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Enhancing academic writing in English language education through generative AI integration

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Abstract

This research investigates the adoption of generative artificial intelligence (GenAI) tools as a means of enhancing academic writing instruction for university-level English as a foreign language (EFL) students, with a view to determining the impacts of these technologies on writing quality, learner motivation, and autonomy. Based on a mixed-methods methodology, the research compared pre- and post-test writing scores for students of AI-assisted versus traditional writing, with qualitative data from student reflection. Results indicated that the AI group performed significantly higher than the control group for vocabulary utilization, structural organization, as well as audience awareness. Qualitative results emphasized higher motivation levels and enjoyment, with some students demonstrating over-reliance on AI-generated text. These results concur with current literature regarding the affordances of AI to assist writing facility as well as i-rhetorical growth, but equally signal its associated risks regarding passive learning tendencies and loss of analytical thinking. This research concludes that while AI-powered GenAI writing tools can potentially augment academic writing instruction, they must be implemented with caution to ensure learner agency as well as independent writing development. Recommendations address guided execution, reflective practice, as well as ethical concerns to instructional design. This research advances knowledge of AI adoption in education through a balanced view of the teaching affordances as well as challenges of AI-facilitated writing for EFL students.

Introduction

The incorporation of (GenAI) into the teaching of academic writing is transforming the academic writing instruction landscape. Against the background of ongoing issues for higher education with regard to students' writing proficiency, particularly with regards to EFL students, new technologies like ChatGPT and other large language models (LLMs) provide new opportunities to augment students' output, participation, and agency. Within academic settings, where clarity, coherence, and knowledge of rhetoric are all of the first importance, the promise of GenAI to assist students with achieving these requirements is a subject of excitement as well as reservation.

In spite of extensive debate regarding a writing crisis for educational systems (The National Commission on Writing, 2003, 2004), there are still under researched EFL students with regard to the ways in which AI-facilitated writing technology can scaffold their linguistic growth. Together with lexical and syntactic accuracy, many of these students have difficulty with accomplishing interpersonal nuances of academic discourse, including audience awareness, stance, and engagement (Hyland, 2005; Jiang & Hyland, 2024). All of these issues highlight the need for pedagogical development centred on empirical research. More recent research has examined the affordances of GenAI for simplifying ideation, text structuring, and lexical range expansion (Curtis, 2023; Steiss et al., 2023). There are, however, continuing concerns over over-reliance, decreased critical thought, and a deficiency of rhetorical sophistication for texts produced by AI (Zhang & Crosthwaite, 2025; Tang et al., 2024). Additionally, issues remain regarding whether these applications merely are automating content or actually assist with learner motivation, learner regulation, and metacognitive development—essential elements of effective scholarly writing and independent learning.

The current research examines the level to which generative AI integration improves the academic writing performance of EFL university students, with a focus on vocabulary utilisation, structural consistency, and awareness of audience. It further investigates how the aforementioned integration can affect learners' internal motivation and autonomy while composing. Integrating rhetorical inquiry with empirical data, the research makes an up-to-date contribution to the area of English for Academic Purposes (EAP), shedding light on the advantages as well as the limitations of using GenAI technology in teaching writing.

Literature review

AI in academic writing: Rhetorical constructs, and pedagogical challenges

The development of artificial intelligence (AI), especially of generative models, has evoked diverse opinions regarding their place within academic composition. Against the background of long-standing perceptions of a writing crisis within the nation (Intersegmental Committee, 2002; The National Commission on Writing, 2003, 2004), there are growing fears that AI may reduce traditional approaches to the teaching of writing. On the other end of the spectrum, industries and professional spheres have embraced AI for speed, scalability, as well as cost-effectiveness in content generation.

Historically, students, particularly English learners (ELs), have struggled with academic writing genres. Evidence from the National Centre for Education Statistics (2012) indicated that more than 20% of U.S. 12th-graders were below basic proficiency in writing, with racially disproportionate results. Additionally, ELs are often confronted with compounded difficulties by the devaluation of their cultural and linguistic identities within mainstream scholarship (Booth et al., 2023; Bunch, 2013). Stance and engagement, as defined by Hyland (2005), are at the heart of understanding academic writers' voice construction and interactivity with readers. Stance refers to the means by which authors signal attitudes, commitment, or doubt towards propositions, while engagement refers to how writers recognise and align with readers. Such constructs have influenced research into academic writing through diachronic research (Hyland & Jiang, 2016), discipline-based corpus studies (Hyland, 2005), as well as longitudinal research into EAP (Crosthwaite & Jiang, 2017). One line of argument pursued throughout that literature is the role of genre and discipline to account for rhetorical style—humanities writers tend to exhibit more markers of stance and engagement than science writers (McGrath & Kuteeva, 2012; Qiu & Jiang, 2021).

