly higher academic writing skills than those who participated in conventional instruction.

METHOD

Research Design

This study employed a quantitative approach using a quasi-experimental pretest–posttest control group design (Sembiring et al., 2024). This design was selected to empirically examine the effect of implementing Guided Inquiry Learning (GIL), reinforced by metacognitive strategies and supported by a Learning Management System (LMS), on students' academic writing skills. In this study, the LMS functioned as a technology-enhanced learning platform that facilitated the delivery of instructional materials, supported teaching and learning interactions, and enabled online assignment management. This digital learning environment allowed students to monitor their learning progress and systematically manage the development of their academic writing throughout the instructional intervention.

Participants

The study was conducted in the Constitutional Law Study Program (Hukum Tata Negara, HTN) at Universitas Islam Negeri (UIN) Raden Intan Lampung and UIN Jurai Siwo, two institutions with comparable academic characteristics. The study population comprised all sixth-semester students enrolled in the Constitutional Law Study Program, Faculty of Sharia, at both universities. During the second semester of the 2025/2026 academic year, the population was distributed across six classes at each institution. Sixth-semester students were selected because they were at a critical stage of their academic program, preparing to undertake their undergraduate thesis, making academic writing competence particularly essential. Participants were selected using purposive sampling based on the relevance of the course, the heterogeneity of students' academic abilities, and the willingness of course instructors to participate in the study.

The final sample consisted of 120 students from four classes, including two classes from UIN Raden Intan Lampung and two classes from UIN Jurai Siwo. These classes were assigned to two study groups: two classes served as the experimental group, while the remaining two classes served as the control group. The experimental group received instruction through the Guided Inquiry Learning (GIL) model, reinforced with metacognitive strategies and supported by a Learning Management System (LMS) as a digital learning platform for the distribution of instructional materials, assignment submission, and monitoring of students' learning progress. In contrast, the control group received conventional instruction in accordance with the prescribed Semester Learning Plan. Students' academic writing skills were assessed using pretest and posttest measures. Metacognitive strategies were systematically incorporated to enhance students' awareness of their own cognitive processes through planning, monitoring, and self-evaluation, thereby enabling a more structured, reflective, and effective academic writing process.

Metacognitive Strategies

Metacognitive strategies were integrated into each phase of the Guided Inquiry Learning (GIL) process by actively engaging students in planning, monitoring, and evaluating their own learning. During the planning phase, students identified their learning objectives and developed

appropriate writing strategies before beginning the writing task. During the monitoring phase, they continuously reflected on their progress and identified challenges encountered throughout the academic writing process. Finally, during the evaluation phase, students critically reviewed and revised their scholarly writing based on self-reflection and formative feedback provided by the instructor. This systematic integration of metacognitive strategies was intended to strengthen students' self-regulated learning and improve the quality of their academic writing.

Implementation of the Learning Management System (LMS)

This study integrated a Learning Management System (LMS) as a technology-enhanced instructional platform to facilitate the implementation of metacognitive strategies within the Guided Inquiry Learning (GIL) framework. The integration of metacognitive strategies with the LMS was intended to foster learner autonomy and enhance students' critical thinking by supporting the systematic processes of planning, monitoring, and evaluating their learning. The LMS was implemented through the use of multiple digital learning platforms. Google Meet was employed to support synchronous learning activities, including lectures, class discussions, and attendance management. The institutional e-learning platform served as a repository for learning materials, instructional modules, and Student Worksheets, all of which were accessible for online viewing and download. In addition, Google Forms was used to administer research questionnaires, collect study data, and conduct online assessments. Through this integrated LMS environment, students were able to monitor the progress of their academic writing, receive formative feedback from instructors, and reflect on the quality of their written work as part of the metacognitive learning process. This technology-enhanced learning environment also supported students in regulating their writing activities more effectively by encouraging continuous planning, monitoring, and self-evaluation throughout the academic writing process.

Research Instruments

Referring to Creswell's (2009) framework, this study employed both non-test and test instruments to collect quantitative data. All instruments underwent validation prior to their use in the study.

The test instrument was an Academic Writing Skills Test in the form of a performance-based assessment, in which students were required to compose a scholarly paper related to the field of Constitutional Law. Assessment was conducted using an analytic scoring rubric covering four aspects: content or substance, structure and coherence of arguments, use of citations, and academic language and writing conventions. Before implementation, the test instrument and scoring rubric were validated by experts and empirically tested to ensure instrument validity, item difficulty, discriminating power, and reliability.

