RESEARCH ARTICLE
published: 21th April 2025
doi: 10.21070/jees.v10i1.1894

EFL postgraduate students' adoption and experiences of chatbot-assisted academic writing

Septi Rahmayanti,[1] Francisca Maria Ivone,[1]* Sintha Tresnadewi,[1] Singhanat Nomnian[2]

[1]University of Malang, Indonesia, [2]Mahidol University International Demonstration School, Thailand

Recently, chatbots have undoubtedly become valuable tools for foreign language learning, particularly in the context of academic writing. They influence the writing process, writing output, and language acquisition; however, their use also raises significant ethical and pedagogical concerns. This qualitative study employs the Technology Acceptance Model (TAM) framework to investigate the adoption and perceptions of chatbot-assisted academic writing among English as a Foreign Language (EFL) learners. Data were collected from 25 EFL learners enrolled in an English Language Education (ELE) postgraduate program through surveys and interviews. The study examines the use of chatbots across all phases of academic writing and explores the characteristics that contribute to their efficacy. The data was analyzed following the three stages of qualitative analysis by Miles et al. (2014), i.e., data condensation, data display, and drawing and verifying conclusions. Specifically, the study examines EFL learners' adoption and perceptions of chatbot-assisted writing based on perceived ease of use, perceived usefulness, attitudes toward usage, intention to use, actual use, and external variables. By investigating the experiences and attitudes of postgraduate EFL learners, the study aims to provide insights into the extent to which chatbots facilitate or potentially hinder the development of academic writing skills. The findings indicate that postgraduate students generally hold positive perceptions of chatbots, considering them useful tools for enhancing writing quality and efficiency. Future research could explore the long-term effects of chatbot-assisted writing and the complexities of student engagement and interaction with chatbot technology in various academic writing contexts.

Keywords: chatbots, writing instruction, academic writing, EFL learners, technology adoption

OPEN ACCESS
ISSN 2503 3492 (online)

*Correspondence:
Francisca Maria Ivone
francisca.maria.fs@um.ac.id

Received: 12th September 2024
Accepted: 22th December 2024
Published: 21th April 2025

Citation:
Rahmayanti, S., Ivone, F.M., Tresnadewi, S., Nomnian, S. (2025). EFL postgraduate students' adoption and experiences of chatbot-assisted academic writing. JEES (Journal of English Educators Society), 10(1). https://doi.org/10.21070/jees.v10i1.1894

INTRODUCTION

Artificial intelligence (AI) has advanced rapidly, resulting in contemporary manifestations and modifications in many different aspects of education (Jain & Jain, 2019). A notable example of this progress is the launch of ChatGPT by OpenAI on November 30, 2020. The introduction of Generative AI (GenAI) to the public was subsequently followed by other companies such as Google with Bard, Microsoft with Bing, and several others. These chatbots are currently employed to perform tasks such as providing information and responding to commonly asked questions (Smutny & Schreiberova, 2020). They can engage in conversations and interact with users by processing and responding to inputs in natural language. Given their potential benefits, AI has been increasingly integrated into various fields, including language learning and education.

The use of AI has recently expanded significantly across various sectors, including education. This rapid development has introduced innovative applications and brought transformative changes to different facets of the educational field (Jain & Jain, 2019). In academic settings, students perceive chatbots as valuable writing assistants that can enhance their writing skills by offering feedback on style, coherence, and grammar, leveraging their programmed capabilities (Aljanabi et al., 2023). As a result, the integration of chatbots in English language learning has gained increasing attention due to their innovative nature and engaging appeal. In particularly, academic writing instruction can benefit significantly from chatbot-assisted learning. These tools support researchers and students by assisting with content organization, initial draft creation, and revisions (Salmi & Setiyanti, 2023). Consequently, this technological innovation has revolutionized foreign language learning and instruction by significantly influencing language teaching, learning processes, and skill development. Language learners now have access to virtual assistants that not only aid them in writing in a foreign language but, in some cases, generate written content on their behalf.

Previous studies have emphasized that chatbots can support foreign language writing and enhance learners' academic writing skills. However, their use in academic writing also raises several concerns, particularly regarding the reliability of the information provided and the potential overreliance on technology for writing in a foreign language. More specifically, concerns have been raised about excessive dependence on AI, risks of plagiarism, and the necessity for fostering critical thinking skills (Yuan et al., 2024). Despite their potential benefits, integrating chatbots into academic writing practices presents several challenges. Emma et al. (2024) highlight the risks associated with AI technology, such as the generation of spam and malicious content, which pose ethical concerns for both users and developers. Additionally, because chatbots rely on statistical learning patterns derived from large datasets, they may inadvertently reinforce biases and stereotypes present in the data (Dale, 2017; Lucy & Bamman, 2021). Furthermore, language learners may struggle to adapt to chatbot interfaces or feel that interactions with chatbots cannot fully replace the guidance and support provided by human instructors or tutor.