The incorporation of AI in EAP and English for Research Publication Purposes (ERPP) teaching opens up new considerations of the same. This research is among the earliest to systematically contrast the discursive realisation of stance and engagement in academic writing produced by human authors with three generative AI models: ChatGPT, MetaAI, and ERNIEBot. This contrast focuses on the contemporary imperative of establishing whether GenAI can approximate the requisite nuance of academic discourse, especially where interdisciplinarity is involved (Jiang & Hyland, 2024; Oh & Lee, 2024). In EAP, AI has historically played roles in automated essay scoring, machine translation, and plagiarism detection. The advent of GenAI, underpinned by large language models (LLMs),

expands these applications into original, context-sensitive content creation (Yeralan & Lee, 2023; Chan & Hu, 2023). These tools now assist learners with feedback, coherence, idea generation, and revision (Curtis, 2023; Su et al., 2023; Steiss et al., 2023), thereby reshaping the writing process. However, concerns persist about authorship, coherence, and critical thinking, especially given AI's limitations in sustaining thematic progression and rhetorical complexity (Mizumoto et al., 2024; Tang et al., 2024).

Hyland's (2005) framework categorises stance features into hedges, boosters, attitude markers, and self-mentions, and engagement features into reader pronouns, questions, directives, appeals to shared knowledge, and personal asides. The question now arises: can AI replicate this interpersonal dimension? Jiang and Hyland (2024) found that ChatGPT essays lacked epistemic stance and relied on repetitive lexical bundles, limiting their rhetorical depth. Similarly, Zhang and Crosthwaite (2025) observed that while AI-generated texts contain formal vocabulary, they miss the personal, socially grounded elements common in L2 writing. Empirical research comparing AI and human writing further underscores these differences. Berber-Sardinha (2024) showed that AI texts diverge from natural academic discourse in cohesion and register. Tang et al. (2024), drawing on Systemic Functional Linguistics, reported major differences in thematic structures, particularly the underuse of interpersonal and textual themes in AI writing. These patterns reflect the still-limited ability of AI to mirror human rhetorical sophistication.

Even so, AI offers potential value in EAP classrooms. Research suggests AI can facilitate feedback provision, often exceeding teacher feedback in relevance and helping students produce more substantial revisions (Han & Li, 2024; Li et al., 2024). Allen and Mizumoto (2024) found that Japanese students preferred AI-assisted proofreading over peer editing, while teachers favoured the scalability of such tools. However, Lin and Crosthwaite (2024) cautioned that GenAI feedback lacks consistency, reinforcing the need for guided integration. Bias also remains a key concern. Detection tools frequently misclassify L2 learners' essays as AI-generated, with Liang et al. (2023) reporting a 61.3% misidentification rate for TOEFL essays—much higher than for native speakers. These findings highlight structural inequities in AI usage, training, and access (Bender et al., 2021; Kenthapadi et al., 2023). Moreover, generative models are susceptible to bias based on training data, with discrimination observed in gender (Bolukbasi et al., 2016), disability (Hutchinson et al., 2020), and multilingual contexts (Lee, 2023).

Despite these limitations, AI shows promise in reducing performance gaps. Studies in workplace contexts report significant efficiency and quality gains among lower-performing users. Noy and Zhang (2023) documented a 40% reduction in task completion time and a 20% quality improvement among marketing and grant writers, while Dell'Acqua et al. (2023) found that below-average writers improved by 43% with AI assistance. They are even challenging concerns expressed regarding the possibility of AI suppressing creativity. It was discovered by Doshi and Hauser (2023) that exposure to AI writing increased creativity for less creative users. Likewise, AI assistance with argumentation writing—a notoriously challenging genre for L2 users—is proving to facilitate rational structuring and awareness of rhetoric, as reported by Su et al. (2023).

While generative AI applications show promise for augmenting academic writing, they are short of capturing the same level of rhetorical richness, disciplinary diversity, and interpersonal nuance as texts produced by humans. This research's comparative examination of stance and engagement sheds light upon these shortcomings, towards a wider understanding of the capabilities and limitations of GenAI. As AI becomes increasingly integrated into EAP and academic writing pedagogy, there is a need for reflective critique to facilitate ethical, fair, and rhetorically guided incorporation.

AI in education and its transformative potential

The incorporation of (AI) into learning systems has radically transformed modern learning and teaching practices. As noted by Amershi et al. (2005), visual and animated AI applications are capable of promoting the understanding of difficult computer science topics, enriching the students' learning experience. AI-based technology can transform higher learning through innovative pedagogical approaches and customised mechanisms of providing feedback (Lim et al., 2023; Mohamed, 2024). Such technology makes learning more individualised and responsive through the delivery of concepts, collection of data, and instant customised feedback (Alenezi et al., 2023; Hwang & Chen, 2023). Such technology makes collaborative course development possible, aids problem-solving, as well as improves academic support through the gamification and adaptability of assessment (Ivanov & Soliman, 2023; Strzelecki, 2024).

