

Using Generative AI as a Pedagogical Scaffold in Undergraduate Research Writing

Abstract

Research Overview

This study examines how one semester of AI-assisted academic writing practice influenced six Taiwanese EFL undergraduate students' research writing development and academic writing self-efficacy, focusing on prompting practices, revision patterns, independent writing performance, and changes in self-perceived writing competence.

Purpose of Study

As generative AI becomes increasingly common in academic communication, helping students use it critically and effectively has become an important goal in English language teaching. For EFL undergraduate students, research writing is challenging because it requires linguistic accuracy, rhetorical organization, source-based writing, methodological clarity, and confidence in managing an extended academic project. While generative AI can support grammar, vocabulary, organization, and idea development, its pedagogical value depends on whether students can internalize writing strategies rather than simply rely on AI-generated output.

This study investigates how sustained AI-assisted writing practice influenced Taiwanese undergraduate students' research paper drafting, revision practices, and academic writing self-efficacy. It also examines whether students' independent writing performance improved after one semester of guided AI-assisted writing practice.

Research Methods

The participants were six Taiwanese college seniors enrolled in an undergraduate research-writing course. During the semester, students practiced using generative AI to support the drafting and revision of research papers consisting of five major sections: Introduction, Literature Review, Methodology, Results, and Conclusion. The study adopted a qualitative-dominant design supplemented by descriptive questionnaire analysis.

Data were collected from students' AI interaction records, written drafts and revisions, pre-test and post-test writing samples, and a 27-item academic writing self-efficacy questionnaire. The questionnaire used a five-point Likert scale to measure students' confidence in linguistic and academic writing competence, writing-process management, source use, information integration, course-related writing confidence, and self-regulated writing practices.

Students were not allowed to use AI tools during either the pre-test or the post-test writing task. The pre-test was administered when students had completed only the first three chapters of their research papers—Introduction, Literature Review, and Method—so the pre-test texts mainly reflected their ability to summarize research background, theoretical framework, research purpose, and methodology. The post-test required students to write an abstract of the complete research paper after the full project had been completed. Therefore, the two writing tasks were not fully equivalent, and the presence of findings and conclusions in the post-test texts should be interpreted partly as a result of students' research progress.

Students' AI interaction records were analyzed to identify three major prompting types: language-focused prompting, structural prompting, and information-focused prompting. Their revisions and writing samples were analyzed for changes in research focus, rhetorical organization, methodological description, findings, academic expression, and linguistic accuracy.

Results and Discussion

The analysis of AI interaction records showed that language-focused prompting was the most frequently used strategy across all five sections of the research paper. Students often asked AI for help with grammar, word choice, sentence clarity, tone, and academic style, suggesting that they initially viewed AI mainly as a language support tool. Structural prompting was also common, especially when students needed help with paragraph organization, coherence, and sequencing ideas. Information-focused prompting appeared less frequently overall, but it was more evident in the Literature Review, Methodology, Results, and Conclusion sections, where students used AI to support literature synthesis, citation integration, APA style, and clarification of methodological or analytical points.

A comparison of the pre-test and post-test writing samples indicated noticeable improvement after one semester of AI-assisted academic writing practice. Although the two tasks were not fully equivalent, the post-test abstracts showed clearer research focus, more coherent rhetorical organization, more specific descriptions of data and

methods, and greater familiarity with the conventional structure of academic abstracts. Compared with the more proposal-like pre-test texts, the post-test samples more often included findings, implications, and clearer connections among the research topic, theoretical framework, and analytical procedures. Students also used more academic expressions such as “this study aims to,” “the findings show,” and “the study adopts,” suggesting that they had begun to internalize rhetorical patterns of research writing.

The questionnaire results further supported this improvement. The overall academic writing self-efficacy mean increased from 3.52 in the pre-test to 4.14 in the post-test. The proportion of “agree” and “strongly agree” responses rose from 53.1% to 87.6%, with no “disagree” or “strongly disagree” responses in the post-test. The largest gain was found in linguistic and academic writing competence, which increased from 3.17 to 4.17.

However, linguistic accuracy remained a challenge. Problems with subject–verb agreement, verb forms, collocation, sentence structure, and academic word choice were still visible in the post-test samples. Students also reported relatively lower confidence in excelling in complete research-writing tasks, managing writing time, and transforming ideas into clear directions. Overall, the findings suggest that AI-assisted writing practice can support macro-level academic writing development and self-efficacy, while teacher guidance remains necessary for improving micro-level language accuracy.

Keywords: generative AI; academic writing self-efficacy; research writing; Taiwanese EFL students; AI literacy