To address these challenges, previous studies have emphasized the importance of teaching students effective prompting strategies, enabling them to utilize chatbots efficiently while also recognizing their limitations (Huang et al., 2023). As chatbots provide opportunities for personalized learning and immediate feedback, language educators must carefully consider their integration into the curriculum to maintain a balance between technological assistance and traditional language pedagogy (Pitychoutis, 2024; Yuan et al., 2024). Furthermore, to facilitate the effective integration of chatbots into language learning, it is essential to examine students' attitudes and perceptions, particularly in terms of how these tools influence their academic writing and overall learning experience.

Language learners have diverse perspectives on technology; while some perceive it as a valuable tool, others remain skeptical due to perceived challenges and limitations (Irwanto, 2002). Their perceptions of technological innovations, such as Generative AI (GenAI), along with their concerns, experiences, and attitudes toward the technology, influence their willingness to adopt it. Consequently, these perceptions also determine the extent to which the tool is integrated into the learning process (Chan & Hu, 2023). This is particularly relevant in the context of technology integration in language learning, where students' perceptions as users play a crucial role (Sumakul et al., 2022). Interest in GenAI for language education has grown significantly, as learners are more likely to engage with technology when they find it user-friendly and beneficial for their academic needs. However, research on the use of chatbots for academic writing and students' attitudes toward them, particularly among English as a Foreign Language (EFL) postgraduate students, remains limited.

Most existing research has primarily focused on the general educational applications of chatbots or their use in broader language learning contexts, often overlooking the specific challenges and needs that EFL learners encounter in academic writing. In particular, EFL postgraduate students face unique difficulties, such as mastering advanced academic writing conventions, developing a critical understanding of research topics, and effectively structuring academic arguments. These challenges underscore the importance of exploring how chatbots can support these learners in enhancing their writing skills. Moreover, there is limited empirical evidence on language learners' perceptions of the ease of use, usefulness, intention to use, and overall experience of employing chatbots for academic writing development. This is particularly relevant within the framework of the Technology Acceptance Model (TAM), which explains how users accept and adopt technology based on perceived usefulness and ease of use. Addressing this gap is essential, as understanding EFL postgraduate students' perspectives can offer valuable insights for educators, curriculum designers, and technology developers, ultimately helping to refine chatbot technologies to better meet the specific needs of this group.

Therefore, examining EFL postgraduate students' adoption and perceptions of chatbot-assisted academic writing is critical for informing best practices and facilitating the effective integration of GenAI technologies in academic writing instruction. This study seeks to answer the following research questions:

1. How do postgraduate English as a Foreign Language (EFL) students incorporate chatbots into the various stages of academic writing?
2. How do postgraduate EFL students perceive the use of chatbots in academic writing within the framework of the Technology Acceptance Model (TAM)?

METHODS

Research Design

The study employed a descriptive qualitative approach, using the Technology Acceptance Model (TAM) as its theoretical framework. Developed by Davis (1989), ATM is one of the most widely applied models in information technology research, particularly for examining how users accept and use new technologies. According to TAM, two key factors – perceived ease of use and perceived usefulness – play a critical role in determining users' intention to adopt a given technology. In the context of this study, TAM is particularly relevant because it provides framework for understanding how language learners perceive and adopt chatbots in academic writing.

In this study, 'adoption' refers to the intention to use chatbots, which is influenced by students' perceptions of the tool's usefulness and ease of use in improving their academic writing. 'Perception' refers to how students evaluate chatbots in terms of their effectiveness in supporting writing tasks, including the clarity, accuracy, and relevance of the feedback provided. These factors were central to the analysis of chatbot adoption in academic writing, as they influence whether students choose to incorporate these tools into their writing practices.

The qualitative approach adopted in this study emphasizes an in-depth understanding of participants' experiences with chatbots rather than aiming for broad generalizations. This approach facilitates a deeper exploration of how and why chatbots are perceived as useful – or not – in academic writing tasks, as interpreted through the lens of the TAM framework (Creswell, 2009).

Research Setting and Participants

The participants of this study were 25 fourth-semester EFL postgraduate students enrolled in the Department of English at a public university in East Java, Indonesia, who had been using chatbots as academic writing assistants. The rationale for selecting postgraduate students as research participants was their frequent engagement in academic writing tasks, such as essays, research reports, and journal articles, as well as their ability to provide informed perspectives on the use of chatbots as an academic writing tool. Additionally, participants were selected based on their willingness to participate, the variety of chatbots they used (e.g., ChatGPT, Grammarly, or Quill Bot), and their varying levels of experience in utilizing chatbots for academic writing.

Table 1 presents the demographic profile of the participants, including their age, gender, length of EFL study, and duration of academic writing experience in the target language.

