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Doctoral Students' Use of Generative Artificial Intelligence (GenAI) in Academic Writing: Their Engagement with AI-Powered Writing Tools

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Abstract

Since the launch of ChatGPT in 2022, a range of Generative Artificial Intelligence (GenAI) tools have emerged to support students' English academic writing, benefiting particularly English as an additional language (EAL) students. Previous studies have primarily focused on undergraduates' knowledge, perceptions, and practices of GenAI use in writing. Research on postgraduates, especially EAL doctoral students' engagement with GenAI remains relatively limited; yet, these students are expected to demonstrate a higher level of writing proficiency to effectively disseminate their research within the academic community. To address this gap, this study aims to examine how EAL PhD students engage with GenAI tools behaviourally, cognitively, and affectively in a thesis writing course. Data were collected from students through questionnaire surveys and focus group interviews. Findings reveal that most participants viewed GenAI as a valuable tool for assisting their writing. However, some expressed hesitation about using the technology due to concerns about academic reputation and the originality of their research writing. This study has significant pedagogical implications regarding: i) the support needed by EAL PhD students to effectively use GenAI in their writing; and ii) possible ways to integrate GenAI technology into academic writing courses.

Keywords: GenAI writing assistant tools; EAL doctoral students; academic writing; engagement

Students' abilities to present information and ideas clearly and effectively in writing play a vital role in their academic performance. Research has indicated that proficient student writers can attain academic success across different domains (Yoon, 2011). These proficient writers excel in different aspects of writing, such as organization, coherence, grammar, and word choice (Campbell, 2019). However, academic writing goes beyond writers' abilities to express ideas in a clear structure with proper grammar. This genre requires critical analysis and synthesis of sources, as well as logical and evidenced-based arguments (Moore & Morton, 2017). These demands are particularly challenging to EAL learners, who may find it difficult to adapt to the academic writing expectations when entering English-medium universities (Starfield & Paltridge, 2018; Zaheer, 2025). A major reason for such challenges is that these students' prior language learning has not addressed expectations related to discipline-specific terminology, academic vocabulary, and rhetorical conventions (Hyland, 2018; Tran, 2020).

Mastering academic writing skills is especially crucial for doctoral students, as they are required to produce a range of research-based texts, such as theses, project proposals, and journal articles, which demand critical thinking abilities. This challenge is even more pronounced for EAL doctoral students, who must also address issues related to accuracy and appropriate language use. This is evident in Hong Kong, which has seen a rapid increase in the number of students from mainland China in the past 20 years. As many of these students have little academic writing training, they encountered considerable challenges (Lin & Morrison, 2021). While universities have provided writing support services including intensive academic writing courses and one-off writing workshops, such support is far from sufficient for students who seek continuous writing assistance throughout their studies. This problem has been alleviated with the emergence of GenAI, which offers a variety of functionalities, ranging from generating and organizing ideas, paraphrasing and summarizing sources to grammar check, while providing spontaneous and timely feedback to enhance students' writing performance (Li, 2025; Moorhouse et al., 2025).

However, the use of these tools is not without reservations. For example, some students have expressed ethical concerns regarding the extent of AI use in their writing (Yao, et al. 2025), while some doubted the usefulness and accuracy of AI-generated information (Moorhouse et al., 2025). Previous research on students' use of GenAI tools in academic writing has largely focused on how students perceive and use the technology during their writing process, and these studies primarily focus on undergraduates. Research on the use of GenAI in academic writing among postgraduates, particularly EAL doctoral students remains scarce. To address

these needs, this paper examines EAL PhD students' perceptions and actual use of GenAI tools in academic writing, which is guided by the following three research questions:

- i) How did the students utilize GenAI tools in their academic writing and what are the underlying reasons for their use?
- ii) To what extent were the students aware of the affordances and constraints of leveraging GenAI tools in their writing, and how such awareness informed and shaped their responses to AI-generated feedback?
- iii) What were the students' attitudes and emotional reactions towards their engagement with the tools?

An understanding of these students' attitudes toward GenAI tools, their awareness of the opportunities and challenges presented by these tools, and their engagement with such technologies to enhance their writing can provide valuable insights into two interrelated issues: their ability to effectively leverage these technologies to support their writing needs, and their commitment to uphold academic integrity and maintain the originality of their work. As emerging academics, any inappropriate or ineffective use of AI technology may jeopardize their credibility and future career prospects (Đerić, et al., 2025). Insights into their perceptions and practices can also help language educators develop effective strategies to enhance the writing support and services for EAL doctoral students in the GenAI era.