Literature constantly emphasises the ability of AI to customise learning and optimise student performance using intelligent tutoring systems and recommendation algorithms (Nemorin et al., 2023; Steenbergen-Hu & Cooper, 2014). Additionally, incorporating AI into university courses

enhances collaborative learning, optimises research opportunities, and fosters security within learning spaces (Kuleto et al., 2021; Strzelecki, 2023; Ziemba et al., 2024).

Intrinsic motivation and the AI learning environment

Academic success relies heavily on motivation, with students' motivation to learn having a direct correlation with results (Filgona et al., 2020). Studies conducted by Alamer (2015), Brooker et al. (2018), and Huang et al. (2023) have indicated that learner motivation is influenced by both the learning environment as well as involvement. Interactive and learner-focussed methods can boost intrinsic motivation and subsequently academic performance (Huang et al., 2023). Literature has proven that motivation plays a crucial role in influencing learners' cognitive processing, engagement, goal persistence, as well as strategic learning approaches (Alamer & Alrabai, 2023; Chiu et al., 2023; Tremblay-Wragg et al., 2021). Alamer and Alrabai (2023) add that students' receptivity to the use of AI tools is directly linked with its effectiveness in real-life applications. With the sensitive nature of teenagers' motivation, Bhat et al. (2024) posit that there should be further research into the motivational mechanisms of AI in learning. AI-based tools are hence placed not only as learning aids but as motivation boosters if implemented pedagogically with consideration for students' requirements (Huang et al., 2023; Muthmainnah et al., 2022).

Generative AI: Educational applications and capabilities

Generative AI (GAI) technologies have facilitated the autonomous generation of varying content types—which extends to text, images, audio, and video through sophisticated statistical and probabilistic modelling (Baidoo-Anu & Ansah, 2023; Jovanovic & Campbell, 2022; Ooi et al., 2023). Patterns from training data are recognised by such systems for creating new artefacts. Importantly, learning algorithms such as generative adversarial networks as well as generative pre-trained transformers have proven exceptionally effective for tasks of generating as well as understanding language (Ahuja et al., 2023; Brown et al., 2020; Govender, 2024; Mannuru et al., 2023; Wang et al., 2023). GPT-3 with 175 billion parameters has proven superior for performance across domains, including education, as it can mimic human-like interactions as well as produce domain-specific academic content (Brown et al., 2020; Kublik & Saboo, 2022; Motlagh et al., 2023).

Latest research into the application of AI within higher education identified drivers of adoption, including performance expectancy, effort expectancy, and social influence (Strzelecki & ElArabawy,

2024). It was with the aid of the unified theory of acceptance and use of technology (UTAUT) framework that the contribution of the intention of action and external support was determined for effective utilisation of utilities such as ChatGPT. Results show that increased awareness, customisation, and familiarity vastly augment adoption by students and educators (Strzelecki et al., 2024). Nevertheless, the literature also warns against possible ethical issues. As Berendt et al. (2020) observe, using AI and big data within educational contexts may jeopardise privacy and basic rights if poorly handled. Self-determination theory (SDT) suggests that intrinsically motivated learning for the sake of enjoyment or interest is key to persistent learning (Ryan & Deci, 2022). Douds (2022) and Ryan and Deci (2022) contend that extrinsic pressures of deadlines or evaluation can inhibit such motivation, while emotional recognition and autonomy can augment it. Intrinsic motivation promotes creativity, autonomy, and active involvement with learning tasks (Lin & Wang, 2021).

Numerous studies attest that AI-based applications, such as gamified software, personalised feedback mechanisms, and chatbots, can enhance learners' internal motivation (Chichekian & Benteux, 2022; Wang et al., 2024). For instance, Lee et al. (2022) proved that AI-based chatbots applied in postclass assessments enhanced students' motivation, participation, and performance. Chiu et al. (2023) also examined how pedagogical practices align with AI, establishing that teacher support, self-regulation, and computer literacy determine students' internal motivation for AI-based learning environments.

