

**AI-Assisted Academic Writing as Information Literacy: Writing Performance,
Student Agency, and Metacognitive Engagement in Higher Education**

Author Information and Cover Page

Joe Pirillo

Information Literacy & Learning Innovation Librarian

Polk Library, University of Wisconsin Oshkosh

800 Algoma Blvd., Oshkosh, WI 54901-8650

Email: pirilloj@uwosh.edu | Phone: 920-424-7332

Corresponding author

Ted Mulvey

Information Literacy Librarian

Polk Library, University of Wisconsin Oshkosh

800 Algoma Blvd., Oshkosh, WI 54901-8650

Email: mulveyt@uwosh.edu | Phone: 920-424-7329

**AI-Assisted Academic Writing as Information Literacy: Writing Performance, Student Agency, and
Metacognitive Engagement in Higher Education**

Abstract

Generative artificial intelligence (AI) is reshaping academic writing in higher education. This review analyzes a purposive corpus of 53 empirical studies drawn from 154 studies that met initial inclusion criteria, examining writing performance, writing processes, feedback and revision, student perceptions, and cognition and agency. Within the analytic corpus, studies most often reported gains in grammar, fluency, and organization, while findings for critical thinking and originality were mixed. Outcomes appeared strongest when students used AI selectively and iteratively with instructor guidance. The synthesis positions AI literacy as an extension of information literacy, emphasizing critical evaluation, metacognition, ethical use, and student agency.

Keywords: artificial intelligence, academic writing, higher education, generative AI, writing performance, information literacy

Introduction

Generative artificial intelligence (AI) tools such as ChatGPT, Grammarly, and Gemini are changing how students approach academic writing in higher education. Students now use these tools to generate ideas, draft text, revise arguments, and edit prose. AI therefore functions not only as a support tool but, in many writing contexts, as an active participant in an increasingly iterative, interactive, and technology-mediated process.

What these changes mean for student learning and writing development remains uncertain. Studies have documented improvements in grammar, fluency, organization, and other surface-level features, yet concerns persist about possible effects on higher-order thinking, originality, and authorship. Students likewise describe a mix of enthusiasm and unease: they value AI's efficiency while questioning its accuracy, the risks of overreliance, and its implications for academic integrity. Together, these tensions characterize a rapidly growing but fragmented body of research.

The studies identified for this review often isolate one dimension of AI use, such as performance outcomes or student perceptions, rather than examining writing processes, feedback practices, and cognitive engagement together. A broader synthesis is needed to understand both what AI does to written products and how students work with AI across the writing process. That distinction is essential for assessing effects on learning, agency, and scholarly practice.

We address this gap by examining how AI tools are used in higher education academic writing and by synthesizing findings across five areas: writing performance, writing process, feedback and revision, student perceptions, and cognition and agency. By mapping a bounded analytic corpus, we identify patterns, tensions, and gaps that can inform future scholarship and instructional practice while avoiding claims of exhaustive coverage.

Methods

Search Strategy and Data Sources

We used a structured evidence-synthesis approach to identify research on the integration of artificial intelligence (AI) writing tools in higher education and then conducted detailed thematic analysis on a bounded, purposive corpus. We searched three major academic databases: ERIC, Web of Science, and PsycINFO. Together, these databases provided coverage of education-focused scholarship, interdisciplinary research on AI in learning, and cognitive and psychological perspectives on writing and thinking.

We organized the search strategy around five thematic concept blocks: (1) AI and generative AI writing tools, (2) higher education student populations, (3) academic writing contexts, (4) writing processes, and (5) learning outcomes related to critical thinking and creativity. We combined these blocks with Boolean operators and adapted each search to the syntax and field conventions of its database. Broad searches paired AI-related terms with higher education and academic writing concepts; more focused searches added terms related to critical thinking, creativity, and writing processes to capture studies addressing specific learning outcomes.

To supplement the database searches, we also searched the AI-powered research tool Elicit and the academic search platform Semantic Scholar. These searches were intended to identify recent, interdisciplinary, and emerging studies that might not yet be fully indexed in traditional databases. We screened all supplementary records using the same inclusion and exclusion criteria as the database results and retained relevant studies not captured in ERIC, Web of Science, or PsycINFO to broaden the review's coverage.

We focused on recent, peer-reviewed empirical studies published in English. Most included studies were published in 2023 or later, reflecting the rapid development of generative AI technologies in educational settings. Appendix A provides representative search strings, and Appendix B lists the 53 studies included in the analytic corpus.

Study Selection and Data Charting

After importing all database and supplementary search records into reference management software, we removed duplicates and screened titles and abstracts against predefined inclusion criteria. Two reviewers conducted the screening, each taking responsibility for records retrieved from different database sources while applying shared inclusion and exclusion criteria. We then reviewed the full text of selected studies.

Screening yielded 154 studies that met the broad inclusion criteria. Because this project also served as an exploratory test of AI-assisted evidence mapping under bounded tool access and project resources, we did not conduct detailed extraction for all 154 records. Instead, we constructed a purposive analytic corpus of 53 studies. A study entered this corpus when (1) AI use was directly tied to students' academic writing rather than treated as a peripheral feature; (2) the article provided sufficient detail to identify the writing context, AI tool or approach, methodology, and relevant outcomes; (3) its findings could be mapped to at least one of the five analytic domains; and (4) the article was available in a form suitable for structured extraction. The resulting corpus was designed for in-depth thematic mapping rather than statistical representation of all eligible studies.

For each study in the analytic corpus, we charted the AI tool or technology examined, the academic writing context, the stage of writing (e.g., planning, drafting, revising), the research methodology, the learning outcomes addressed (e.g., critical thinking, creativity, agency), and the

principal findings related to AI integration in writing processes. Table 1 summarizes the mapping and coding framework.

AI-Assisted Evidence Mapping

After the analytic corpus had been established, we used Elicit to assist with structured evidence mapping of the 53 studies. The tool organized study-level information about the AI technology or approach, academic writing context, stage of writing, methodology, learning outcomes, and principal findings. The authors reviewed the resulting map before thematic synthesis and retained responsibility for corrections, final categorizations, interpretations, and conclusions. Elicit was not treated as an independent source of evidence and did not make final eligibility or coding decisions.

Because Elicit access was usage-limited, detailed AI-assisted mapping was confined to the 53-study analytic corpus. The remaining 101 eligible studies were retained in the broader search record but were not included in the detailed thematic analysis. This boundary is reflected in the wording of the results and is addressed as a limitation.