Literature Review

Academic Writing Challenges Faced by PhD Students

Many students, especially EAL PhD students, encounter a range of challenges in academic writing. This genre is unique due to its complexities, which include mastery of academic language, understanding of writing requirements, and familiarity with discipline-specific conventions. To EAL learners who have little prior training in academic writing, structuring and writing up an academic text is a challenging and daunting task (Sidman-Taveau & Karathanos-Aguilar, 2015; Teng & Yue, 2023). This challenge is further compounded at the doctoral level, where PhD students are expected to comprehend complex discipline-specific concepts, engage with extensive literature, and express their ideas with a high level of academic rigor. While these students can seek support from their supervisors, research has shown that supervisors may feel overwhelmed by the daunting task of reviewing and editing students' drafts (Maher et al., 2014). Some universities have provided writing support such as academic writing courses, writing workshops and one-to-one consultations; however, these support and services tend to

be one-off, intensive and unidirectional (Badenhorst et al., 2015; Larcombe et al., 2007; Son & Park, 2014). In addition, these support services may not meet supervisors' expectations (Gopee & Deane, 2013; McAlpine & Amundsen, 2011). These challenges, along with EAL students' limited English proficiency, have hindered their development of academic writing skills. This is evidenced by prior research, which shows that EAL doctoral students encounter greater challenges than their English-speaking counterparts (Ma, 2020; Wang & Li, 2008). For example, these students are often unfamiliar with the specific content and organizational features required in the various chapters of a research thesis (Bitchener & Basturkmen, 2006). Some have even experienced difficulties in expressing their ideas using appropriate vocabulary (Cooley & Lewkowicz, 1997; Dong 1998). This situation is compounded by the difficulties in obtaining timely and adequate feedback from their supervisors. Such delay in feedback have led to frustration and even stress during their doctoral studies (Gupta et al., 2022). The emergence of GenAI writing assistant tools has provided a potential remedy for these students.

GenAI in Academic Writing: Affordances and Challenges

GenAI has brought both benefits and challenges to students' academic writing. Previous studies have examined the affordances of GenAI tools in academic writing, including their functions as a provider of brainstorming (Barrot, 2023), outlining (Barrett & Pack, 2023) and editing (Casal & Kessler, 2023). For example, in Chan and Hu's (2023) study, both undergraduate and postgraduate participants used GenAI tools to facilitate their writing, such as searching for literature, summarizing readings, and proofreading drafts. Students' partnership with GenAI has enabled them to improve their language proficiency, writing competency, and overall understanding of academic writing genres (Marzuki et al., 2023; Rad et al., 2023; Rafi & Amjad, 2025). However, the use of GenAI tools in academic writing has presented new challenges.

Researchers have raised issues related to academic integrity and ethical concerns. Some contend that GenAI may lead to unintentional plagiarism because of writers' failure to evaluate AI-generated responses critically and incorporate them directly into their writing (Nugroho et al., 2024; Salvagno et al., 2023; Yan, 2023; Zou & Huang, 2024). Studies have also revealed concerns that students' over-reliance on GenAI could lead to a potential reduction in their critical thinking and learning loss (Moorhouse et al., 2025; Zou & Huang, 2024). The continuous advancement of GenAI tools is likely to exacerbate these existing challenges. In response, scholarly attention has begun to explore further students' engagement with GenAI in AI-assisted writing.

EAL Doctoral Students' Engagement with GenAI

Understanding students' engagement with GenAI provides insights into their writing practices and learning experiences. Previous studies on academic writing highlight the complex interplay among genre awareness, rhetorical knowledge, and academic language proficiency (Cheng, 2007; Li & Flowerdew, 2020; Tardy, 2005). GenAI-powered writing tools can serve as valuable aids for students in navigating the complex academic writing landscape, with particular benefits for EAL PhD students. Cheng et al. (2025) suggest that ChatGPT can enhance postgraduates' genre awareness and rhetorical knowledge by providing them with immediate information on genre conventions and rhetorical structures specific to their research area. These tools can also produce sample sections of a research paper upon demand. While prior scholarship has investigated students' use of GenAI tools in academic writing, limited research has explored PhD students' engagement with these tools; specifically, the extent to which they use them, how they use them, and their reasons for use or non-use.

To answer these questions, this study adopts Zhang and Hyland's (2023) model of digital literacy and student engagement with feedback in second language writing. This model was developed to enhance understanding of student reactions to automated writing evaluation feedback through three forms of engagement: behavioral (revision behaviors based on feedback), cognitive (cognitive strategies taken to address feedback), and affective (attitudes and emotional responses to feedback). The model has been adopted in previous studies on student engagement with different forms of feedback such as teacher, peer, and automated feedback (Koltovskaia et al., 2024; Zhang et al., 2023; Zhang & Xu, 2022). For example, Koltovskaia et al. (2024) adopted the model to examine how Iranian postgraduate students engaged with AI-generated feedback when revising their research proposals. In addition, Gazmuri et al. (2025) also adopted the same model to investigate L2 learners of Spanish and Indonesian engagement with ChatGPT's feedback behaviorally, cognitively, and affectively in essay writing. The widespread use of Zhang and Hyland's (2023) engagement model is attributed to its ability to provide a comprehensive understanding of how students engage with feedback from various sources, as well as insight into the factors that facilitate or hinder the integration of feedback into writing.

The current study extends the utilization of the engagement model by investigating EAL PhD students' engagement with GenAI writing assistant tools, focusing on: i) students' experiences in leveraging AI technologies in their writing process; ii) their awareness of GenAI's affordances

and challenges, and its impact on their responses to AI-generated feedback; and iii) their attitudes and emotional responses when using GenAI in academic writing.