TABLE 1 | Demographic profile of the participants (N = 25)

Characteristics	Detail	f	%
Age	20 - 24 years old	4	16
	25 - 29 years old	18	72
	30 - 35 years old	3	12
Gender	Male	4	16
	Female	21	84
Length of EFL Learning Experience	≥ 20 years	4	16
	≥ 15 years	11	44
	< 15 years	10	40
Length of Academic Writing Experience	≥ 10 years	7	28
	≥ 5 years	11	44
	< 5 years	7	28

Data Collection Instruments

In this study, data in the form of EFL students' perceptions and adoption of chatbots in academic writing were collected through a survey and interviews. The survey employed a questionnaire designed to examine students' adoption and perceptions of chatbot-assisted academic writing. The questionnaire included multiple-choice items, 4-point Likert scale items, short-answer questions, and long-answer questions. It was divided into four sections: (1) demographic information and experience with chatbots in language learning and academic writing, (2) adoption of chatbots at different stages of academic writing, (3) perceptions of chatbot use in academic writing, and (4) consent for interview participation.

To ensure the validity of the instrument, the researcher sought validation from two expert lecturers – one specializing in educational technology and the other in academic writing. Both experts provided feedback on the clarity, relevance, and alignment of the instrument with the research objectives. Additionally, a pilot test was conducted with a small group of respondents to evaluate the clarity and coherence of the questionnaire and interview questions, ensuring the instrument's reliability and cultural appropriateness. Based on the pilot test results, several adjustments were made to enhance the clarity and relevance of the instrument before the main study.

The semi-structured interviews were designed to expand on the questionnaire responses, focusing on clarifying participants' demographic profiles, exploring their general experiences using chatbots in academic writing, examining their adoption of chatbots at various stages of the writing process, and eliciting their perceptions of chatbot use. Participants were also asked to provide further descriptions, explanations, and comments on emerging issues. Both the questionnaire and interview guide were developed based on the six main components of the Technology Acceptance Model (TAM) proposed by Davis (1989) for modeling technology adoption. As shown in Figure 1, the TAM indicators used to develop the instruments include: (1) Perceived Ease of Use, (2) Perceived Usefulness, (3) Attitudes Toward Using Technology, (4) Intention to Use Technology, (5) External Variables, and (6) Technology Usage.

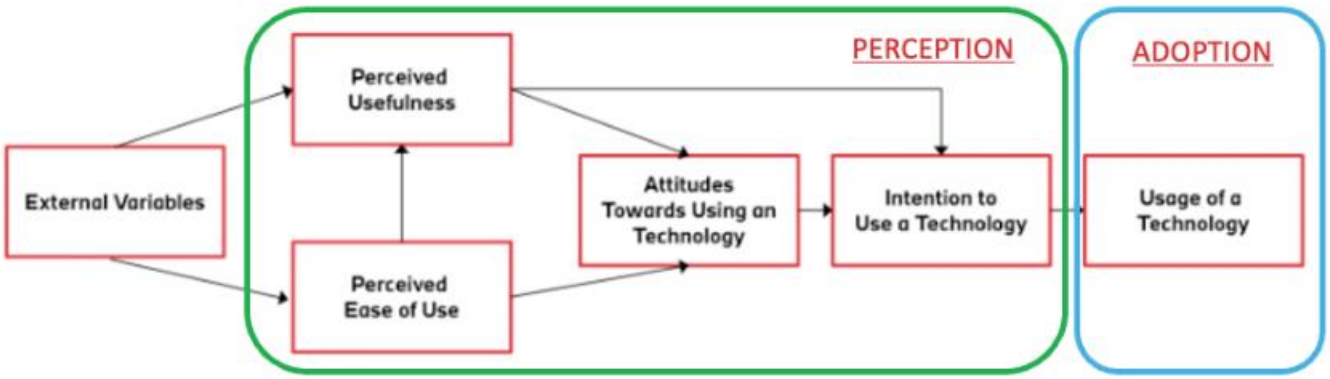

FIGURE 1 | The Technology Acceptance Model (TAM) by Davis (1989)

Data Collection Procedure

The questionnaire was distributed to the respondents via Google Form – with a two-week period allocated for responses. Only students who utilized chatbots as academic writing assistants were eligible to complete the form. Following the initial analysis of the questionnaire data, the researchers conducted face-to-face or online interviews with five selected respondents. These participants were selected based on their willingness to participate, the variety of chatbots they used (e.g., ChatGPT, Grammarly, or Quill Bot), and their differing levels of experience in utilizing chatbots for academic writing. The interviews aimed to clarify questionnaire responses that were limited, ambiguous, or required further elaboration. The mode of conducting the interviews – whether face-to-face or online – was determined by the respondents' preferences. After reviewing the initial interview data, the researchers conducted follow-up interviews with the same participants to obtain a more comprehensive dataset.