Table 1

Data-Charting and Thematic Mapping Framework for the 53-Study Analytic Corpus

Mapping field	Information recorded	Use in analysis
AI tool or approach	AI system, writing assistant, automated evaluation tool, corpus-based intervention, or other reported technology	Described the technology or intervention being evaluated.
Academic writing context	Higher education setting, disciplinary or language context, and type of writing task, as reported	Situated findings and identified concentrations in particular contexts.
Writing stage	Planning, drafting, feedback, revision, editing, or reflection	Traced how AI was used across the writing process.
Study methodology	Research design, data sources, and form of evidence, as reported by each study	Supported cautious interpretation of the reported findings.

Mapping field	Information recorded	Use in analysis
Learning outcome	Writing performance, critical thinking, creativity, agency or metacognition, perceptions, and feedback or revision outcomes	Connected study findings to the review domains.
Principal findings	Reported benefits, limitations, conditions, and tradeoffs associated with AI use	Provided the evidence base for the narrative synthesis.
Primary thematic category	Writing performance (n = 26); writing process (n = 10); cognition/agency (n = 7); feedback/revision (n = 6); student perceptions (n = 4)	Assigned one principal theme to each study for consistent counting; secondary findings were retained in the narrative.

Note. Elicit assisted with organizing the mapped fields. The authors made all final coding and interpretive decisions. Counts reflect one primary theme per study and sum to 53.

Synthesis Approach

We did not formally appraise study quality. Within the 53-study analytic corpus, we used thematic synthesis to identify patterns of AI integration in academic writing, reported effects on critical thinking and creativity, and emerging conceptual trends. We also identified gaps and underexplored areas within the corpus to guide future research.

We assigned each study a primary theme based on its principal analytical focus: writing performance, feedback and revision, student perceptions, cognition and agency, or writing process. When a study addressed more than one dimension, we categorized it according to the primary outcome or phenomenon under investigation while retaining secondary findings in the narrative synthesis. This approach supported consistent classification and counting across the bounded analytic corpus.

Use of AI in Manuscript Preparation

Artificial intelligence tools supported the drafting and organization of portions of this manuscript, including the methods section. Elicit's role in evidence mapping is described above. The authors reviewed, edited, and verified AI-assisted manuscript content for accuracy, clarity,

and scholarly integrity. Responsibility for the final interpretations, synthesis, and conclusions remains with the authors.

Results

Thematic Findings

Our analysis of the 53-study corpus identified five primary themes: writing performance (n = 26), writing process (n = 10), cognition/agency (n = 7), feedback/revision (n = 6), and student perceptions (n = 4). These categories capture the principal ways AI was examined within the analytic corpus.

Writing Performance

Writing performance was the dominant theme, accounting for nearly half of the analytic corpus (n = 26). Among these studies, AI-assisted approaches, particularly those combined with corpus-based learning, outperformed traditional instruction and single-method approaches in grammar, vocabulary, cohesion, and task response (Rong et al., 2026; Wang et al., 2025; Pryma et al., 2025).

Within the writing-performance studies, the most frequently reported gains involved fluency, accuracy, and lexical diversity. Studies reported longer essays, fewer language errors, and improvements in organization, coherence, and linguistic precision (Sharshova et al., 2025; Shi et al., 2025; Hao & Razali, 2025). Taken together, these results point to AI's particular strength in supporting the surface-level and structural dimensions of writing within this group of studies (Pryma et al., 2025; Zamorano, 2025; Ding et al., 2025).

Within the analytic corpus, findings for higher-order writing were less consistent. Although AI-supported texts were often more fluent and grammatically accurate, overreliance on AI was associated with reduced originality and weaker argumentation (Tekir, 2026; Pryma et al., 2025). Improvements in linguistic quality, therefore, did not necessarily correspond to deeper critical or analytical development (Tekir, 2026; Rizkiani, 2024).

Feedback and Revision

The six studies centered on feedback and revision reported that AI could increase both the frequency and efficiency of revision. Compared with teacher feedback alone, AI-generated feedback was associated with higher revision rates, largely because it was immediate and offered specific, actionable suggestions (Tran, 2025; Wang & Xie, 2025).

More favorable outcomes appeared in hybrid feedback models that combined AI with instructor input. In these arrangements, AI addressed grammar, mechanics, and other surface-level concerns, while instructors concentrated on argumentation and conceptual development (Tran, 2025; Ding et al., 2025).

AI-generated feedback was also reported as broadly consistent with teacher evaluations, suggesting potential value as a supplementary assessment tool (Lu et al., 2024; Shi et al., 2025). When thoughtfully integrated, it may improve revision behavior while helping students interpret and act on instructor feedback (Lu et al., 2024; Guo et al., 2024).

Student Perceptions

Students in the four **student perceptions** studies generally viewed AI writing tools positively, especially for efficiency, clarity, and feedback. They valued assistance with grammar and vocabulary and often described AI as reducing writing-related anxiety (Song & Song, 2023; Mahapatra, 2024; Seelro & Khan, 2024).

Their enthusiasm was tempered by awareness of AI's limitations. Students raised concerns about overreliance, diminished critical thinking, threats to originality, academic integrity, and the preservation of an authentic voice (Wang, 2024; Kim et al., 2025; Black & Tomlinson, 2025).

Even so, students generally described AI as a support for human thinking rather than a replacement for it. They emphasized augmentation: using AI to extend, clarify, or refine their own writing processes without surrendering authorship (Yang et al., 2024; Gawlik-Kobylińska, 2024; Black & Tomlinson, 2025).

Cognition and Agency

The seven studies on **cognition and agency** shifted attention from whether students used AI to how they used it. They identified distinct patterns of engagement, with different patterns producing different learning outcomes (Yang et al., 2024; Nguyen et al., 2024).

Agency emerged as a central condition of effective use. Selective and strategic engagement with AI supported stronger critical thinking, preservation of personal voice, and deeper involvement in writing tasks (Tekir, 2026; Wang, 2024). By contrast, frequent or

uncritical reliance tended to yield fluent but less original writing and lower cognitive engagement.

Metacognitive awareness, critical reasoning, and epistemic beliefs also shaped students' ability to evaluate AI-generated content and avoid incorporating inaccurate or misleading information (Urban et al., 2025; Tekir, 2026).

Writing Process

The ten studies focused on the **writing process** showed students using AI at every stage, from planning and drafting to revision. Their uses ranged from global concerns, such as brainstorming and organization, to local concerns, such as grammar and sentence structure (Wang, 2024; Karanjakwut & Charunsri, 2025; Jacob et al., 2024).

Within the ten writing-process studies, stronger outcomes were reported when students engaged with AI actively and reflectively. Rather than accepting feedback passively, they refined, evaluated, and revised AI-supported text as part of a metacognitive process (Nguyen et al., 2024; Parker et al., 2025; Ren et al., 2025).