Enhancing learning through AI-driven personalisation

AI applications provide enormous opportunities for increased learning effectiveness through individualisation and adaptability. T. Wang and Cheng (2021) indicate that AI integration in education simplifies the provision of feedback, automates routine tasks, and facilitates adaptive testing according to particular students. Ethical concerns regarding data privacy, permission, and learner agency remain, however (Nguyen et al., 2023). Alam (2023) indicated that AI-powered learning environments enable immersive experiences, instant feedback, as well as personalised instruction within subjects. Such interventions may be adjusted according to students' levels and interests, making learning both inclusive and interactive, particularly through gamification and simulation. Klayklung et al. (2023) highlighted ChatGPT's ability to enable interactive as well as personalised learning. Not only does it support students with language understanding, but it can even aid teachers with the provision of feedback as well as instructional assistance outside of the classroom. This research aimed to provide answers to the following questions:

Question 1: To what extent does the integration of generative AI tools enhance EFL university students' academic writing in terms of vocabulary, structural coherence, and audience awareness?

Question 2. How does the use of generative AI in academic writing influence students' motivation and learning autonomy in English language education?

Methodology

Context and participants

The study was conducted over a six-week instructional period at a mid-sized private university in Santiago, Chile, as part of a first-year EAP course. A total of forty Chilean undergraduate students were recruited using purposive sampling from two intact EAP classrooms. All participants were Spanish-speaking learners of and had been placed at the B1–B2 proficiency level on the Common European Framework of Reference (CEFR) through university-administered placement testing. Participants were randomly assigned to one of two groups. The experimental group (n = 20) received writing instruction supported by GenAI tools, specifically ChatGPT, while the control group (n = 20) received traditional instruction without access to AI tools. The random allocation allowed for comparable baseline characteristics between groups, while preserving the ecological validity of classroom-based research.

Research design

This study adopted a parallel mixed-methods design to investigate the pedagogical value of integrating (GenAI) tools into academic writing instruction for EFL university students. Quantitative and qualitative data were collected concurrently, analysed independently, and merged at the interpretation stage to provide a comprehensive understanding of the intervention's effects. The quantitative component followed a quasi-experimental, pre-test/post-test design, while the qualitative component captured learner perceptions, motivation, and writing autonomy through structured reflections. This design enabled both performance outcomes and learner experiences to be interpreted together for deeper pedagogical insights.

Instructional procedures

Both groups followed a standardised writing curriculum consisting of expository, argumentative, and cause-effect essay tasks. Instructional input, assessment rubrics, and weekly class contact hours were

equivalent across the two groups. The experimental group was introduced to ChatGPT during the first week and received guided instruction on how to use it to support ideation, structuring, lexical choice, and editing. The instructor modelled effective prompting techniques and included targeted AI-integrated tasks, which were embedded into the weekly writing workshops. Students in this group maintained a weekly reflection journal to record their use of AI, critical thinking processes, and decisions regarding content revision. In contrast, the control group completed the same writing tasks using conventional strategies such as teacher feedback, peer editing, and textbook exercises. They were not exposed to any AI-based tools throughout the duration of the study.

Data collection

Quantitative data were obtained through two timed writing tasks: one administered as a baseline assessment in the first week (pre-test) and the other conducted in the final week (post-test). The prompts were designed to be thematically equivalent to ensure fair comparison across time points. Student essays were assessed using an analytic rubric adapted from Hyland's (2005) model of academic discourse. The rubric evaluated three core dimensions of academic writing: vocabulary richness and appropriacy, structural coherence and organisation, and rhetorical awareness, with an emphasis on audience engagement and stance. Two trained EAP instructors independently rated all essays. In instances where their scores differed by more than one full band, discrepancies were resolved through consensus discussions to ensure inter-rater reliability.

Qualitative data were drawn from structured written reflections submitted by the experimental group after the post-test. Students responded to four open-ended prompts focusing on the perceived usefulness of GenAI, its effect on motivation, the level of writing autonomy experienced, and any challenges encountered. These reflections provided in-depth insight into learners' affective and cognitive engagement with the AI tools during the writing process.

Data analysis

Quantitative analysis was conducted using SPSS version 29. Descriptive statistics were computed for pre- and post-test scores within and across groups. A repeated-measures ANOVA was used to test for significant differences over time and between groups. The interaction effect between time and group condition was of particular interest, as it indicated whether the GenAI-supported instruction yielded a statistically significant improvement in writing performance beyond the traditional approach.

Partial eta squared (ηp^2) values were reported to convey effect sizes, with a significance threshold of $p < .05$. Qualitative data were analysed using thematic analysis. A hybrid coding strategy was employed, combining deductive codes derived from the research questions—motivation, autonomy, engagement, and over-reliance—with inductively generated codes that emerged from students' responses. Transcripts were uploaded to NVivo for systematic coding. Themes were refined through iterative cycles and validated through peer debriefing. This process ensured both analytical rigour and the faithful representation of participant perspectives.