Methodology

Study Context

The study was conducted at a university in Hong Kong that offers a wide range of Research Postgraduate (RPg) programmes. Most RPg students (also known as research students) are pursuing a PhD degree, while a smaller proportion are enrolled in a Master of Philosophy (MPhil) programme. The overwhelming majority of these students (about 95%) are from mainland China, with the remainder coming from Hong Kong or other countries. The participants in the present study were enrolled in research-based programmes. As the medium of instruction in the university is English, all the participants were required to achieve a minimum overall IELTS score of 6.5 (or an equivalent test score) before commencing their studies.

Considering the language skills required for RPg students' studies and publications, and the observation that most mainland students are strong in receptive skills (reading and listening) but relatively weak in productive skills (speaking and writing) (Lin, 2023; Qian & Lin, 2020), the university mandates that all RPg students take two language courses unless they pass an exemption test. The two courses are: "Presentation Skills for Research Students" and "Thesis Writing for Research Students."

Participants

A total of 74 students (31 females and 43 males) participated in the data collection. The majority (92.5%) were from science and technology disciplines, while the remaining 7.5% were from the humanities and social sciences. Of the 74 participants, valid responses were obtained from 71 students in the first round of the questionnaire and 64 students in the second round. The reduction in valid responses was due to incomplete answers, such as missing one or two items. At the end of the semester, all 74 students who had agreed to participate in the study were invited to take part in focus group interviews, and 56 attended. To accommodate participants' schedules, the interviews were conducted in six sessions on different days. Informed consent was obtained from all participants. All interviews were recorded, transcribed, and subsequently analyzed thematically.

Data Collection

The data for the present study were gathered from the aforementioned writing course, “Thesis Writing for Research Students”. This 13-week course (3 hours per week) focuses on thesis writing and also introduces key skills necessary for composing other types of academic texts, such as journal articles. It required that students complete three assessments, with the first two being closely interrelated. Both assessments focused on the same task: writing an introduction to a research paper based on the students’ current research. These two assessments followed a process writing approach, i.e., students completed a first draft for Assessment 1 (approximately 1,000 words), received feedback from the instructor, and then revised and submitted a second draft for Assessment 2 (approximately 1,200 words). The task required students to structure their introductions according to Swales’ (1991) Creating a Research Space (CARS) model. This requirement reduced the likelihood of students submitting introductions generated by GenAI tools.

Despite this reduced possibility, there were still concerns about students’ inappropriate use of GenAI. To identify how students engaged with GenAI during the assessment process, a sequential explanatory design is adopted in this study (Creswell & Plan Clark, 2018). Quantitative data were collected first, followed by qualitative information to elaborate, explain, and confirm the initial quantitative data (Plano Clark & Ivankova, 2015). This study administered two rounds of online surveys: one after the submission of Assessment 1 and another after Assessment 2. Following Dalati and Marx’s (2018) 6-W model of questionnaire design, the surveys included both 5-point Likert scale items and open-ended questions, which permit deeper insights into respondents’ views. Both types of questions were intended to address the three research questions.

The first round focused on how GenAI was leveraged during the completion of Assessment 1, such as its roles as an information provider and a language assistant during the drafting of the introduction. The second round addressed higher-level concerns, including comparisons between teacher and GenAI feedback, the relationship between GenAI use and critical thinking skills, and prompt writing strategies. The survey results guided question development and topic prioritization for the focus-group interviews. Six sessions of semi-structured focus group interviews were conducted at the end of the semester, and each lasted between 45 to 60 minutes. All the interviews were conducted in English to ensure coherence across the survey and focus group interview data, enabling a comparison between students’ responses in the survey and those shared in the focus group interviews. While the survey questionnaires focused

on students' experiences with GenAI, mainly addressing 'what' and 'how' questions, the semi-structured interviews were designed to explore these experiences in greater depth, particularly the reasons behind their practices, thereby addressing 'why' questions.

Research Framework and Data Analysis

Data analysis is guided by Zhang and Hyland's (2023) three-dimensional model. In line with this framework, the survey results were first tabulated to identify trends and patterns in students' perspectives and practices. Findings related to the three types of student engagement with GenAI were further supplemented by data from the focus group interviews. The interview transcripts were coded in NVivo 14 and thematically analyzed following Braun and Clarke (2006). The analysis process consisted of repeatedly reading, categorizing, and aligning themes and sub-themes according to Zhang and Hyland's (2023) learner engagement model. Two experienced researchers were involved in this process. They independently reviewed and cross-checked their thematic findings, resolving discrepancies through discussion until consensus was reached. This analysis aimed to further explore the nuances of students' engagement in these three areas. Figure 1 presents the data collection and analysis process.