Within this part of the corpus, the findings point toward hybrid pedagogical models that pair established writing practices with strategic, guided AI use (Hutson et al., 2024; Wang & Ren, 2024). Such models retain an emphasis on critical thinking, ethical use, and student authorship while incorporating AI into instruction (Parker et al., 2025; Hutson et al., 2024).

Discussion

Interpreting the Current Landscape of AI-Assisted Academic Writing

Our analytic corpus depicts a rapidly expanding but unevenly developed field. Within the 53 studies, research concentrated most heavily on writing performance, where included studies frequently reported improvements in grammar, organization, and fluency (Pryma et al., 2025; Shi et al., 2025; Hao & Razali, 2025; Sharshova et al., 2025). Far fewer included studies examined how students critically engage with AI, regulate its use, or develop the metacognitive skills needed to use it effectively (Yang et al., 2024; Urban et al., 2025; Tekir, 2026). This distribution suggests that the analytic corpus gives more attention to measurable changes in written products than to the cognitive activity surrounding AI-assisted writing.

This imbalance reflects a consequential divide between what AI does to writing products and how students think with and through AI during the writing process (Nguyen et al., 2024; Wang, 2024; Parker et al., 2025). Within the analytic corpus, evidence is more developed for improvements in written output (Rong et al., 2026; Wang et al., 2025; Zamorano, 2025) than for the ways AI shapes learning, authorship, and intellectual growth (Tekir, 2026; Jacob et al., 2024; Khuder, 2025).

Surface-Level Gains and Higher-Order Tradeoffs

Across the five themes in the analytic corpus, one distinction remained especially clear: improvements in surface-level features did not reliably extend to higher-order writing abilities. Included studies associated AI use with grammatical accuracy, lexical diversity, and structural coherence (Pryma et al., 2025; Tekir, 2026; Aiman et al., 2025), while the cognition and agency

studies associated frequent or uncritical reliance with reduced originality, weaker argumentation, and diminished critical engagement (Tekir, 2026; Pryma et al., 2025; Seelro & Khan, 2024).

The resulting paradox is central to this synthesis:

AI can simultaneously improve the quality of written text while potentially constraining the development of deeper writing and thinking skills (Aiman et al., 2025; Rizkiani, 2025).

Within the analytic corpus, the tension does not appear to be an inherent limitation of AI. Outcomes varied primarily with the manner of use (Yang et al., 2024; Tekir, 2026). Strategic and selective engagement helped preserve critical thinking and authorial voice, whereas passive reliance shifted cognitive effort away from the student (Tekir, 2026; Urban et al., 2025; Pryma et al., 2025).

The Central Role of Student Agency and Metacognition

Among the seven cognition and agency studies, agency emerged as a prominent condition of effective AI use. Students who questioned, revised, and evaluated AI outputs demonstrated stronger learning than those who treated AI as a substitute for their own thinking (Yang et al., 2024; Tekir, 2026; Parker et al., 2025).

This pattern closely parallels **information literacy**, particularly the practices of evaluating sources, assessing credibility, and engaging critically with information systems. AI extends those practices beyond conventional source evaluation: students must assess generated content for accuracy, reasoning, bias, and completeness (Urban et al., 2025; Wang, 2024; Khuder, 2025).

Metacognitive awareness and epistemic beliefs further influenced whether students could use AI effectively. Those who recognized AI's limitations and monitored their own understanding were better positioned to identify and reject inaccurate or misleading information (Urban et al., 2025; Tekir, 2026). Effective AI use, in this sense, is less a discrete technical skill than a cognitive and epistemic practice (Yang et al., 2024; Urban et al., 2025; Parker et al., 2025).

Implications for AI Literacy and Information Literacy

Our synthesis therefore positions AI literacy as an extension of information literacy, not as a separate competency domain. Patterns within the analytic corpus align closely with concepts articulated in the ACRL Framework for Information Literacy for Higher Education (Association of College and Research Libraries [ACRL], 2016).

The writing-process findings align with *Searching as Strategic Exploration*: students used AI to generate, refine, and organize ideas while navigating complex writing tasks, but successful use required strategy rather than passive acceptance. The cognition and agency findings similarly reflect *Research as Inquiry*. Students achieved stronger outcomes when they questioned, evaluated, and refined AI-generated content iteratively instead of treating AI as a source of ready-made answers.

The analytic corpus also reinforces *Authority Is Constructed and Contextual*. Because AI-generated content often lacks transparent authorship, provenance, and evidentiary support, students must evaluate both the output and the conditions under which a system produced it. Feedback and revision, meanwhile, connect with *Scholarship as Conversation*. AI can participate in iterative exchanges that support idea development and revision, but it does not contribute

original scholarship and cannot replace engagement with human authors, disciplinary perspectives, or scholarly discourse.

From this perspective, AI tools are more than productivity technologies, but they are not autonomous scholarly partners. They are cognitive supports whose educational value depends on sustained judgment, evaluation, and reflection. Instruction grounded in the ACRL Framework should therefore emphasize critical engagement with AI-generated content, responsible integration into research and writing workflows, and learner agency in deciding when and how to use AI-supported outputs.

Evolving Writing Processes and Pedagogical Shifts

The writing-process studies depict AI-supported writing as iterative and interactive, with students moving repeatedly among brainstorming, drafting, feedback, and revision. This pattern departs from linear models of composition and points instead to fluid, recursive workflows shaped by ongoing exchanges with AI systems.

These workflows appeared more productive within hybrid pedagogical models in which AI complemented rather than replaced established instruction. Instructors remained essential, especially in helping students distinguish surface-level editing from the deeper work of developing arguments and concepts.

Taken together, the findings informed an integrated, iterative model of AI-assisted writing in which AI operates across multiple stages while student agency and metacognitive awareness mediate its effects. Within such a model, effective instruction should emphasize:

- explicit guidance on when and how to use AI
- structured opportunities for reflection on AI use
- continued emphasis on authorship, argumentation, and critical thinking

Figure 1*AI-Integrated Academic Writing Framework*

Note. Author-developed synthesis based on findings from the analytic corpus.