Trustworthiness and validity

Several measures were undertaken to ensure validity and reliability. The writing prompts and scoring rubrics were piloted and validated before full implementation. Instructional materials and learning outcomes were standardised across groups to minimise instructional bias. Inter-rater reliability was established through independent scoring and resolution discussions, resulting in a Cohen's kappa coefficient of .84. The mixed-methods design enabled data triangulation, while thick description of the instructional context and procedures supported transferability. Peer checking and researcher reflexivity contributed to the overall trustworthiness of the thematic analysis.

Ethical considerations

The study received approval from the institutional ethics review board of the participating Chilean university (Approval No. ZC-2025/4/2). Written informed consent was obtained from all participants prior to data collection. Students were assured that their participation was voluntary, and that they could withdraw at any point without academic penalty. Confidentiality was maintained through anonymisation procedures, including the use of pseudonyms in all reporting. All data were stored securely on encrypted, password-protected drives accessible only to the principal investigator.

Given the involvement of AI tools, additional ethical safeguards were implemented. Students in the experimental group were explicitly instructed that AI-generated content was to be used as a resource to support—not replace—their own ideas. Instructional sessions included discussions on academic integrity, authorship, and the limitations of AI output. Students were required to submit annotated versions of their work where they explained how AI was used, edited, or adapted. These measures helped prevent passive dependency on GenAI and promoted responsible, critical engagement with emerging technologies.

Analysis

The qualitative data Table 1 reveal that generative AI integration fostered distinct benefits in students' academic writing. Under the theme of improved vocabulary, learners noted an increased lexical variety, reporting that "*ChatGPT helped me find more academic words I never used before*" Table 1. This suggests that AI prompts can broaden students' academic register repertoire, supporting more precise word choices and richer expression. In tandem, the better organisation theme highlights enhancements in structural coherence, with a student observing, "*I followed the AI's suggestions to structure my essay more clearly*" Table 1. Such feedback indicates that AI scaffolding can guide learners through logical essay frameworks, potentially reducing cognitive load associated with planning.

Table 1

Themes and subthemes from students' experiences using generative AI for academic writing

Theme	Subtheme	Representative Quote
Improved vocabulary	Lexical variety	*"ChatGPT helped me find more academic words I never used before."*
Better organisation	Structural coherence	*"I followed the AI's suggestions to structure my essay more clearly."*
Increased motivation	Enjoyment and engagement	*"I enjoyed writing more because the tool made it feel easier."*
Over-reliance on AI	Passive learning behaviours	*"Sometimes I copied everything the AI wrote and didn't think for myself."*
Awareness of audience	Reader consideration	*"It reminded me to consider who I'm writing for, not just what I want to say."*

In addition, heightened motivation was a salient qualitative finding. Numerous participants noted that writing was more fun as a result of using the tool because it facilitated ideation and drafting. One student said, "*I enjoyed writing more because the tool made things easier*" Table 1, highlighting AI assistance's psychological affordances. On the other hand, over-reliance on AI was a warning against passive learning practices: "*At some points I just copied everything the AI generated and didn't think for myself*" Table 1. This fact suggests that without instruction, students can replace reflective thought with algorithmic output, potentially inhibiting the growth of self-regulated writing. Lastly, consideration of audience came through as a surprising payoff of AI assistance: suggestions from AI

helped students think about readers' expectations, with one student expressing, "It reminded me to think about who I'm writing for, rather than what I want to say" Table 1.

Quantitative analyses corroborate these qualitative insights. Descriptive statistics, Table 2 depict equivalent pre-test means for the control (M = 64.14, SD = 4.80) and AI groups (M = 63.87, SD = 4.10), indicating initial parity. Post-test results diverged: the AI group achieved a mean of 69.77 (SD = 4.81), compared with 64.35 (SD = 5.20) for controls, yielding an overall increase in the combined sample (M = 67.06, SD = 5.66). These descriptive trends suggest that AI support may accelerate writing improvement beyond traditional methods.

Table 2
Descriptive statistics of pre-test and post-test scores by group

	Group_code	Mean	Std. Deviation	N
Pre-test Score	.00	64.14350719279 0850	4.800142107195 129	20
	1.00	63.86654813812 2050	4.104238472059 430	20
	Total	64.00502766545 6450	4.410371457089 378	40
Post-test Score	.00	64.34558184660 8700	5.204790545905 268	20
	1.00	69.77235846619 1190	4.811659260995 589	20
	Total	67.05897015639 9920	5.659336113849 201	40

Repeated-measures ANOVA Table 3 confirmed a significant main effect of time, $F(1, 38) = 38.14$, $p < .001$, $\eta p^2 = .50$, demonstrating overall score gains across the study period. Crucially, the time × group interaction was also significant, $F(1, 38) = 33.26$, $p < .001$, $\eta p^2 = .47$, indicating that the AI group's improvements exceeded those of the control group. Within-subjects contrasts (Table 4) further verify these linear trends: time: $F(1, 38) = 38.14$, $p < .001$, $\eta p^2 = .50$; interaction: $F(1, 38) = 33.26$, $p < .001$, $\eta p^2 = .47$. Together, these results substantiate that generative AI integration contributed uniquely to student progress.