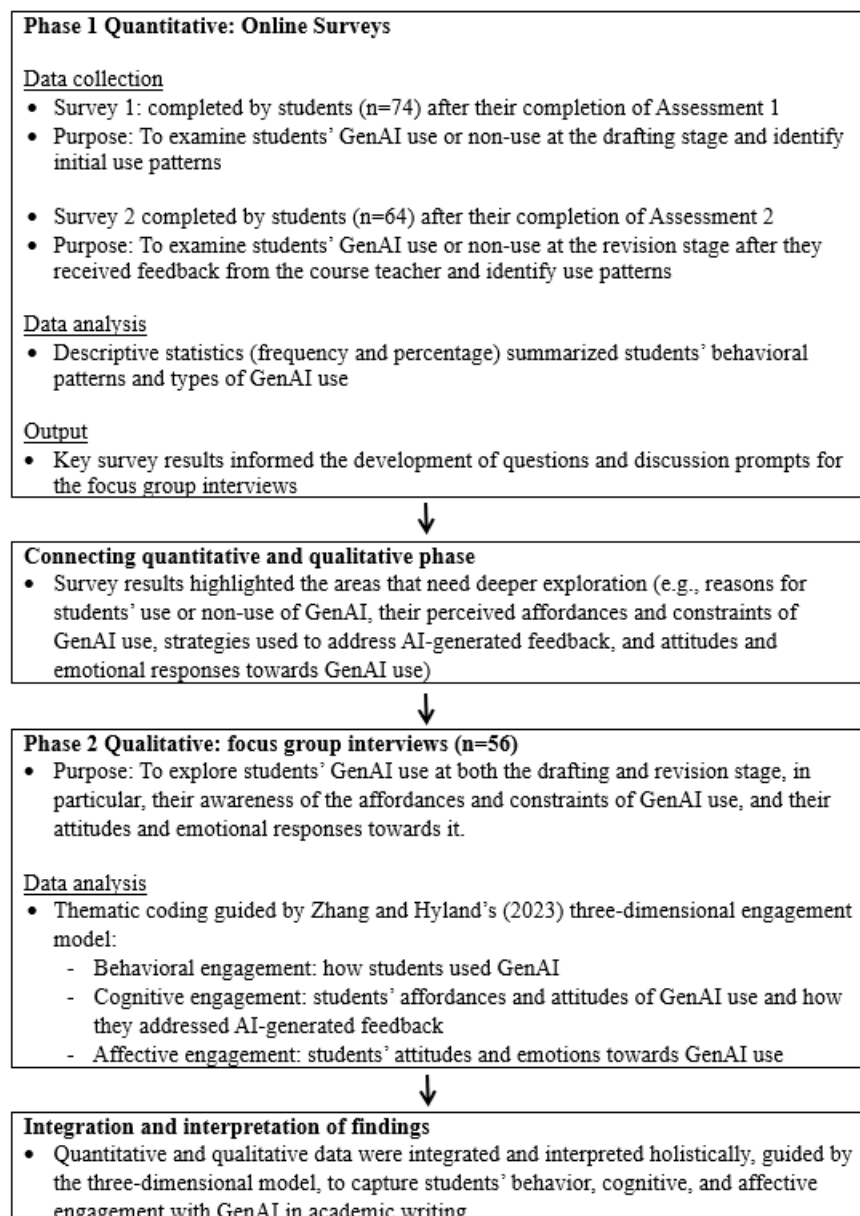


Figure 1. Data Collection and Analysis Process

Findings

This section presents the findings from the two online surveys and the follow-up focus group interviews, focusing on how the participants engaged with GenAI behaviorally, cognitively, and affectively during their writing process. As mentioned in the data collection section, this study adopted a sequential mixed-methods approach with quantitative data showing the broader

patterns of students' GenAI use and qualitative data providing depth and context to explain "why" these patterns emerged. In this section, the results from both sources are presented sequentially and integrated to address each research question.

RQ1: How did the students utilize GenAI tools in their academic writing and what are the underlying reasons for their use?

The first survey focuses on students' GenAI use at the drafting stage. Table 1 shows their two specific uses: information search and language refinement. Survey results (n=71) reveal a low overall GenAI use for information search and a relatively higher use for language enhancement. Only 18 students (25%) reported GenAI use for information search: background information gathering (48%), literature search (28%), and language use (24%). Among the 46 students who did not use GenAI for information search, 41% stated their concerns about the reliability of AI-generated information, 26% reported the lack of discipline-specificity in AI-feedback, and 26% doubted the usefulness of AI-generated information. A small number of them did not feel the need to use GenAI (11%) and very few reported unfamiliarity with the technology (7%).

Compared to the information search, GenAI was more frequently used for language refinement (58%). The use was centered on word use (37%), grammar check (31%), and paraphrasing (26%). Very few reported using GenAI to rewrite their paragraphs (6%). For students who did not use GenAI for language refinement (42%), their primary reasons were personal preference (27%), use of non-GenAI tools such as Microsoft word grammar check (20%), and issues of inaccuracies and unreliability (17%) (See Table 1 for full list).

Table 1. Specific Uses of GenAI at Drafting Stage

Information search			
Percentage of users	Reasons for usage (% among users*)	Percentage of non-users	Reasons for non-usage (% among users*)
25% (n=18)	<ul style="list-style-type: none"> Gathering background information (48%) Literature search (28%) 	75% (n=53)	<ul style="list-style-type: none"> Unreliability of AI-generated information (41%) Lack of discipline-specificity (26%) Limited usefulness (26%)

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- Seeking information about language use (24%)
 - Deemed unnecessary (11%)
 - Unfamiliarity with GenAI (7%)