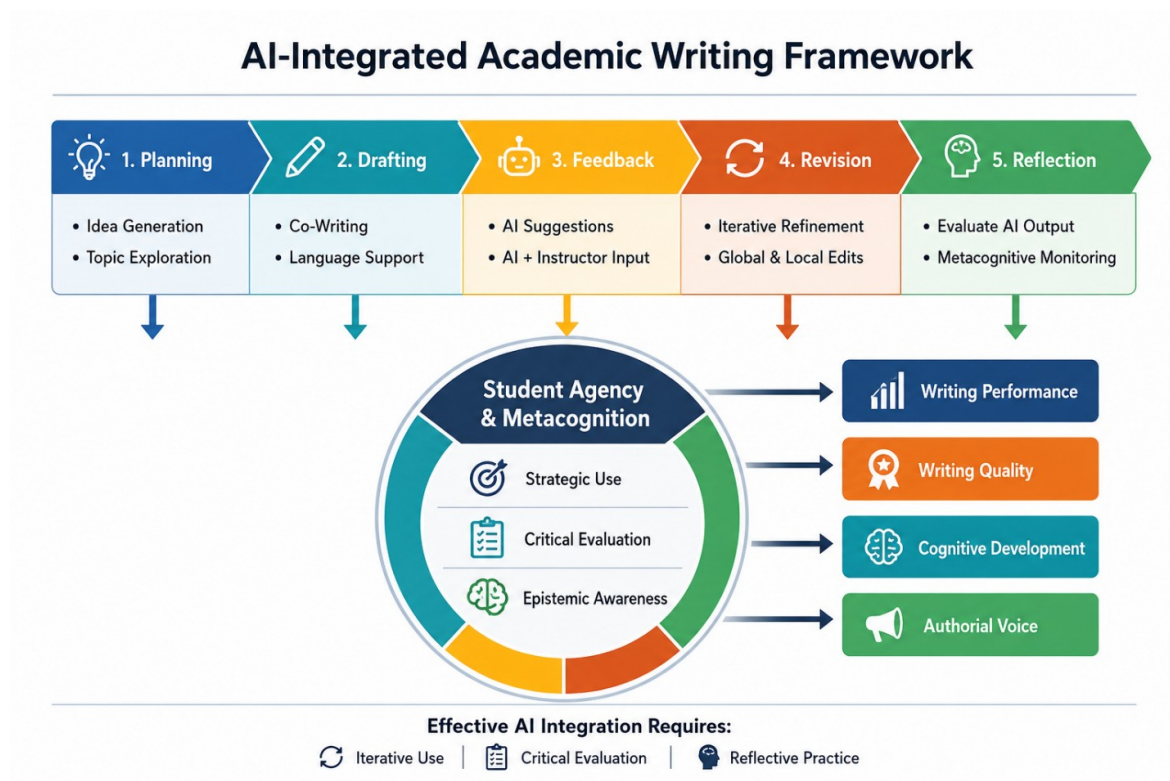


Figure 1 distills these patterns into an author-developed conceptual model. It presents AI-supported writing as an iterative process spanning planning, drafting, feedback, revision, and reflection, with student agency and metacognition mediating the relationship between AI use and writing outcomes.

Gaps in the Analytic Corpus and Future Directions

The 53-study analytic corpus leaves several important questions unresolved. Most notably, few included studies examined long-term learning outcomes or determined whether AI-supported writing produces durable improvement rather than short-term performance gains.

The included studies also offered relatively little evidence about how students learn from AI feedback. They commonly documented changes in writing quality, but less often asked whether students internalized corrections or transferred what they learned to later writing tasks.

Within the analytic corpus, work on cognition and agency remained limited in comparison with performance-focused research. Longitudinal studies are needed to clarify how AI affects thinking processes, intellectual independence, and knowledge construction over time.

Finally, the concentration of included studies in ESL/EFL populations limits the transferability of this synthesis across disciplines, institutional settings, and student groups.

Limitations

Five limitations shape the interpretation of this review. First, although 154 studies met the broad inclusion criteria, detailed AI-assisted mapping and thematic analysis were limited to a purposive corpus of 53 studies. This boundary reflected the exploratory aim of the project and bounded access to Elicit and other project resources. The stated selection criteria improve transparency, but they do not make the corpus statistically representative; relevant findings from the remaining 101 eligible studies may therefore be absent. Claims in this article should be interpreted as applying to the analytic corpus rather than to the entire literature.

Second, two reviewers divided the database results and applied shared inclusion and exclusion criteria. Because not all records were double-screened, we did not calculate formal inter-rater reliability, and screening judgments may have varied.

Third, Elicit assisted with structured evidence mapping. Although the authors reviewed the resulting map and retained responsibility for the final analysis, automated extraction can introduce omissions, oversimplifications, or inconsistencies. The mapped fields should therefore be understood as an AI-assisted organizational aid rather than a substitute for author judgment.

Fourth, the pace of technological change limits the durability of the findings. Many included studies examined early versions of AI tools and may not represent the capabilities of newer or emerging systems. The conclusions should therefore be read as a snapshot of a research and technological landscape that continues to change rapidly.

Fifth, the included studies differed in design, sample size, and context, with a notable concentration on ESL/EFL learners. This concentration limits generalizability across higher education disciplines and settings. A stronger evidence base will require longitudinal research, more diverse populations, and more consistent reporting of outcomes.

Conclusion

Within the 53-study analytic corpus, AI's influence on academic writing in higher education appeared substantial but uneven. The clearest reported benefits involved grammatical accuracy, organization, fluency, and other surface-level features. Findings for critical thinking, originality, authentic voice, and argument development depended more heavily on how students engaged with the tools.

The synthesis's central insight is that educational value resides not in AI capabilities alone but in the practices students build around them. Strategic, reflective use can support learning;

uncritical reliance can reduce cognitive engagement and intellectual ownership. Student agency, critical evaluation, and metacognitive awareness therefore help determine whether AI functions as a tool for learning or a substitute for it.

For educators and librarians, the task is not simply to permit or restrict AI use, but to integrate it thoughtfully within information literacy and academic writing instruction. Students need repeated opportunities to evaluate AI-generated content, decide when its use is appropriate, incorporate it ethically, and retain responsibility for their arguments and prose.

As AI systems continue to evolve, research should move beyond near-term performance measures to examine sustained learning, cognitive development, and the changing nature of authorship in AI-mediated environments. That shift would help the field understand not only whether AI improves writing, but how it shapes students' thinking, learning, and participation in scholarly work.