Table 3

Results of tests of within-subjects effects for Time and Time × Group interaction

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	186.531	1	186.531	38.137	.000	.501
	Greenhouse-Geisser	186.531	1.000	186.531	38.137	.000	.501
	Huynh-Feldt	186.531	1.000	186.531	38.137	.000	.501
	Lower-bound	186.531	1.000	186.531	38.137	.000	.501
Time * Group_code	Sphericity Assumed	162.663	1	162.663	33.257	.000	.467
	Greenhouse-Geisser	162.663	1.000	162.663	33.257	.000	.467
	Huynh-Feldt	162.663	1.000	162.663	33.257	.000	.467
	Lower-bound	162.663	1.000	162.663	33.257	.000	.467
Error(Time)	Sphericity Assumed	185.863	38	4.891			
	Greenhouse-Geisser	185.863	38.000	4.891			
	Huynh-Feldt	185.863	38.000	4.891			
	Lower-bound	185.863	38.000	4.891			

Table 4

Results of tests of within-subjects contrasts

Measure: MEASURE_1

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	186.531	1	186.531	38.137	.000	.501
Time * Group_code	Linear	162.663	1	162.663	33.257	.000	.467
Error(Time)	Linear	185.863	38	4.891			

Table 5

Results of tests of between-subjects effects for Group_code

Measure: MEASURE_1

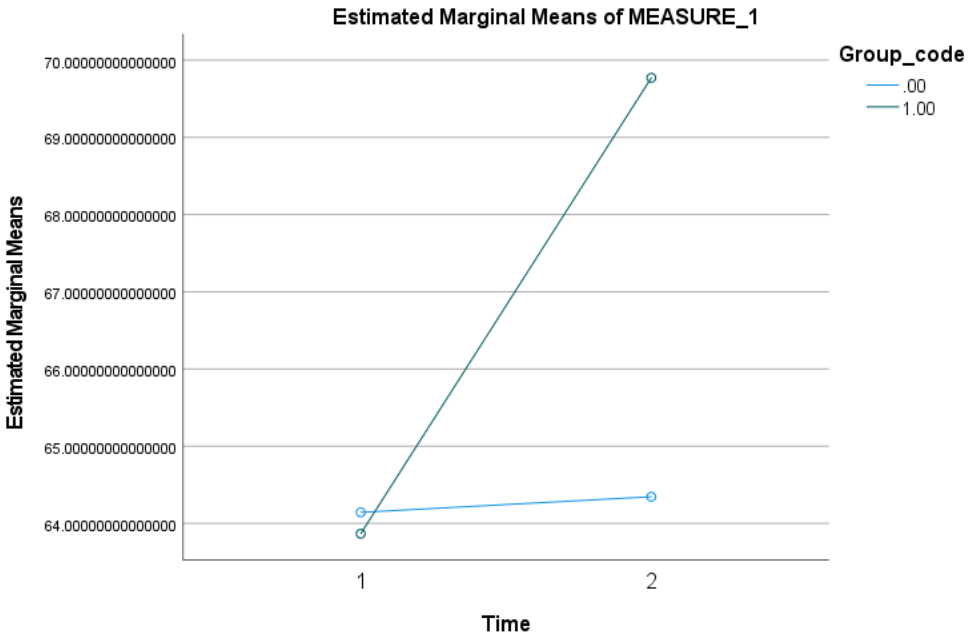
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared

Intercept	343555.431	1	343555.431	8551.922	.000	.996
Group_code	132.603	1	132.603	3.301	.077	.080
Error	1526.570	38	40.173			

Between-subjects effects Table 5 and Figure 1 showed no significant baseline differences between groups after controlling for the intercept, $F(1, 38) = 3.30$, $p = .077$, $\eta p^2 = .08$, supporting the assertion that observed gains stemmed from the intervention rather than pre-existing disparities. The high intercept value, $F(1, 38) = 8551.92$, $p < .001$, $\eta p^2 = .996$, reflects overall score magnitude but does not detract from the non-significant group effect.

Figure 1



Discussion

The current research aimed at investigating the pedagogical implications of incorporating (GenAI) into academic writing pedagogy for university students of. Analysing quantitative results alongside qualitative comments, this research sheds light through empirical evidence on the twin affordances and constraints of GenAI in developing students' writing proficiency, motivation, as well as learner autonomy.