Data Analysis

Quantitative data collected from the questionnaire were tabulated and analyzed descriptively using frequency, percentage, and mean values. The results were then presented in summary tables. Qualitative data were analyzed using the three-stage process outlined by Miles et al. (2014): (1) data condensation, (2) data display, and (3) conclusion drawing and verification. In this study, data condensation involved organizing and refining the raw data from questionnaires and interviews by categorizing it into themes related to chatbot usage, perceptions, and adoption in academic writing. The researchers summarized and coded the data to highlight key insights relevant to the research objectives. Data display was achieved through visual representations, such as tables and thematic charts, to present the findings clearly and facilitate pattern recognition. In the final stage—drawing and verifying conclusions—the researchers analyzed the displayed data, identified overarching themes, and cross-verified the findings through triangulation, ensuring that the conclusions were well-supported and aligned with the study's objectives.

RESULTS AND DISCUSSION

Before addressing the two research questions – (1) How do English as a Foreign Language (EFL) learners adopt chatbots at various stages of academic writing? and (2) How do they perceive the use of chatbots in academic writing from the perspective of the Technology Acceptance Model (TAM) framework? – it is essential to first revisit the purpose and significance of these inquiries. Understanding how EFL learners adopt and perceive chatbots is crucial for identifying their support needs in academic writing. Chatbots have the potential to enhance the writing process by assisting at different stages, such as brainstorming, drafting, and revising. Therefore, examining learners' usage patterns and perceptions of chatbots can provide valuable insights into effective strategies for integrating such tools into academic writing instruction and support. The following section presents the chatbots utilized by the respondents in this study and their patterns of use in supporting academic writing.

Chatbots Usage in Academic Writing

The respondents reported using several types of chatbots in academic writing. As shown in Table 2, eleven different

chatbots were identified, each serving distinct purposes. The most widely used chatbots was ChatGPT, followed by Quill Bot, Grammarly, and Scite.ai. The remaining seven chatbots were used less frequently in the academic writing process.

TABLE 2 | Types Chatbot Used by the Respondents (N = 25)

No.	Chatbot	f	%	Functions
1	ChatGPT	17	68	Engage in conversation, answer questions, and provide information on a wide range of topics.
2	Quill Bot	8	32	AI-powered tool that helps in paraphrasing, rewriting, and enhancing text clarity for improved readability and comprehension.
3	Grammarly	3	12	AI-driven writing assistant that helps users improve their writing by checking grammar, punctuation, and style
4	Scite.ai	3	12	Provides insights and contextual analysis of scientific papers, aiding in literature review and citation management.
5	Perplexity	2	8	Conversational AI designed to provide precise answers and explanations, often used for specialized or complex queries
6	Gemini	2	8	Offers context-aware writing suggestions, assisting in refining and enhancing text clarity
7	Windows Copilot	1	4	Enhances productivity by integrating system features, offering quick access to tools such as grammar checkers and citation managers
8	Google Assistant	1	4	A virtual assistant developed by Google that helps users perform tasks, set reminders, and retrieve information through voice commands
9	Google Translate	1	4	A machine translation service by Google that facilitates text, documents, and website translation between multiple languages
10	IBM Watson Assistant Primarily	1	4	An AI assistant designed for businesses applications, providing customer support, answering queries, and automating routine tasks
11	U Dictionary	1	4	AI-powered translation and dictionary application that offers definitions, translations, and language learning resources

The data presented in Table 2 indicate that while ChatGPT is the most widely used chatbot, there is also significant interest in specialized tools such as Quill Bot and Grammarly for writing assistance. Interview findings on the use of chatbots at different stages of academic writing revealed that ChatGPT and Perplexity were the most preferred options among users. Additionally, the interview data suggested that while both ChatGPT and Perplexity serve similar functions in academic writing, Perplexity is perceived as more user-friendly and more accurate in providing academic writing support.

TABLE 3 | Description of Chatbot Usage (N = 25)

Questionnaire Items	*f*	%
I feel comfortable using chatbots to support the language learning process.		
Uncomfortable	3	12
Comfortable	20	80
Extremely comfortable	2	8
Using chatbots in language learning has made learning more convenient and accessible.		
Strongly disagree	0	0
Disagree	2	8
Agree	19	76
Strongly agree	4	16

Questionnaire Items	*f*	%
I use more than one chatbot in academic writing.		
Yes	20	80
No	5	20
How often do you use chatbots as a writing assistance in academic writing?		
Rarely	3	12
Sometimes	4	16
Often	16	64
Always	2	8
Do you have any preferences for the type of chatbot you use to assist you in the academic writing process?		
Yes	19	76
No	6	24

In terms of chatbot use, frequency, impact, and user preferences, the analysis of questionnaire data presented in Table 3 indicates a positive reception of chatbots in language learning. The majority of respondents (80%) reported feeling comfortable using chatbots, while 8% expressed being extremely comfortable utilizing them for academic writing support. Furthermore, 92% of participants agreed or strongly agreed that chatbots have made learning more convenient and accessible. Regarding academic writing, 64% of respondents frequently used chatbots for writing assistance. Notably, 80% of the total respondents reported using more than one chatbot for academic writing, with 64% using them often and 8% always relying on chatbots. These findings suggest that chatbot technology is widely adopted among postgraduate students. The popularity of chatbots was further explained by the respondents in the interviews, as illustrated in the following excerpts, which highlight chatbots' convenience, accessibility, and time-saving capabilities as key factors influencing their use in academic writing.