References

- Aiman, N., Akber, A. G., Aslam, S., & Mazahir, I. (2025). AI writing tools and media literacy: Exploring ChatGPT as a scaffold for ESL learners' writing skills in higher education. *Media Education (Mediaobrazovanie)*, 21(4), 490–497.
<https://doi.org/10.13187/me.2025.4.490>
- Association of College and Research Libraries. (2016). *Framework for Information Literacy for Higher Education*. Association of College and Research Libraries.
<https://www.ala.org/acrl/standards/ilframework>
- Black, R. W., & Tomlinson, B. (2025). University students describe how they adopt AI for writing and research in a general education course. *Scientific Reports*, 15, Article 8799.
<https://doi.org/10.1038/s41598-025-92937-2>
- Ding, L., Zou, D., & Kohnke, L. (2025). ChatGPT as an automated writing evaluation tool: How students perceive it and how it affects their writing. *Education and Information Technologies*, 30, 26777–26799. <https://doi.org/10.1007/s10639-025-13775-3>
- Gawlik-Kobylińska, M. (2024). Harnessing artificial intelligence for enhanced scientific collaboration: Insights from students and educational implications. *Education Sciences*, 14(10), Article 1132. <https://doi.org/10.3390/educsci14101132>
- Guo, K., Pan, M., Li, Y., & Lai, C. (2024). Effects of an AI-supported approach to peer feedback on university EFL students' feedback quality and writing ability. *The Internet and Higher Education*, 63, Article 100962. <https://doi.org/10.1016/j.iheduc.2024.100962>
- Hao, H., & Razali, A. B. (2025). Impact of ChatGPT on English academic writing ability and engagement of Chinese EFL undergraduates. *International Journal of Instruction*, 18(2), 323–346. <https://doi.org/10.29333/iji.2025.18218a>

- Hutson, J., Plate, D., & Berry, K. (2024). Embracing AI in English composition: Insights and innovations in hybrid pedagogical practices. *International Journal of Changes in Education* 1(1), 19-31. <https://doi.org/10.47852/bonviewIJCE42022290>
- Jacob, S. R., Tate, T., & Warschauer, M. (2024). Emergent AI-assisted discourse: A case study of a second language writer authoring with ChatGPT. *Journal of China Computer-Assisted Language Learning*, 5(1), 1–22. <https://doi.org/10.1515/jccall-2024-0011>
- Karanjakwut, C., & Charunsri, K. (2025). Transforming AI chatbots for a brainstorming teaching technique of process writing. *Malaysian Online Journal of Educational Technology*, 13(1), 1–18. <https://doi.org/10.52380/mojet.2025.13.1.559>
- Khuder, B. (2025). Enhancing disciplinary voice through feedback-seeking in AI-assisted doctoral writing for publication. *Applied Linguistics*, Article amaf022. <https://doi.org/10.1093/applin/amaf022>
- Kim, J., Yu, S., Detrick, R., & Li, N. (2025). Exploring students’ perspectives on generative AI-assisted academic writing. *Education and Information Technologies*, 30(1), 1265–1300. <https://doi.org/10.1007/s10639-024-12878-7>
- Lu, Q., Yao, Y., Xiao, L., Yuan, M., Wang, J., & Zhu, X. (2024). Can ChatGPT effectively complement teacher assessment of undergraduate students’ academic writing? *Assessment & Evaluation in Higher Education*, 49(5), 616–633. <https://doi.org/10.1080/02602938.2024.2301722>
- Mahapatra, S. (2024). Impact of ChatGPT on ESL students’ academic writing skills: A mixed methods intervention study. *Smart Learning Environments*, 11, Article 9. <https://doi.org/10.1186/s40561-024-00295-9>

Nguyen, A., Hong, Y., Dang, B., & Huang, X. (2024). Human-AI collaboration patterns in AI-assisted academic writing. *Studies in Higher Education*, 49(5), 847–864.

<https://doi.org/10.1080/03075079.2024.2323593>

Parker, J. L., Richard, V. M., Acabá, A., Escoffier, S., Flaherty, S., Jablonka, S., & Becker, K. P. (2025). Negotiating meaning with machines: AI's role in doctoral writing pedagogy. *International Journal of Artificial Intelligence in Education*, 35(3), 1218–1238.

<https://doi.org/10.1007/s40593-024-00425-x>

Pryma, V., Pelivan, O., Teletska, T., Tsobenko, O., & Zagrebelna, N. (2025). AI writing assistants and student competence: A linguistic aspect. *Arab World English Journal, Special Issue on Artificial Intelligence*, 319–329. <https://doi.org/10.24093/awej/AI.18>

Ren, B., Dong, Y., & Zhang, B. (2025). From errors to excellence: AI-driven scaffolding for advancing L2 writing skills. *Cogent Education*, 12(1), Article 2588512.

<https://doi.org/10.1080/2331186X.2025.2588512>

Rong, J., Deng, Y., & Liu, D. (2026). Effects of using data-driven and generative AI-assisted instructions on learning multiword constructions in written academic English. *Language Teaching Research*. <https://doi.org/10.1177/13621688251412525>

Rizkiani, S., Maulana, A., Resmini, S., & Satriani, I. (2024). Examining the use of AI tools in academic writing: Effects on the critical thinking skills of EFL learners. *JELA: Journal of English Language Teaching, Literature and Applied Linguistics*, 6(2), 111–121.

<https://doi.org/10.37742/jela.v6i2.155>

Seelro, S., & Khan, M. A. (2024). Exploring the benefits and challenges of ChatGPT in enhancing ESL learners writing skills. *Academy of Education and Social Sciences Review*, 4(4), 480–493. <https://doi.org/10.48112/aessr.v4i4.885>

- Sharshova, R. N., Salkhanova, Z. K., Yelubayeva, P., Maral, A., Sholakhova, A., & Kaliaskarova, A. (2025). The use of AI writing tools in second language learning to enhance Kazakh IT students' academic writing skills. *Forum for Linguistic Studies*, 7(8), 251-267.
<https://doi.org/10.30564/fls.v7i8.10408>
- Shen, Y., & Chen, L. (2025). "Critical chatting" or "casual cheating": How graduate EFL students utilize ChatGPT for academic writing. *Computer Assisted Language Learning*, 1–29. <https://doi.org/10.1080/09588221.2025.2479141>
- Shi, H., Chai, C. S., Zhou, S., & Aubrey, S. (2025). Comparing the effects of ChatGPT and automated writing evaluation on students' writing and ideal L2 writing self. *Computer Assisted Language Learning*, 1-28. <https://doi.org/10.1080/09588221.2025.2454541>
- Song, C., & Song, Y. (2023). Enhancing academic writing skills and motivation: Assessing the efficacy of ChatGPT in AI-assisted language learning for EFL students. *Frontiers in Psychology*, 14, Article 1260843. <https://doi.org/10.3389/fpsyg.2023.1260843>
- Tekir, S. (2026). Generative AI use in EFL writing: Associations with originality, critical reasoning, and metacognitive engagement in a Turkish higher education context. *Computer Assisted Language Learning*, 1-22.
<https://doi.org/10.1080/09588221.2026.2617399>
- Thandla, S. R., Armstrong, G. Q., Menon, A., Shah, A., Gueye, D. L., Harb, C., Hernandez, E., Iyer, Y., Hotchner, A. R., Modi, R., Mudigonda, A., Prokos, M. A., Rao, T. M., Thomas, O. R., Beltran, C. A., Guerrieri, T., Leblanc, S., Moorthy, S., Yacoub, S. G., Gardner, J. E., Greenberg, B. M., Hubal, A., Lapina, Y. P., Moran, J., O'Brien, J. P., Winnicki, A. C., Yoka, C., Zhang, J., & Zimmerman, P. A. (2024). Comparing new tools of artificial