Language refinement

Percentage of users	Reasons for usage (% among users*)	Percentage of non-users	Reasons for non-usage (% among users*)
58% (n=41)	<ul style="list-style-type: none"> • Checking words/phrases (37%) • Grammar check (31%) • Paraphrasing (26%) • Rewriting paragraphs (6%) 	42% (n=30)	<ul style="list-style-type: none"> • Personal preference (27%) • Use of non-GenAI alternatives (20%) • Inaccuracies and unreliability (17%) • Inconvenience (10%) • Unfamiliarity with GenAI (10%) • Forgot to use (7%) • No reasons (6%) • Privacy concerns (3%)

**Multiple options are allowed. Percentages reflect the proportion of students selecting each option.*

The second survey focuses on students' GenAI use at the revision stage after receiving teacher's feedback (see Table 2). Out of 64 respondents, 28 of them (30%) used GenAI to support their draft revision. These students primarily used GenAI comments on specific points (50%) and the overall writing (32%) of their drafts. Some described using prompting strategies including re-prompting based on unexpected AI-generated responses (32%), multiple rounds of prompting (29%), and switching to a new prompt (7%). In contrast, those who did not use GenAI for revision (n=36) questioned mainly the accuracy (36%) and usefulness (15%) of the AI-generated responses, as well as academic appropriateness (14%) (Table 2).

Table 2. GenAI Use at the Revision Stage

Students used GenAI at the revision stage (30%, n=28)

Users' strategies	Percentage among users*
Seeking comments on specific points	50
Seeking comments on overall writing	32
Prompting and re-prompting strategies	<ul style="list-style-type: none">• Re-prompting based on unexpected results (32%)• Multiple rounds of re-prompting to obtain desired results (29%)• Changing prompts after first round (7%)

Students did not use GenAI at the revision stage (70%, n=36)

Reasons for non-usage	Percentage among users*
Inaccurate and biased information	36
Information not useful	15
Academic appropriateness	14
Misalignment with task requirements	13
Other	7

**Multiple options are allowed. Percentages reflect the proportion of students selecting each option.*

Findings from the focus group interviews contextualize the quantitative results above, highlighting students' practical and strategic considerations of GenAI use to support their writing. Students elaborated on the effectiveness of GenAI in addressing lower order writing tasks such as grammar and spelling check at the drafting stage. They viewed GenAI mainly as a means for basic language refinement, reducing their time on mechanical corrections, and allowing them to focus more on their own research. These views were illustrated in the three excerpts below.

Excerpt 1

“It is good in dealing with low level tasks such as grammar. But in terms of high-level requirements, such as the structure and ideas and technical issues, it cannot compare with our teachers and professors.”

Excerpt 2

“I think AI is new technology and it can speed up writing efficiency, then students will have extra time to do more research.”

Excerpt 3

“I think also, GenAI and all kinds of AI-based tools should be accepted to increase efficiency and productivity. So, if we can save the time on writing, then we can have more time to do experiments.”

While students valued GenAI’s efficiency in language refinement, most of them expressed their concerns about using the technology for gathering information such as literature search. This finding corroborates the survey results, which can be illustrated by Excerpts 4 and 5.

Excerpt 4

“I wanted to ask ChatGPT to seek some information and write a literature review for me and it would just give me something fake.”

Excerpt 5

“Sometimes, it may be misleading. For example, it will generate many references. Many of them do not exit.”

These excerpts may account for students’ cautious attitudes towards GenAI use for information search. The prompting and re-prompting strategies captured in the survey results also appeared in the qualitative data, revealing students’ critical stance rather than direct acceptance of the feedback. Excerpts 6-8 show their critical strategies to address AI-generated feedback.

Excerpt 6

“If not very useful, give it more background and give more information for it.”

Excerpt 7

“If I want to get more explicit feedback, I need to express my questions more in detail.”

Excerpt 8

“So, when I'm not satisfied with the answer, I will also do the prompt.”

The findings from both the online surveys and focus-group discussions suggest that students’ GenAI use was mainly driven by instrumental and practical reasons: seeking assistance in

language refinement rather than information or idea generating. Students' cautious and selective use highlights their awareness of the limitations in GenAI.

RQ2: To what extent were the students aware of the affordances and constraints of leveraging GenAI tools in their writing, and how such awareness informed and shaped their responses to AI-generated feedback?

This section addresses RQ2 by first presenting students' perceived affordances and constraints of GenAI use, followed by a description of their adaptative strategies in response to AI-generated feedback.

Affordances and Constraints

RQ2 was primarily addressed using Survey 2 results, which specifically probed perceived affordances and constraints of GenAI use after students completed the two written assessments. According to Table 3, more than half of the participants (61%) valued the timely response from GenAI, a substantial proportion of them (32%) commended GenAI's language-support functions, and a small number of them (7%) highlighted the diversified AI-generated information. These affordances were accompanied by students' awareness of the challenges in integrating AI-feedback into their writing. About one-third of the respondents reported the inaccuracy of the AI-feedback (31%), around one-fifth worried about committing plagiarism (18%), and a small proportion had privacy concerns (18%), indicating that GenAI may collect information about their unpublished research. A minority of students questioned the source of information generated by AI (17%) and raised ethical concerns (16%).