> *The reason I used Chatbot for my academic writing is to maximize the desired results and also to simplify and save time. (S2)*
>
> *Because it helps me correct grammar, is easy to access, and shortens the completion time. (S3)*
>
> *As long as we can ask the right questions or focus correctly, using the chatbot becomes comfortable. (S5)*

Overall, the findings confirm positive perceptions of chatbot use in both language learning and academic writing. Participants reported feeling comfortable using chatbots, found them convenient, and frequently utilized multiple chatbots to maximize their effectiveness. Their preference for specific chatbot types further highlights the importance of tailoring these tools to meet individual needs. As chatbot technology continues to evolve, integrating user insights will be crucial for enhancing the design and functionality of future educational and writing assistance tools.

How do postgraduate EFL students adopt chatbots at different stages of academic writing?

The adoption of chatbots across various stages of academic writing, as presented in Table 4, demonstrates high levels of utilization in the initial six stages: planning, literature review, drafting, revising, editing, and proofreading. However, their usage is notably lower in the formatting, citation, and referencing stages. The highest levels of chatbot use occur during the drafting, revising, and editing stages, with mean scores of 2.96, 2.96, and 3.20, respectively. The overall average mean score across all eight stages of academic writing is 2.75, indicating a generally high level of chatbot adoption in academic writing among postgraduate EFL students.

TABLE 4 | Chatbot Adoption in Academic Writing Stages (N = 25)

Writing Stage	Very low		Low		High		Very high		Mean ($\bar{x}$)	Category
	f	%	*f*	%	*f*	%	*f*	%		
Planning	1	4	5	20	17	68	2	8	2.80	High
Reviewing Literature	2	8	10	40	9	36	4	16	2.60	High
Drafting	1	4	3	12	17	68	4	16	2.96	High
Revising	0	0	5	20	17	68	3	12	2.92	High
Editing	0	0	2	8	16	64	7	28	3.20	High
Proofreading	1	4	8	32	13	52	3	12	2.72	High
Formatting	2	8	14	56	6	24	3	12	2.40	Low
Citing and referencing	2	8	12	48	10	40	1	4	2.40	Low
Average	**1.125**	**0**	**7.375**	**12**	**13.125**	**76**	**3.375**	**12**	**2.75**	**High**

Planning Stage

Overall, chatbots are perceived as highly supportive tools in the planning stage of academic writing. As shown in Table 4, 68% of respondents reported a high level of chatbot adoption during this stage, while 8% fell into the very high category. With a mean score of 2.80, this finding indicates a strong reliance on chatbots for planning academic writing. Supporting the survey results, the interview data further highlight the value of chatbots in the planning stage, as respondents found them helpful in identifying research gaps, formulating research questions, brainstorming ideas, and structuring content. Specifically, participant S3 limited chatbot use to particular tasks, such as title generation, while participant S4 utilized them to craft engaging introductions.

The following excerpts from the interviews illustrate these findings:

Of course, it helps me to find the gap for my research and formulate the RQ efficiently and timelessly. (S1)

For creating writing plans or timelines for my academic assignments, it's almost always used for brainstorming and outlining. For brainstorming, I usually ask for ideas on how to structure paragraphs for a specific topic, especially what the topic sentences should be. (S2)

I rarely use chatbots at the planning stage, but I usually use them to determine the title. (S3)

In the planning stage, I usually ask about opening sentences for writing new paragraphs and subsequent paragraphs. (S4)

Literature Review Stage

The adoption level of chatbots during the literature review stage indicates varied usage patterns. As shown in Table 4, 48% of respondents reported low or very low adoption levels, while the remaining respondents fell into the high or very high categories. The mean score of 2.60 suggests a generally high adoption level despite some reservations. Interview data revealed a mixed approach to chatbot use in this stage of academic writing. While some students relied on tools such as Perplexity, Scite.ai, and IBM Watson Assistant to find credible sources and summaries, others avoided chatbots due to their limitations in accessing specific articles or citations. These findings suggest that students prefer chatbots capable of providing access to reliable academic sources, highlighting the need for further improvements in their integration into research practices.