Research Procedure

The experimental group received instruction through Guided Inquiry Learning (GIL) integrated with metacognitive strategies and supported by a Learning Management System (LMS). The instructional intervention was implemented in a structured sequence designed to guide students in planning, monitoring, and evaluating the process of academic writing. Throughout the intervention, students progressed through four major instructional phases, as presented in Table 1.

Table 1. Instructional Procedure in the Experimental Class

Step	Focus of Activities	Activity Description
1	Orientation and Metacognitive Planning	Students identify the challenges of writing academic papers, understand the learning objectives, and formulate initial writing strategies.
2	Exploration and Guided Investigation	Students investigate the topic using the Student Worksheet (LKM) to explore references and develop arguments in a structured manner.
3	Draft Formulation and Metacognitive monitoring	Students draft their scientific papers and monitor the writing process using the guidelines provided in the Student

Step	Focus of Activities	Activity Description
4	Presentation and Metacognitive Evaluation	Worksheet (LKM). Students present their written work, conduct peer reviews, and engage in final reflection on the quality of their academic papers.

In contrast, the control group received conventional instruction routinely implemented by the course instructor without integrating Guided Inquiry Learning (GIL), metacognitive strategies, or Learning Management System (LMS) support. Prior to the instructional intervention, students in both groups completed a pretest to assess their baseline academic writing skills. Upon completion of the instructional program, all participants completed a posttest to evaluate their academic writing performance following the intervention.

Quantitative Data Analysis

Quantitative data analysis was conducted to examine the effect of implementing Guided Inquiry Learning (GIL), reinforced by metacognitive strategies and supported by a Learning Management System (LMS), on students' academic writing skills. All data were analyzed using inferential statistical techniques to test the study hypotheses. Data normality was assessed using the Shapiro–Wilk test, while the homogeneity of variances was examined using Levene's test. Subsequently, an independent-samples *t*-test was performed to compare the posttest scores of the experimental and control groups. All statistical analyses were conducted using IBM SPSS Statistics version 27, with the level of statistical significance set at $p < 0.05$.

RESULTS AND DISCUSSION

The analysis indicated no statistically significant difference in the pretest mean scores between the experimental and control groups. At both UIN Raden Intan Lampung and UIN Jurai Siwo, students in the two groups demonstrated comparable baseline levels of academic writing proficiency. At UIN Raden Intan Lampung, the mean pretest scores were 0.43 for the control group and 0.44 for the experimental group, whereas at UIN Jurai Siwo, the corresponding mean scores were 0.42 and 0.43, respectively. These minimal differences indicate that, before the instructional intervention, students in both groups possessed equivalent initial academic writing abilities. This comparability can be attributed to the fact that, during the initial stage of the study, instruction followed the conventional course format prescribed in the Semester Learning Plan (Rencana Pembelajaran Semester, RPS). Consequently, students had not yet been exposed to instruction integrating Guided Inquiry Learning (GIL), metacognitive strategies, or Learning Management System (LMS) support. Establishing equivalent baseline performance represents an important methodological prerequisite for evaluating the effectiveness of the intervention, as subsequent differences in learning outcomes can be more confidently attributed to the instructional approach rather than to pre-existing differences between groups. Accordingly, during the pretest phase, students had not yet been systematically supported in planning, monitoring, and evaluating their academic writing processes through metacognitive regulation.

After the instructional intervention was implemented through the integration of Guided Inquiry Learning, metacognitive strategies, and Learning Management System (LMS) support, students focused not only on the final written product but also actively engaged in the entire thinking process involved in academic writing. The structured inquiry stages in Guided Inquiry Learning encouraged students to formulate problems, explore and evaluate scholarly sources, and construct arguments based on relevant evidence. Learning activities that connected concepts with meaningful contexts also helped students develop deeper understanding and fostered active engagement in the learning process (Loviana et al., 2026). Problem-based or activity-based learning models further encourage students to develop critical thinking, problem-solving skills, and more independent learning strategies (Yuberti et al., 2018). The effectiveness of this instructional approach was subsequently analyzed by comparing pretest and posttest results between the experimental and control groups, as presented in Figure 1.