- intelligence to the authentic intelligence of our global health students. *BioData Mining*, 17, Article 58. <https://doi.org/10.1186/s13040-024-00408-7>
- Tran, T. T. T. (2025). Enhancing EFL writing revision practices: The impact of AI- and teacher-generated feedback and their sequences. *Education Sciences*, 15(2), Article 232. <https://doi.org/10.3390/educsci15020232>
- Urban, M., Brom, C., Lukavský, J., Děchtěrenko, F., Hein, V., Svacha, F., Kmoníčková, P., & Urban, K. (2025). “ChatGPT can make mistakes. Check important info.” Epistemic beliefs and metacognitive accuracy in students’ integration of ChatGPT content into academic writing. *British Journal of Educational Technology*, 56(5), 1897–1918. <https://doi.org/10.1111/bjet.13591>
- Wang, C. (2025). Exploring students’ generative AI-assisted writing processes: Perceptions and experiences from native and nonnative English speakers. *Technology, Knowledge and Learning*, 30, 1825–1846. <https://doi.org/10.1007/s10758-024-09744-3>
- Wang, L., & Ren, B. (2024). Enhancing academic writing in a linguistics course with generative AI: An empirical study in a higher education institution in Hong Kong. *Education Sciences*, 14(12), Article 1329. <https://doi.org/10.3390/educsci14121329>
- Wang, Q., Deng, Y., & Liu, D. (2025). Corpus-driven and AI-assisted learning in teaching business academic writing: Examining their efficacies and the predicting/moderating effects of learner variables. *Computer Assisted Language Learning*, 1-29. <https://doi.org/10.1080/09588221.2025.2589739>
- Wang, Y., & Xie, Q. (2025). ERNIE-assisted feedback and its impact on EFL learners’ revision strategies and writing performance. *Educational Psychology*, 1-23. <https://doi.org/10.1080/01443410.2025.2599787>

Yang, Y., Luo, J., Yang, M., Yang, R., & Chen, J. (2024). From surface to deep learning approaches with generative AI in higher education: An analytical framework of student agency. *Studies in Higher Education*, 49(5), 817–830.

<https://doi.org/10.1080/03075079.2024.2327003>

Zamorano, C. (2025). Enhancing academic writing in English language education through generative AI integration. *Research Studies in English Language Teaching and Learning*, 3(3), 424–447. <https://doi.org/10.62583/rseltl.v3i3.87>

Appendix A

Representative Search Strategies by Database

Table A1

Search Strategy for ERIC

Concept Block	Search Terms
AI Writing Tools	"artificial intelligence" OR "generative AI" OR ChatGPT OR "AI writing tool*" OR "large language model"
Population	"higher education" OR "university student*" OR "college student*" OR undergraduate* OR "graduate student"
Writing Context	"academic writing" OR "research paper*" OR "academic essay*" OR "thesis writing"
Writing Process	"writing process" OR brainstorming OR revising OR editing OR argumentation
Learning Outcomes	"critical thinking" OR "analytical thinking" OR creativity OR "authorial voice"
Combined Example	(AI Writing Tools) AND (Population) AND (Writing Context) AND (Learning Outcomes)

Table A2

Search Strategy for Web of Science

Concept Block	Search Terms (TS = Topic)
AI Writing	TS=("artificial intelligence" OR "generative AI" OR ChatGPT OR

Concept Block	Search Terms (TS = Topic)
Tools	"AI writing tool*" OR "large language model*")
Population	TS=("university student*" OR "college student*" OR undergraduate* OR "graduate student*")
Writing Context	TS=("academic writing" OR "research paper*" OR "academic essay*" OR "thesis writing")
Writing Process	TS=("writing process" OR brainstorming OR revising OR editing OR argumentation)
Learning Outcomes	TS=("critical thinking" OR creativity OR "authorial voice")
Combined Example	(AI Writing Tools) AND (Population) AND (Writing Context) AND (Learning Outcomes)

Table A3*Search Strategy for PsycINFO*

Concept Block	Search Terms
AI Writing Tools	"artificial intelligence" OR "generative AI" OR ChatGPT OR "AI writing tool*" OR "large language model*"
Population	student* OR undergraduate* OR "college student*" OR "university student*"
Writing Context	"academic writing" OR "research paper*" OR "academic essay*" OR

Concept Block	Search Terms
	"writing tasks"
Writing Process	"writing process" OR brainstorming OR revising OR editing OR argumentation
Learning Outcomes	"critical thinking" OR metacognition OR creativity OR "learner agency"
Combined Example	(AI Writing Tools) AND (Population) AND (Writing Context) AND (Learning Outcomes)

Note. Search strings were adapted slightly across databases to align with database-specific syntax and controlled vocabulary where applicable.

Appendix B

Included Studies in the Analytic Corpus (n = 53)

The following studies were included in the analytic corpus and subjected to detailed data extraction and thematic analysis.

Aiman, N., Akber, A. G., Aslam, S., & Mazahir, I. (2025). AI writing tools and media literacy:

Exploring ChatGPT as a scaffold for ESL learners' writing skills in higher education.

Media Education–Mediaobrazovanie, 21(4), 490–497.

<https://doi.org/10.13187/me.2025.4.490>

An, T. H. (2025). An investigation into the influence of AI tools on syntactic maturation in EFL

writers at selected Vietnamese universities. *Contemporary Research in Education and*

English Language Teaching, 7(2), 34–41. <https://doi.org/10.55214/26410230.v7i2.7122>

Bista, K., & Bista, R. (2025). Leveraging AI tools in academic writing: Insights from doctoral

students on benefits and challenges. *American Journal of STEM Education*, 6, 32–47.

<https://doi.org/10.32674/9m8dq081>

Black, R. W., & Tomlinson, B. (2025). University students describe how they adopt AI for

writing and research in a general education course. *Scientific Reports*, 15, Article 8799.