Table 3. Affordances and Challenges of GenAI in Academic Writing (n=64)

Affordances	Percentage	Challenges	Percentage
Easy access and instant responses	61	Inaccuracy of AI-feedback	31
Enhancement in language use	32	Unintentional plagiarism	18
Diverse perspectives in AI-feedback	7	Privacy concerns	18
		Lack of source transparency of AI-feedback	17
		Ethical issues	16

Findings from the focus-group interviews further illustrated students' awareness of the affordances and challenges captured in Survey 2. For example, Excerpts 9 and 10 reveal students' recognition of the timely feedback from GenAI.

Excerpt 9

"Maybe the GenAI, it gives feedback very quickly...If I ask the teacher, I need to wait and ask the teacher whether he has time or not."

Excerpt 10

"GenAI can give you a general idea... for example, for writing, you can get... feedback for grammar error, structural error, logical error. But for teachers, sometimes teachers are busy, so they usually give you like one aspect."

One other key affordance identified in the survey is the use of GenAI for language refinement. This is further elaborated during the focus-group discussions, where students described how they leveraged GenAI to improve grammar and clarity in their writing. Below are three illustrative quotes.

Excerpt 11

"GenAI can be utilized to correct grammar errors or the polishing of the sentence."

Excerpt 12

"Some sentences I'm not sure how to explain it more coherently or more academically. For this sentence, I will send it to GenAI to help me revise it."

Excerpt 13

"So, the GenAI can make it more natural and make it easier for the readers to understand."

During the interviews, students also articulated the challenges they encountered in using GenAI. Their concerns were related to hallucination effects, plagiarism, privacy, and the transparency of the source of AI-generated information. These views echo those captured in the second survey (see Table 3b). Apart from these, students also raised concerns beyond the survey. These include the loss of author voice and opportunities for writing and research skill development (Excerpts 14–17).

Excerpt 14

“GenAI will fully rewrite my paragraph, and the paragraph may be not what I want to retain.”

Excerpt 15

“Because some sentences or words that are generated by OpenAI would be very professional and the reviewer doesn't think it is my mother tongue.”

Excerpt 16

“AI makes the research lose its meaning. Because it replaces you to do all works, including the literature view and finding the research gap. I think this part is very important for research.”

Excerpt 17

“You use it [ChatGPT] to generate ideas and then you put the ideas to ChatGPT to polish them. In the whole process, you are not involved in the writing. You can't get the practice. In this case, it will undermine the value of the writing.”

Adaptative Strategies to Address AI-Generated Feedback

Results show that students employ different strategies to verify AI-generated feedback. As shown in Table 4, out of the 28 participants who used GenAI at the revision stage, 16 (56%) cross-checked AI-feedback against academic journals, and 11 (41%) evaluated AI-suggestions and selected words or phrases that align with the intended message. Only 1(3%) integrated AI-feedback directly into their writing.

Table 4. Approaches Adopted to Address AI-Generated Feedback (n=28)

Approaches adopted	Percentage
Verification of the AI-feedback against academic journals	56
Selection of preferred words/phrases generated by AI	41
Direct integration of AI-feedback into the writing	3

These strategies were also mentioned and further explained by students during the interviews. Excerpts 18 to 20 illustrate students' individualized approaches to managing AI-generated feedback.

Excerpt 18

"I noticed that sometimes the GenAI cannot understand the full point of my writing, and I need to double check whether the details express the key point of my writing. So, I need to double check."

Excerpt 19

"I will read the content and see if the logic and the meaning is right or not. So, [I will] change some sentences that I think may not [be] right or may not be very precise."

Excerpt 20

"I will compare with my own version and the version from Gen AI to improve my further writing skills."

The survey results and focus-group discussions suggest that while students placed high value on GenAI's immediate feedback and efficiency in providing language support, they remained sceptical towards the accuracy and reliability of AI-feedback. They also feared that they may lose the author's voice and the opportunity to develop their writing and research skills, which is crucial to their academic career. They addressed these limitations by verifying and editing AI-suggestions. They were aware that critical human judgement is indispensable for effectively and responsibly integrating AI-feedback in their writing.

RQ3: What were the students' attitudes and emotional reactions towards their engagement with the tools?

To answer the third research question, quantitative data are used to report students' attitudes, while qualitative data are presented to capture their emotional responses. Students' attitudes and emotional reactions towards using GenAI revealed a mix of reassurance, frustration, and

disappointment. Survey results showed that students generally had positive attitudes towards GenAI as a writing assistant. As shown in Table 5, out of 71 respondents, most of them appreciated GenAI's effectiveness in language editing (75%). However, a substantial proportion of them expressed mixed (15%) or even negative feelings (6%), with some (4%) claiming no use of GenAI in academic writing.

Table 5. Students' Attitudes Towards the use of GenAI in Writing the Introduction (n=71)

Attitudes	Percentage
Possible attitude towards GenAI for language improvement	75
Mixed attitude towards GenAI in supporting writing	15
Negative attitude towards GenAI in supporting writing	6
Indication of non-usage of GenAI in writing process	4

During the interviews, many students expressed a sense of reassurance, highlighting GenAI-assistance for EAL writers (Excerpts 21-23).

Excerpt 21

"Because we are all the non-native speakers. So, using some tools to help us improve our writings, I think it is very important."

Excerpt 22

"If someone like me, English is not good, I think it's very useful to choose the online tools to help write a paper. Because it can help us express more clearly and more correctly."