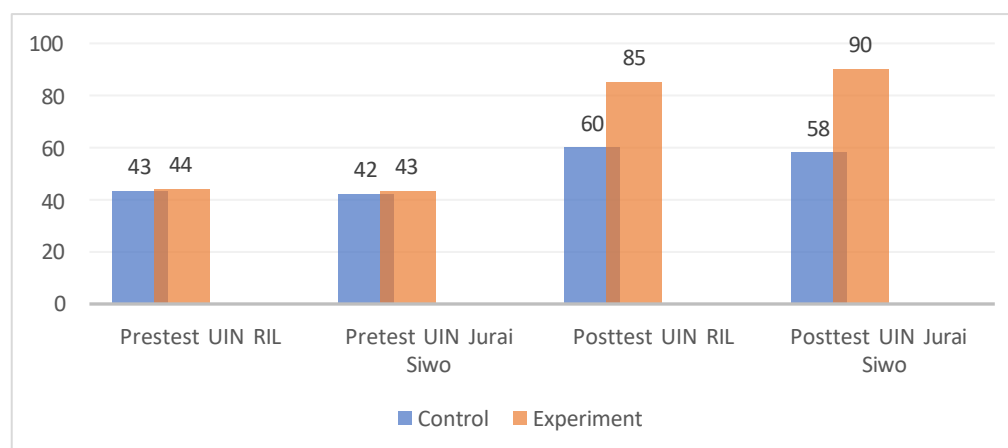


Figure 1. Mean Pretest and Posttest Scores of Students' Academic Writing Skills.

Following the implementation of metacognitive learning strategies, the posttest results indicated improvements in students' academic writing skills in both groups, with substantially greater gains observed in the experimental group. At UIN Raden Intan Lampung, the control group's posttest mean increased to 0.60, whereas the experimental group achieved a mean score of 0.85. A similar pattern was observed at UIN Jurai Siwo, where the control group's posttest mean reached 0.58, while the experimental group demonstrated a marked improvement, attaining a mean score of 0.90. These findings underscore the critical role of metacognitive competence in enhancing the quality of students' academic writing (Prayitno & Suciati, 2023). Effective metacognitive interventions in academic writing should encompass four key dimensions: epistemic awareness, self-regulation during the writing process, critical reflection, and audience awareness. Previous research has likewise demonstrated that problem-based learning enriched with metacognitive scaffolding effectively improves students' ability to produce high-quality academic writing (Rahmat et al., 2021). Collectively, the evidence suggests that metacognitive competence contributes to multiple dimensions of academic writing quality, including conceptual clarity, theoretical grounding, methodological rigor, analytical depth, and the articulation of conceptual and practical implications (Negretti, 2024).

The greater improvement observed in the experimental group indicates that metacognitive strategies effectively supported students in managing the academic writing process. The research findings show that implementing metacognitive strategies within Guided Inquiry Learning, supported by a Learning Management System (LMS), had a positive effect on students' academic writing skills. The LMS also functioned as a platform that facilitated material distribution, assignment submission, and more structured learning reflection (Septiari & Bayu, 2025). This digital learning environment enabled students to monitor their writing progress, receive feedback, and independently regulate their learning strategies. The integration of metacognitive strategies with the LMS was shown to enhance learner autonomy and critical thinking through organized, self-reflective learning activities (Sari et al., 2022). The t-test results are presented in Table 2.

Table 2. Independent-Samples *t*-Test Results for Students' Academic Writing Skills

University	<i>t</i>	df
UIN Raden Intan Lampung	14.175	58
UIN Jurai Siwo	15.902	58

The independent-samples *t*-test results revealed significant differences in academic writing performance between the experimental and control groups at both universities. At UIN Raden Intan Lampung, the analysis yielded $t(58) = 14.175$, while at UIN Jurai Siwo, the corresponding result was $t(58) = 15.902$. These findings indicate that students who participated in instruction integrating Guided Inquiry Learning (GIL), metacognitive strategies, and a Learning Management

System (LMS) demonstrated significantly stronger academic writing skills than those who received conventional instruction.

These statistical findings indicate that the instructional intervention implemented in the experimental group exerted a significant positive effect on students' academic writing skills. The consistent pattern of statistically significant differences across both higher education institutions suggests that the observed improvements cannot be attributed to chance alone but are closely associated with the systematic implementation of the instructional approach adopted in the experimental group.