<https://doi.org/10.1038/s41598-025-92937-2>

Chen, C., & Gong, Y. (Frank). (2025). The role of AI-assisted learning in academic writing: A

mixed-methods study on Chinese as a second language students. *Education Sciences*,

15(2), Article 141. <https://doi.org/10.3390/educsci15020141>

Ding, L., Zou, D., & Kohnke, L. (2025). ChatGPT as an automated writing evaluation tool: How

students perceive it and how it affects their writing. *Education and Information*

Technologies, 30(18), 26777–26799. <https://doi.org/10.1007/s10639-025-13775-3>

- Fitzek, S., & Bârgăoanu, A. (2025). Introducing large language models in communication and public relations education: A mixed-methods pilot study. *International Journal of Artificial Intelligence in Education*, 35(4), 2478–2494.
- Gawlik-Kobylińska, M. (2024). Harnessing artificial intelligence for enhanced scientific collaboration: Insights from students and educational implications. *Education Sciences*, 14(10).
- Guo, K., Pan, M., Li, Y., & Lai, C. (2024). Effects of an AI-supported approach to peer feedback on university EFL students' feedback quality and writing ability. *The Internet and Higher Education*, 63, Article 100962.
- Hao, H., & Razali, A. B. (2025). Impact of ChatGPT on English academic writing ability and engagement of Chinese EFL undergraduates. *International Journal of Instruction*, 18(2), 323–346. <https://doi.org/10.29333/iji.2025.18218a>
- Hong, S., & Shin, Y. K. (2025). Effects of three levels of AI integration on second language academic writing: Evaluating restricted, guided, and free use of ChatGPT. *System*, 134. <https://doi.org/10.1016/j.system.2025.103820>
- Hutson, J., Plate, D., & Berry, K. (2024). Embracing AI in English composition: Insights and innovations in hybrid pedagogical practices. *International Journal of Changes in Education*, 1(1), 19–31. <https://doi.org/10.47852/bonviewIJCE42022290>
- Jacob, S. R., Tate, T., & Warschauer, M. (2024). Emergent AI-assisted discourse: A case study of a second language writer authoring with ChatGPT. *Journal of China Computer-Assisted Language Learning*, 5(1), 1–22. <https://doi.org/10.1515/jccall-2024-0011>

- Karanjakwut, C., & Charunsri, K. (2025). Transforming AI chatbots for a brainstorming teaching technique of process writing. *Malaysian Online Journal of Educational Technology*, 13(1), 1–18. <https://doi.org/10.52380/mojet.2025.13.1.559>
- Khampusaen, D. (2025). The impact of ChatGPT on academic writing skills and knowledge: An investigation of its use in argumentative essays. *LEARN Journal: Language Education and Acquisition Research Network*, 18(1), 963–988. <https://doi.org/10.70730/PGCQ9242>
- Khuder, B. (2025). Enhancing disciplinary voice through feedback-seeking in AI-assisted doctoral writing for publication. *Applied Linguistics*. Advance online publication. <https://doi.org/10.1093/applin/amaf022>
- Kim, J., Yu, S., Detrick, R., & Li, N. (2025). Exploring students' perspectives on generative AI-assisted academic writing. *Education and Information Technologies*, 30, 1265–1300. <https://doi.org/10.1007/s10639-024-12878-7>
- Krajka, J., & Olszak, I. (2024). Artificial intelligence tools in academic writing instruction: Exploring the potential of on-demand AI assistance in the writing process. *Roczniki Humanistyczne*, 72(6), 123–140. <https://doi.org/10.18290/rh247206.8>
- Lu, Q., Yao, Y., Xiao, L., Yuan, M., Wang, J., & Zhu, X. (2024). Can ChatGPT effectively complement teacher assessment of undergraduate students' academic writing? *Assessment & Evaluation in Higher Education*, 49(5), 616–633. <https://doi.org/10.1080/02602938.2024.2301722>
- Mahapatra, S. (2024). Impact of ChatGPT on ESL students' academic writing skills: A mixed methods intervention study. *Smart Learning Environments*, 11, Article 9.

- Nguyen, A., Hong, Y., Dang, B., & Huang, X. (2024). Human-AI collaboration patterns in AI-assisted academic writing. *Studies in Higher Education*, 49, 847–864.
<https://doi.org/10.1080/03075079.2024.2323593>
- Parker, J. L., Richard, V. M., Acabá, A., Escoffier, S., Flaherty, S., Jablonka, S., & Becker, K. P. (2025). Negotiating meaning with machines: AI's role in doctoral writing pedagogy. *International Journal of Artificial Intelligence in Education*, 35(3), 1218–1238.
- Pryma, V., Pelivan, O., Teletska, T., Tsobenko, O., & Zagrebelna, N. (2025). AI writing assistants and student competence: A linguistic aspect. *Arab World English Journal*, Special Issue 1, 319–329. <https://doi.org/10.24093/awej/AI.18>
- Ren, B., Dong, Y., & Zhang, B. (2025). From errors to excellence: AI-driven scaffolding for advancing L2 writing skills. *Cogent Education*, 12(1).
<https://doi.org/10.1080/2331186X.2025.2588512>
- Ren, Y., Wong, W. L., Barrot, J., & Zhang, L. J. (2026). Learning styles, engagement and anxiety in AI-mediated writing: A multimodal feedback study. *International Journal of Applied Linguistics*. Advance online publication. <https://doi.org/10.1111/ijal.70120>
- Rong, J., Deng, Y., & Liu, D. (2026). Effects of using data-driven and generative AI-assisted instructions on learning multiword constructions in written academic English. *Language Teaching Research*. Advance online publication.
<https://doi.org/10.1177/13621688251412525>
- Sanchez-Fortun, J. M. de A., & Rodriguez, K. B. (2026). Academic literacy assisted by generative artificial intelligence: Impact on the quality of disciplinary writing. *Pixel-Bit: Revista de Medios y Educación*, 75. <https://doi.org/10.12795/pixelbit.113712>