Excerpt 23

"I think the advantages is that these tools can provide immediate feedback. We can do quick revisions based on the feedback"

Some respondents even expressed their doubtfulness and frustration as they described AI feedback as "fake", "silly", and "bad". Excerpts 24 to 26 illustrate these emotions.

Excerpt 24

"I ask him to find a lot of literature, but they are all fake."

Excerpt 25

"But in academia, especially in Computer Science research, I think most ideas from ChatGPT are quite silly and don't make any sense."

Excerpt 26

“From my perspective of view, I think when I use ChatGPT to gather information, they always give me some citations from trash papers...ChatGPT don't know how to find the high-quality papers in prestigious conference...So in the end, the summary given by ChatGPT always looks very bad. Because they just use trash paper.”

It is worth noting that some students felt a sense of detachment, and they described AI-feedback as “too nice” and lacking “personal touch”. The impersonal feedback let some students question if AI-feedback was constructive and useful. Excerpts 27 to 29 reveal these emotions.

Excerpt 27

“Nearly, now we use it to get feedback. I think the Gen AI has been too nice. It will always encourage you and give you good feedback.”

Excerpt 28

“In most cases, it will encourage you. But sometimes you need to keep in mind if you are actually good or not.”

Excerpt 29

“And I think the disadvantage is that AI lacks the personal touch. It has no deep understanding of the students’ specific needs.”

Discussion

The purpose of this study was to examine EAL PhD students’ GenAI use in academic writing, focusing on how and why they used it (RQ1), their awareness of its affordances and limitations and how these might have informed and shaped students’ responses to AI-generated feedback (RQ2), and their attitudes and emotional responses towards GenAI use (RQ3). The findings suggest the complexities and dynamics of students-GenAI interactions across the three intertwined behavioral, cognitive, and affective dimensions (Zhang & Hyland, 2023). Overall, students were more likely to use GenAI for language refinement, and they tended to use the tools less for information search due to concerns regarding inaccuracies and unreliability. At the revision stage, students mainly used GenAI to seek comments on specific points in their writing through adaptative prompting strategies. Findings also revealed that students were clearly aware of both the affordances and constraints of GenAI use, and such awareness informed their GenAI use patterns, shaping their responses towards AI-generated feedback. Emotionally, students expressed a mix of reassurance, frustration, and disappointment. Taken together, these findings underscore the complex interplay between students’ behavioral, cognitive, and affective engagement with GenAI.

Behavioral Engagement: How and Why Students Used GenAI

Students' behavioral engagement was manifested through their active and strategic GenAI use to support the different stages of their writing. At the drafting stage, most participants avoided using GenAI to gather information for their writing due to issues related to accuracy, reliability, and discipline-specificity of AI-generated information. This finding is consistent with Yeung et al. (2025), who explained that postgraduates relied less on GenAI for information search as they had solid research foundations and experience, allowing them to rely more on their own experiences. Another possible reason is that discipline knowledge and evidence-based ideas are essential elements that must be evident in their scholarly writing; consequently, the PhD students in this study tended to rely on GenAI for information search.

Consistent with previous research (Kim et al., 2025; Yeung et al., 2025), the participants in this study primarily used GenAI for proofreading purposes such as grammar and spelling check, paraphrasing, and enhancing lexical variety and formality. This finding coincides with Cheng and Liu (2022) who suggest that students have higher-level of engagement with GenAI in terms of language refinement. Students valued GenAI's efficiency in producing more polished texts. The fact that GenAI can provide immediate feedback to address doctoral students' language polishing needs enables them to offload lower order writing tasks and focus on more complex research and academic writing challenges.

Students' behavioral choices with GenAI at the drafting and revision stage were closely intertwined with their cognitive engagement with GenAI. It is evident that the participants did not just simply accept all the AI-generated suggestions. Instead, they actively interpreted, evaluated, and selected the suggestions that best suit the context of their writing. Their prompting and re-prompting strategies also revealed their active and individualized engagement with GenAI (Koltovskaia et al., 2024; Wang & Wang, 2024). When encountering unexpected AI-generated responses, they either revised or changed the prompts used. Viewed from Zhang and Hyland's (2023) engagement framework, the student participants moved beyond simple acceptance of the AI-generated feedback. They were negotiating meanings with GenAI until they obtained desired responses.

Cognitive Engagement: Awareness and Adaptation to GenAI Feedback

The findings of the present study revealed that students' awareness of affordances and constraints of GenAI use emerged as a key factor that informed and shaped students' willingness to engage with GenAI, and their adaptative strategies to address AI-generated feedback. Many participants considered GenAI's high accessibility, immediate and varied feedback, and language support as the main affordances. This finding is consistent with previous research such as Dizon and Gold (2023), highlighting how the tools can support the technical aspects of writing, enhancing particularly EAL students' linguistic competence (Mizumoto & Eguchi, 2023; Seyyedrezaei et al., 2024). However, students also questioned the limitations of GenAI in generating accurate, reliable, and discipline-specific information, which may lead to unintentional plagiarism. They also expressed concerns about the loss of individual voice, and the chance to develop their research and writing skills. These concerns corroborate the limitations of GenAI reported in previous studies (Santiago et al., 2023; Singh, 2023, Yeung et al., 2025), highlighting the importance of critical human judgement when addressing AI-responses.