The following excerpts from the interviews illustrate these findings:

Sometimes, I find it hard to find the latest and newest references for my topic. Therefore, I used Chatbot for finding the literature review and I used perplexity. (S1)

Yeah, but for literature, I tend to use Perplexity and Scite.ai. Scite.ai really provides articles that are published in journals, not just regular websites. (S2)

Oh no, I've never used a chatbot because ChatGPT can't provide that. For example, when I asked about reviewing, I once asked, "Can you give me an article to read about critical thinking?" If it can't provide sources, it just gives me general information about the topic without any citations. (S3)

For reviewing literature, I used Scite.ai. Scite.ai is the assistance helps me to find journals in a more convenient way that google scholar. (S4)

I use IBM Watson assistant to gather information, search for articles and sources related to specific topics. It provides summaries, presenting summaries of relevant articles or studies. (S5)

Drafting Stage

The adoption level of chatbots during the drafting stage indicates a strong preference for their use. As shown in Table 4, 84% of respondents reported high or very high adoption levels, with a mean score of 2.96, confirming a high overall adoption rate. Interview data revealed mixed attitudes toward chatbot-assisted drafting. Some respondents (S1, S2, S3) preferred to draft independently, emphasizing the importance of originality and critical thinking. Conversely, others (S4, S5) utilized AI tools such as Windows Copilot and IBM Watson primarily for idea generation and content organization, particularly in the early stages of writing. These findings suggest that while chatbot adoption for drafting remains somewhat limited, there is a growing openness to AI-assisted writing support.

The following excerpts from the interviews illustrate these perspectives:

I never use chatbots for drafting academic writing because I prefer the ideas or sentences to come directly from my own thoughts. (S1)

Usually, I just need the topic sentence, and then I come up with the rest of the sentences on my own. Because ChatGPT generates sentences and paragraphs for us, but I often don't like the supporting sentences, so I usually write those myself. (S2)

I don't use chatbot for drafting my academic papers. (S3)

Yes, I use Windows Copilot to help draft my academic papers. It's particularly useful for generating ideas and organizing my thoughts. When I'm stuck or unsure how to start, I can type in my topic or a question, and it suggests different ways to approach the subject. It's like having a brainstorming partner. (S4)

Yes, I do use IBM Watson for drafting my academic papers. It helps me generate ideas and structure my thoughts, especially when I'm stuck or unsure about how to start a paper. However, I usually use it more for brainstorming and getting initial drafts rather than for the final version of my papers. (S5)

Revising Stage

The adoption level of chatbots during the revising stage indicates a strong preference for their use. As shown in Table 4, 80% of respondents reported high or very high adoption levels, with a mean score of 2.92, confirming a high overall adoption rate. Interview findings highlight the significant role of chatbots and AI tools in the revision process of academic writing. Respondents S1 and S2 utilized ChatGPT and Perplexity to interpret feedback and make necessary revisions, while S3 and S4 primarily relied on

chatbots for grammar and structural improvements. S5, though using chatbots less frequently, depended on tools such as Grammarly for grammar checking and paraphrasing. These findings suggest that although chatbot use in the revising stage is not universal, these tools are highly valued for enhancing clarity, providing constructive feedback, and facilitating the revision process.

The following excerpts from the interviews illustrate these perspectives:

Basically, I use ChatGPT and perplexity for formulating and revising my academic writing. It helps me to discover what my lecturer wants, because sometime he gives difficult feedback to be understood. (S1)

For revising, I've tried that with ChatGPT. For example, when I get comments from my professor and don't know how to start the revisions, I ask, "You are my supervisor, and I'm doing my thesis." Then I input the comments from my supervisor and ask, "What should I do?" Usually, it provides clear suggestions that are relevant and aligned with my needs. (S2)

Yes, I use chatbots to revise my writing, check grammar, and make my text more academic and well-structured. (S3)

I mostly use it to help with grammar revisions. (S4)

I rarely use it for revision, but I have used it to check grammar and for paraphrasing. For checking grammar, I use Grammarly. (S5)

Editing Stage

Chatbots during the editing stage indicates strong usage among postgraduate EFL students. As shown in Table 4, no students reported a very low adoption level, while 2 students (8%) fell into the low category. In contrast, 16 students (64%) reported high adoption, and 7 students (28%) reported very high adoption. The mean score of 3.20—the highest among all academic writing stages—further confirms that chatbot usage during editing is notably high.

The interview findings highlight diverse approaches to using AI tools for editing academic writing. S1 used chatbots exclusively for grammar checking, demonstrating a limited application of these tools in the editing process. S2 relied primarily on Google Docs for automatic correction of minor errors, noting that ChatGPT-generated text generally exhibited high grammatical accuracy. S3 viewed editing as an extension of the revision process, focusing on correcting inappropriate word choices and grammatical errors. S4 preferred Windows Copilot for editing, appreciating its ability to detect grammatical mistakes and suggest improvements in clarity and style. S5 favored specialized grammar and style-checking tools like Grammarly for editing, considering IBM Watson more suitable for content generation than detailed editing. Overall, while students recognize the value of AI tools in editing, their preferences vary, with many relying on specialized grammar-checking tools or built-in software features for comprehensive editing support.