The statistical results indicated a marked improvement in writing scores of students who had interacted with GenAI tools, particularly vocabulary range, structural coherence, and awareness of audience. This aligns with previous research conducted by Su et al. (2023) and Li et al. (2024), which noted the affordances of GenAI systems like ChatGPT for ideation, organisation, and lexical choice of L2 writing tasks. Nonetheless, the qualitative answers also revealed risks, such as the dependence on content provided by AI with less room for autonomous critical thinking—echoing warnings expressed by Zhang and Crosthwaite (2025) and Mizumoto et al. (2024).

One of the most evident advantages that were noted within this research was the development of students' lexical repertoire. Students often indicated that GenAI applications helped them access more accurate and advanced vocabulary that they had never employed. This coincides with research by Yeralan and Lee (2023) and Curtis (2023), who indicated that AI-provided feedback tends to feature academic vocabulary and subject-area vocabulary, making it a helpful aid for students struggling with genre conventions. While such vocabulary enrichment leads to more fluent, error-free writing, lexical richness alone does not necessarily constitute rhetorical proficiency. As Jiang and Hyland (2024) warn, excessive use of lexical bundles can turn writing monotonous and robotic, which can curtail opportunities for rich expression as well as interpersonal connection. Nevertheless, the improvements evident from students' vocabulary selection, attested to by both statistical results and student comment, point towards the effectiveness of using GenAI as a learning scaffold for vocabulary development in the context of EAP. This is of particular relevance for students of EFL who might otherwise have less access to rich academic input outside class. It must be noted, though, that without incorporating reflective learning exercises or critical work within the learning design, there is a risk of students using GenAI as a shortcut instead of as a learning assistant.

Structural coherence and writing organisation

The second common thread was students' use of GenAI to augment their organisational skill. Students indicated that AI prompt assistance aided them to articulate their ideas more clearly and to structure their essays more rationally. Quantitative measures substantiated substantial post-test gains for structuring, demonstrating that students benefited from using GenAI assistance to create more coherence and sequencing. Results are consistent with those of Steiss et al. (2023), who found students to revise more successfully when provided with AI-provided structure and flow feedback. Such a benefit can be understood through the framework of cognitive load theory. Planning and

structuring are cognitively taxing tasks of academic writing, particularly for non-native students who have to handle linguistic issues at the same time. GenAI applications can reduce such a burden by imitating cohesive structures and providing explicit transition measures. Crosthwaite and Jiang (2017) firmly believe that scaffolding with modelling plays a pivotal role in making L2 writers internalise genre conventions as well as rhetorical expectations. Nevertheless, such should not be construed as proof that AI produces fully cohesive or maturely rhetorical texts. Studies conducted by Tang et al. (2024) and by Berber-Sardinha (2024) have indicated that although GenAI can imitate text cohesiveness, it is usually unable to sustain thematic development or even a quality of rhetorical richness in prolonged discourse. This shortcoming serves to underscore that teachers need to present GenAI as a drafting aid or revising tool instead of a replacement for original composition.

One of the most outstanding discoveries of the current research was students' increased awareness of audience, as expressed. Several of the participants reported that suggestions from GenAI encouraged them to think more actively about their readers' expectations—a quality of L2 academic writing that can sometimes remain underdeveloped. This corresponds with Hyland's (2005) model of stance and engagement, where interpersonal positioning plays a central role within academic discourse. This is important because it implies that GenAI, if given the right prompt, can act as a linguistic aid as well as a rhetorical mentor. Few past studies have directly reported the audience-awareness effect, although it roughly tracks Su et al.'s (2023) noted gains in AI-assisted argumentation writing. If GenAI software is able to push students towards increased reader awareness, it will be a substantial development for its pedagogical uses. More research, however, is required to ascertain whether such awareness endures throughout writing tasks or is activated only by the AI interface.

One of the main goals of the research was to determine if the integration of GenAI had a positive effect on students' inherent desire to write. The qualitative results indicate that it did. Students often explained writing as a more pleasant and less fear-provoking endeavor with the assistance of AI, due to the ease of generating ideas and drafting. This evidence is supported by the educational AI motivational literature (Huang et al., 2023; Lee et al., 2022), which confirms that interactive, personalised aids can assist with motivation through the alleviation of anxiety as well as the development of self-efficacy.