These findings suggest that the integration of Guided Inquiry Learning (GIL), metacognitive strategies, and a Learning Management System (LMS) creates a more meaningful and cognitively engaging learning experience for students. The LMS serves as a complementary instructional platform that facilitates the systematic delivery of learning materials, assignment submission, and formative feedback. Within this technology-enhanced learning environment, students are able to access academic writing resources, monitor their writing progress, and reflect on the quality of their work throughout the writing process. Furthermore, the integration of the LMS with metacognitive strategies promotes learner autonomy and critical thinking by encouraging students to plan, monitor, and evaluate their learning in a more structured and self-regulated manner.

Furthermore, the metacognitive strategies embedded within Guided Inquiry Learning (GIL) function as a self-regulated learning mechanism that enables students to manage the academic writing process more effectively. (Wang et al., 2025). In addition, the Learning Management System (LMS) incorporated learning analytics and activity-tracking features that enabled instructors to monitor students' academic progress systematically, including their access to learning materials, participation in online discussions, and assignment completion. These data provided instructors with actionable insights to deliver timely and targeted instructional support tailored to students' learning needs (Goh, 2026). Through this approach, students are guided to plan their writing, monitor the clarity and coherence of their arguments, and critically evaluate the quality of their written work. This mechanism helps explain why students in the experimental group consistently outperformed those in the control group across both institutions, where conventional instructional approaches remained predominant. Consequently, the integration of the LMS contributed to enhanced student engagement, learner autonomy, self-reflection, and academic achievement within a technology-enhanced learning environment, particularly in the development of academic writing skills.

Accordingly, the independent-samples t-test results not only demonstrate a statistically significant difference between the groups but also provide empirical evidence that the integration of Guided Inquiry Learning (GIL), metacognitive strategies, and Learning Management System (LMS) support constitutes an effective instructional approach for enhancing students' academic writing skills. These findings further reinforce the pivotal role of metacognition in the development of higher-order academic competencies in higher education, as it enables students to systematically plan, monitor, and evaluate their cognitive processes, thereby contributing to the production of higher-quality academic writing.

LIMITATIONS

Although this study demonstrates that the integration of Guided Inquiry Learning (GIL), metacognitive strategies, and Learning Management System (LMS) support has a positive effect on students' academic writing skills, several limitations should be acknowledged. First, the study employed a quasi-experimental design with purposive sampling, meaning that participants were not randomly assigned and the influence of uncontrolled extraneous variables cannot be entirely ruled out. Second, the study involved students from only two higher education institutions, which limits the generalizability of the findings to broader higher education contexts. Finally, the study evaluated learning outcomes only at the end of the intervention. Consequently, the long-term effectiveness of integrating Guided Inquiry Learning, metacognitive strategies, and an LMS in enhancing students' academic writing skills remains to be established through future longitudinal research.

CONCLUSION

This study demonstrates that the integration of Guided Inquiry Learning (GIL), metacognitive strategies, and a Learning Management System (LMS) constitutes an effective instructional approach for enhancing students' academic writing skills. The integration of these three components encourages students to systematically plan, monitor, and evaluate their writing processes while leveraging a digital learning environment to obtain formative feedback and regulate their own learning. From a theoretical perspective, these findings reinforce the role of metacognitive strategies as a key mechanism for developing academic writing skills through self-planning, self-monitoring, and self-evaluation. From a practical perspective, the results suggest that integrating Guided Inquiry Learning, metacognitive strategies, and an LMS offers a promising instructional alternative for improving the quality of academic writing instruction in higher education.

AUTHOR CONTRIBUTIONS

UH was responsible for the conceptualization of the study, data collection, implementation of the instructional intervention, data analysis, and preparation of the initial manuscript draft. RF contributed to the conceptualization of the study, academic supervision, methodological refinement, and critical review and editing of the manuscript. HH has contributed to methodological development, data analysis, interpretation of the findings, and manuscript review. HHan contributed to the interpretation of the findings, critical review, and refinement of the manuscript content, particularly in the discussion section. RAS contributed to the validation of the research instruments, interpretation of the findings, and final review of the manuscript to ensure academic consistency and publication readiness. All authors have read and approved the final version of the manuscript.

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