The following excerpts from the interviews further illustrate these perspectives:

I use it only for checking the grammar. (S1)

For editing, not really, because I usually work a lot in Google Docs. So if there are mistypes, misspellings, or minor grammar errors, Google Docs automatically corrects them. Also, when I ask ChatGPT to generate sentences or paragraphs, the grammar is usually very good and even complex. (S2)

Yes, my editing is similar to revising; I just edit words that seem inappropriate and correct the grammar. (S3)

Yes, I do use Windows Copilot for editing my academic writing. It helps me catch grammatical errors and suggests improvements in clarity and style. Sometimes it highlights awkward phrasing or helps me rephrase sentences to make them more formal or academic. (S4)

I don't typically use IBM Watson for editing my academic writing. For editing, I prefer tools that are more focused on grammar and style, like Grammarly or the built-in tools in word processors. IBM Watson is more useful for generating content and helping with initial drafts, while editing requires a more detailed and nuanced approach that I find other tools handle better. (S5)

Proofreading Stage

At the proofreading stage, chatbots adoption varied among respondents. As shown in Table 4, 1 respondent (4 %) reported a very low-level adaptation, while 8 respondents (32%) fell into the low category. In contrast, 13 respondents (52%) reported in a high category of adaption, and 3 respondents (12%) reported a very high level of adoption. The mean score of 2.72 suggests a moderate to strong adoption level based on the proofreading indicator.

The interview findings highlight distinct approaches to using AI tools for proofreading academic writing. Most respondents (S1, S2, S3, and S5) did not utilize chatbots for proofreading, preferring manual review or alternative methods at this stage. S1 and S3 explicitly stated that they relied on their own proofreading processes rather than AI tools. S2 expressed a preference for revision over AI-assisted proofreading. In contrast, S4 used Windows Copilot for proofreading, valuing its ability to detect typos, correct spelling errors, and improve sentence structure and coherence. These findings indicate a prevailing preference for human oversight in the proofreading process, although some respondents acknowledge the usefulness of AI tools in enhancing clarity and refining their work.

The following excerpts from the interviews further illustrate these perspectives:

No, I don't use it for proofreading. I read by myself and chatbot only for checking the grammar. (S1)

Oh no, never. I prefer just revising. (S2)

I never use chatbot for proofreading stage. (S3)

Yes, I use Windows Copilot for proofreading as well. It helps me spot typos, spelling mistakes, and any other errors I might have missed. Additionally, it offers suggestions for improving sentence structure and coherence, which is really useful for making sure my writing is clear and polished before submitting it. (S4)

I don't usually use IBM Watson for proofreading my academic writing. (S5)

Formatting Stage

The analysis of chatbot adoption at the formatting stage indicates relatively low usage among respondents. As shown in Table 4, 2 respondents (8%) reported a very low level of adoption, while 14 respondents (56%) fell into the low category. In contrast, 6 respondents (24%) reported a high level of adoption, and 3 respondents (12%) reported an extremely high level of adoption. The mean score of 2.40 suggests a low overall adoption level of chatbots for formatting purposes.

Interview findings further confirm that most respondents preferred manual formatting rather than relying on AI technology. S1 and S3 expressed a preference for manual formatting due to the diverse formatting requirements of academic papers and the inconsistencies that may arise when using AI-generated content. Similarly, S2 and S4 stated that they did not use AI for formatting, with S4 specifically emphasizing that formatting is handled separately from the drafting, editing, and proofreading stages. S5 reported using word processing tools such as Microsoft Word and Google Docs for formatting, noting that IBM Watson lacked specialized formatting features. Overall, while AI tools are widely utilized for drafting, editing, and proofreading, formatting remains a task that most respondents prefer to manage manually or with conventional word processing software to ensure accuracy and adherence to specific academic requirements.

The following excerpts from the interviews further illustrate these perspectives:

I prefer to do formatting manually because each academic paper has different formatting requirements. (S1)

Oh no, I don't use that. It could be done, but I don't use it. (S2)

No. Because usually, when ChatGPT generates an essay for us and we copy it to Word, the formatting can get messed up and change. So, I handle the formatting manually. (S3)

Not really. While Windows Copilot is great for drafting, editing, and proofreading, I usually handle formatting separately. (S4)

No, I don't use IBM Watson for formatting my academic papers. Formatting is something I usually handle directly in word processing software like Microsoft Word or Google Docs. IBM Watson doesn't offer specific formatting features, so I rely on other software for that aspect of my work. (S5)

Citing and Referencing Stage

The results of this study indicate a low level of chatbot adoption at the citing and referencing stage, with most participants opting for manual methods or dedicated reference management tools such as Mendeley. Among the 25 respondents, 2 (8%) reported a very low adoption level, 12 (48%) fell into the low category, 10 (40%) were in the high category, and 1 (4%) was in the very high category. The mean score of 2.40 suggests that chatbot adoption for citing and referencing remains limited.