As shown in the finding section, students engaged in active cognitive processing of the AI-generated feedback with only one student (3%) directly integrated the feedback into their writing. Similar to the postgraduates in Koltovskaia et al. (2024), the EAL PhD students in this study engaged cognitively with the feedback – they critically evaluated the feedback and responded accordingly. They cross-checked the feedback with credible academic journals, adapted the comments for their context, and some also revised their prompts to obtain desired results. These behaviors demonstrate students' abilities to evaluate feedback critically and make informed revision decisions. It is important to note that unlike the students in Koltovskaia et al. (2024) who had research-led training or workshop during the time of study, the EAL students in this study were not trained in handling feedback. This may reflect their self-initiated strategies through active problem-solving and strategic thinking. It is evident that they exercised their discernment and metacognitive regulation during GenAI use while remaining cautious about its limitations.

Affective Engagement: Attitudes and Emotional Responses to GenAI Use

Students' attitudes and emotions towards GenAI use encompass a mix of reassurance, frustration, and disappointment. These feelings strongly influenced their behavioural engagement with GenAI. The findings showed that students commended about the language support from GenAI which resulted in their more academic and professional writing. They relied on GenAI for lower-stakes tasks such as grammar and spelling check. They valued the time saved for higher-order tasks related to their own research. Students also felt a sense of reassurance, indicating that GenAI can provide language support to EAL writers, assisting them to refine grammar, vocabulary, and paraphrase. This confirms studies that highlight the supportive role that GenAI plays in EAL students' writing (Oka Agustini, 2023). However, at the same time, students felt disappointed and even frustrated due to inaccurate feedback (Koltovskaia et al., 2024; Steiss et al., 2024). Furthermore, while AI-generated feedback was personalised to meet their needs (Kim et al., 2024; Santiago et al., 2023; Singh, 2023), the participants in this study felt that the feedback was mechanical, lacking a personal touch. They valued authenticity and a more critical and honest feedback. This finding shed light into the importance of having teachers' feedback to complement AI-generated feedback. As Escalante et al. (2023) explained, some students may still prefer interactions with teachers and the feedback from them.

Conclusions

This study examined EAL PhD students' engagement with GenAI in academic writing across the behavioral, cognitive, and affective dimensions. Behaviorally, most participants leveraged the tools primarily to enhance the local features of their writing, such as grammar and vocabulary. Cognitively, students actively engaged with the AI-generated responses, demonstrating an awareness of the tools' functionalities, the ability to identify their affordances and constraints based on personal experience, and the capacity to critically evaluate, rather than passively accept, the AI-generated feedback. Most students highly appreciated the instant and personalized feedback offered by GenAI tools, which allowed them to devote more time to their own research. However, some engagement was hindered by concerns about the originality and reliability of AI-generated responses. Affectively, students expressed mixed emotions: while they valued the language support offered by GenAI, they were sometimes disappointed and

even confused by the discipline-specific information generated by the tools. The interplay between students' behavioral, cognitive, and affective engagement with GenAI underscores the importance of cultivating PhD students' critical judgment, ethical awareness, and sustained reflection in AI-assisted writing.

Pedagogical Implications

The findings in the study have two valuable pedagogical implications. First, the study highlights how GenAI can support doctoral students in academic writing by providing personalized and timely feedback. This support is especially important for EAL PhD students, who typically face tight research schedules and administrative duties assigned by their supervisors. It is particularly important for those pursuing a thesis-by-publication, which requires the publication of a certain number of papers to complete their doctoral programme. Second, this study revealed that the participants primarily used GenAI tools for language polishing. As GenAI tools continue to advance, educators and students could collaboratively explore ways to expand their roles in academic writing. To foster students' behavioral engagement with GenAI, language educators can demonstrate effective prompt writing strategies for various stages of the writing process, such as brainstorming, drafting, and revising. They can also recommend a range of online language tools and teach students how to effectively leverage them for different purposes throughout the academic writing process. Cognitively, educators can focus on enhancing students' awareness of the affordances and limitations of these tools, as well as strategies for critically evaluating and integrating AI-generated feedback. Affectively, educators can share their own experiences with GenAI tools in academic writing, highlighting both their benefits and the potential risks of over-reliance.

Limitations

This study is subject to three main limitations. First, it draws on data from EAL doctoral students primarily in the science, engineering, and computing disciplines, who may have relatively higher AI literacy. Future research could explore the use of GenAI tools among students in other disciplines, such as Arts and Social Sciences, to enable comparison of the findings. This will contribute to an understanding of how doctoral students' research background can inform and shape their use of GenAI tools in academic writing. Second, this study focuses on the use of GenAI tools in completing course assessments, specifically the first and final drafts of a research paper introduction. It would be interesting to explore how these students use GenAI tools for

different types of academic texts such as PhD theses or research proposals. Such research can provide insights into the use of GenAI tools at the different writing stages of these different genres. Third, a longitudinal study could be conducted to examine how students' AI literacy develops over time, and whether increased confidence in their writing abilities leads to reduced reliance on the technology, or conversely, whether greater proficiency enables them to use these tools more effectively to generate personalized feedback that meets their writing needs.

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