- Seelro, S., & Khan, M. A. (2024). Exploring the benefits and challenges of ChatGPT in enhancing ESL learners' writing skills. *Academy of Education and Social Sciences Review*, 4(4), 480–493. <https://doi.org/10.48112/aessr.v4i4.885>
- Sharshova, R. N., Salkhanova, Z. K., Yelubayeva, P., Maral, A., Sholakhova, A., & Ainur, K. (2025). The use of AI writing tools in second language learning to enhance Kazakh IT students' academic writing skills. *Forum for Linguistic Studies*, 7(8), 251–267. <https://doi.org/10.30564/fls.v7i8.10408>
- Shen, Y., & Chen, L. (2025). 'Critical chatting' or 'casual cheating': How graduate EFL students utilize ChatGPT for academic writing. *Computer Assisted Language Learning*, 1–29. <https://doi.org/10.1080/09588221.2025.2479141>
- Shi, H., Chai, C. S., Zhou, S., & Aubrey, S. (2025). Comparing the effects of ChatGPT and automated writing evaluation on students' writing and ideal L2 writing self. *Computer Assisted Language Learning*, 1–28. <https://doi.org/10.1080/09588221.2025.2454541>
- Silvola, A., Kajamaa, A., Merikko, J., & Muukkonen, H. (2025). AI-mediated sensemaking in higher education students' learning processes: Tensions, sensemaking practices, and AI-assigned purposes. *British Journal of Educational Technology*, 56(5), 2001–2018.
- Rizkiani, S., Maulana, A., Resmini, S., & Satriani, I. (2024). Examining the use of AI tools in academic writing: Effects on the critical thinking skills of EFL learners. *JELA (Journal of English Language Teaching, Literature and Applied Linguistics)*, 6(2), 111–121. <https://doi.org/10.37742/jela.v6i2.155>
- Song, C., & Song, Y. (2023). Enhancing academic writing skills and motivation: Assessing the efficacy of ChatGPT in AI-assisted language learning for EFL students. *Frontiers in Psychology*, 14, Article 1260843. <https://doi.org/10.3389/fpsyg.2023.1260843>

- Sykes, E. R. (2024). AI-assisted academic writing: A comparative study of student-crafted and ChatGPT-enhanced critiques in ubiquitous computing. *International Journal of Advanced Computer Science and Applications*, 15(9).
<https://doi.org/10.14569/IJACSA.2024.0150905>
- Tekir, S. (2026). Generative AI use in EFL writing: Associations with originality, critical reasoning, and metacognitive engagement in a Turkish higher education context. *Computer Assisted Language Learning*, 1-22.
<https://doi.org/10.1080/09588221.2026.2617399>
- Thandla, S. R., Armstrong, G. Q., Menon, A., Shah, A., Gueye, D. L., Harb, C., Hernandez, E., Iyer, Y., Hotchner, A. R., Modi, R., Mudigonda, A., Prokos, M. A., Rao, T. M., Thomas, O. R., Beltran, C. A., Guerrieri, T., Leblanc, S., Moorthy, S., Yacoub, S. G., ... Zimmerman, P. A. (2024). Comparing new tools of artificial intelligence to the authentic intelligence of our global health students. *BioData Mining*, 17, Article 58.
<https://doi.org/10.1186/s13040-024-00408-7>
- Thong, C. L., Chaw, L. Y., & Cherukuri, A. K. (2025). Enhancing academic writing through non-institutional technologies (GenAI tool): A case study. *Journal of Information & Knowledge Management*. <https://doi.org/10.1142/S0219649225501011>
- Tran, T. T. T. (2025). Enhancing EFL writing revision practices: The impact of AI- and teacher-generated feedback and their sequences. *Education Sciences*, 15(2).
<https://doi.org/10.3390/educsci15020232>
- Urban, M., Brom, C., Lukavsky, J., Dechterenko, F., Hein, V., Svacha, F., Kmonickova, P., & Urban, K. (2025). “ChatGPT can make mistakes. Check important info.” Epistemic beliefs and metacognitive accuracy in students’ integration of ChatGPT content into

- academic writing. *British Journal of Educational Technology*, 56(5), 1897–1918.
<https://doi.org/10.1111/bjet.13591>
- Vicente-Yagüe-Jara, M. I., López-Martínez, O., Navarro-Navarro, V., & Cuéllar-Santiago, F. (2023). Writing, creativity, and artificial intelligence: ChatGPT in the university context. *Comunicar*, 31(77). <https://doi.org/10.3916/C77-2023-04>
- Wang, C. (2025). Exploring students' generative AI-assisted writing processes: Perceptions and experiences from native and nonnative English speakers. *Technology, Knowledge and Learning*, 30, 1825–1846. <https://doi.org/10.1007/s10758-024-09744-3>
- Wang, L., & Ren, B. (2024). Enhancing academic writing in a linguistics course with generative AI: An empirical study in a higher education institution in Hong Kong. *Education Sciences*, 14(12). <https://doi.org/10.3390/educsci14121329>
- Wang, Q., Deng, Y., & Liu, D. (2025). Corpus-driven and AI-assisted learning in teaching business academic writing: Examining their efficacies and the predicting/moderating effects of learner variables. *Computer Assisted Language Learning*, 1–29.
<https://doi.org/10.1080/09588221.2025.2589739>
- Wang, Y., & Xie, Q. (2025). Ernie-assisted feedback and its impact on EFL learners' revision strategies and writing performance. *Educational Psychology*, 1–23.
<https://doi.org/10.1080/01443410.2025.2599787>
- Wikanengsih, W., Puspita, R. D., Wardani, D. S., Nurhayati, E., & Moid, I. B. (2025). Enhancing academic writing in higher education: The impact of ChatGPT and QuillBot in AI-driven project-based learning. *Journal of Information Technology Education: Innovations in Practice*, 24. <https://doi.org/10.28945/5646>

- Yang, Y., Huang, L., Lin, W., Li, Y., Xu, Y., & Cheng, L. (2025). Enhancing sustainable English writing instruction through a generative AI-based virtual teacher within a co-regulated learning framework. *Sustainability*, 17(19). <https://doi.org/10.3390/su17198770>
- Yang, Y., Luo, J., Yang, M., Yang, R., & Chen, J. (2024). From surface to deep learning approaches with generative AI in higher education: An analytical framework of student agency. *Studies in Higher Education*, 49(5), 817–830.
<https://doi.org/10.1080/03075079.2024.2327003>
- Zamorano, C. (2025). Enhancing academic writing in English language education through generative AI integration. *Research Studies in English Language Teaching and Learning*, 3(3), 424–447. <https://doi.org/10.62583/rseltl.v3i3.87>
- Zhang, K. (2025). Enhancing critical writing through AI feedback: A randomized control study. *Behavioral Sciences*, 15(5), Article 600. <https://doi.org/10.3390/bs15050600>
- Zhang, Y., Liu, Y., & Wang, X. (2025). Enhancing anti-plagiarism literacy practices among undergraduates with AI. *Interactive Learning Environments*. Advance online publication.
<https://doi.org/10.1080/10494820.2025.2492783>
- Zhou, S., & Preez, G. D. D. (2025). Bringing Cinderella into spotlight: GenAI-assisted grammar acquisition in academic writing. *Language Learning & Technology*, 29(1).
- Zhu, L., Su, Y., Xu, S., & Liu, K. (2025). Enhancing EFL argumentative writing through an AI-powered corpus: Impact on learner writing proficiency. *Computer Assisted Language Learning*. Advance online publication.