This finding also aligns with self-determination theory (Ryan & Deci, 2022), which identifies autonomy, competence, and relatedness as drivers of intrinsic motivation. GenAI appears to contribute to at least two of these domains. First, it enables students to take initiative in managing their writing process, thereby enhancing autonomy. Second, the real-time feedback it offers can reinforce students' sense of competence, especially when it leads to visible improvements in output. However, as Chichekian and Benteux (2022) argue, motivation in AI-mediated environments is shaped not only by tool design but also by instructional context. If students perceive GenAI as merely an automated editor, the motivational effects may be short-lived. Therefore, pedagogical frameworks must be deliberately structured to support sustained engagement through goal setting, reflective tasks, and metacognitive prompts.

Concerns around passive use and over-reliance

Even with these positive results, research revealed significant caveats. Several students admitted to replicating complete AI-written paragraphs verbatim without revision or critique. This passive practice may indicate a worrisome over-reliance on the device, which can detract from learning independence as well as from critical thought. Such issues have been previously highlighted by Mizumoto et al. (2024), who said that L2 writers tend to lose attention to inconsistency in AI-generated content and may automatically accept it. Additionally, passive use can suppress the formation of writer identity—which Booth et al. (2023) as well as Bunch (2013) highlight as a key to empowering EFL students who are culturally and linguistically marginalised within academic settings. If students offload the cognitive work of writing to GenAI, they may dissociate from the pertinent writing practices that writing courses are intended to foster.

This situation underscores the ethical nuance of AI incorporation: how to preserve support while maintaining student agency. Han & Li (2024) contend that teacher mediation is key to striking a balance, with the goal of having AI as a collaborator, not a replacement author. Practically, that could mean creating activities where students are asked to critique, revise, or annotate AI work instead of just submitting it. Another area worthy of note is the wider concern of fairness and bias within AI technology. While beyond the main scope of the current study, it is important to place our results within a community where there is a growing criticism of disparities within AI performance for different learner populations. Research conducted by Liang et al. (2023) and Bender et al. (2021) have

indicated that GenAI models tend to be trained from datasets that put non-native writers at a disadvantage, resulting in biased detecting systems and uneven quality of support.

Though the students who participated in our research did not describe such disparities, there is a risk that students from underrepresented linguistic groups are subject to subtle exclusion or misrepresentation within AI-generated content. Thus, fair utilisation of GenAI necessitates scrutiny of both training data and output quality—an agenda that needs to be addressed jointly by teachers, developers, and policymakers.

Pedagogical implications and future directions

Collectively, the results of this research provide guarded optimism for the application of GenAI to teaching academic writing. Implemented with consideration, AI can facilitate vocabulary acquisition, push structural clarity, and even encourage rhetorical sensitivity. AI can also render writing more compelling and less cognitively taxing for EFL writers, potentially closing gaps in achievement while enhancing self-regulated learning.

Nonetheless, pedagogical adoption of GenAI needs to be thoughtful and reflected. Educators must model explicitly for students how to deploy AI as a drafting aid, as opposed to a text generator. Writing exercises need to provoke reflective utilisation, inviting students to query and revise AI suggestions. Assessment rubrics may even have to change, reflecting the hybrid quality of content composed partly by humans and partly by AI. Moreover, longitudinal studies must investigate how long benefits are maintained without the aid of AI. Are gains in vocabulary recalled later without AI assistance? Transfers of rhetorical awareness from one genre to another? It is these kinds of longitudinal studies that set a research agenda that must keep up with change.

Conclusion

The research for this paper provided evidence for how incorporating generative AI software into learning materials for academic writing can positively affect the writing of university-level EFL students, specifically vocabulary acquisition, structural organisation, and knowledge of effective persuasion. Quantitative measures indicated test-score gains for students who were using AI, while qualitative results indicated increased learner motivation as well as commitment. Students benefited from the tool's aid for creating ideas, outlining arguments, as well as uncovering new academic vocabulary. Notably, a heightened awareness of audience was gained by some of the participants as a

result, something that is seldom accomplished with conventional teaching of EFL without extensive training.

Nevertheless, these advantages have some challenges. Over-reliance on AI writing and unchecked copying indicate that students can dissociate from autonomous learning and self-regulated writing habits if they are utilised without pedagogical guidance. As the results show, GenAI's real strength comes from augmenting students as they craft their voice as writers as well as academic literacy, not from replacing it. Thus, incorporating GenAI into writing instruction is a matter of purposeful scaffolding, reflective assignment, as well as ethics considerations so that its application bolsters instead of replaces the learning process. This research contributes to the ongoing discourse of AI as it pertains to education, presenting a balanced picture of its ability to augment—not abbreviate—the acquisition of academic writing ability.

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Generative AI (ChatGPT) was used exclusively for language checking and improving clarity and fluency in the writing of this manuscript. No AI-generated content was used for idea development, data analysis, or interpretation of results. All critical thinking, analysis, and academic writing were conducted by the author.

Conflict of interest

The author declares no conflict of interest related to the research, authorship, or publication of this study.

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