Interview data further support these findings, as most participants expressed a preference for manual citation methods or specialized reference management tools rather than relying on chatbots for this stage of academic writing. These results are consistent with the study by Hutson et al. (2024), which highlights the limitations of AI, including chatbots, in generating accurate citations and references. While chatbots provide convenience for other writing-related tasks, citation accuracy remains a significant challenge. This limitation may explain why the participants in this study preferred manual citation methods or established reference management tools that have been proven more reliable.

The following interview excerpts further illustrate these findings:

I do not use a chatbot for citing and referencing. Usually, I directly copy the references from google scholar. (S1)

I usually only ask for reference suggestions, but I don't use a chatbot for formatting references, I write them manually. (S2)

I don't use a chatbot for references; I usually use Mendeley. (S3)

No, I don't use Windows Copilot for citing and referencing. I usually handle that part manually. (S4)

I don't use IBM Watson for citing and referencing my academic papers. For citing and referencing, I rely on citation management tools like Mendeley. (S5)

How do postgraduate EFL students perceive the use of chatbots in academic writing from the perspective of the TAM framework

The perception level in chatbot usage aims to provide an overview of the general perception level of chatbot usage among the postgraduate EFL students in this study. Overall, 91.2% of the survey respondents rated chatbots positively, with an average mean of 1.912. In general, chatbots were valued for their ease of use, accessibility, and user-friendly interfaces, as well as their usefulness in assisting academic work, increasing productivity, and boosting writing quality.

TABLE 5 | Description of Perception Levels in Chatbot Usage (N = 25)

Perception	Negative		Positive		Mean Score	Category
	f	%	*f*	%		
Perceived Ease of Use	1	4	24	96	1.96	Positive
Perceived Usefulness	1	4	24	96	1.96	Positive
Attitudes toward Using Technology	5	20	20	80	1.80	Positive
Intention to Use Technology	2	8	23	92	1.92	Positive
External Variables	2	8	23	92	1.92	Positive
Average	2.2	8.8	22.8	91.2	1.912	Positive

Perceived Ease of Use

The perception level based on the ease-of-use indicator shows that 1 respondent (4%) fell into the negative category, while 24 respondents (96%) were in the positive category. The mean score obtained is 1.96, placing it in the positive category, indicating that the respondents' perception of ease of use was generally positive. This finding is further supported by the respondents' statements during the interviews.

The interviewees generally expressed a positive perception of the accessibility and ease of use of various AI tools. S1 rated accessibility highly, emphasizing that formulating clear questions were crucial for maximizing the tool's effectiveness. S2 found the tools very easy to use, provided a stable internet connection was available, and appreciated their ease of interaction. S3 also found the chatbots easy to access, preferring ChatGPT's interface over other tools like Perplexity. S4 described Windows Copilot as user-friendly, highlighting its intuitive interface and helpful suggestions. Similarly, S5 found chatbots straightforward and responsive, appreciating their ease of use and effective interface. Overall, the respondents consistently reported a favorable experience with the accessibility and usability of their chosen AI tools, emphasizing user-friendly interfaces and responsive interactions.

Perceived Usefulness

The usefulness of chatbots in academic writing encompasses familiarity with the technology and its effectiveness in supporting academic writing tasks. The perception level based on the perceived usefulness indicator falls into the positive category, with a mean score of 1.96. The interview data revealed that chatbots were highly effective for academic writing, as their responses were relevant to the academic tasks. Participants demonstrated a good understanding of how to use chatbots effectively. Moreover, chatbots were perceived as tools that could enhance students' productivity and efficiency in academic writing. Overall, students expressed satisfaction with the chatbots' performance in assisting them with academic writing tasks.

The following interview excerpts further illustrate these findings:

I give 9 for the accessible as long as your question is clear so it can help you maximally. (S1)

Very easy, as long as the internet connection is good. It's also easy to interact with. (S2)

The chatbot I use is very easy to access. Perplexity is the same, but in terms of appearance, I think ChatGPT looks better. (S3)

I find Windows Copilot quite easy to use. The interface is user-friendly, and the suggestions it provides are usually relevant and helpful. (S4)

I find the chatbot fairly easy to use. The interface is usually straightforward, and it's quite responsive when I ask questions or need help generating content. (S5)

Attitudes toward Using Technology

Attitudes towards using chatbots in academic writing encompass students' enthusiasm and engagement with these tools throughout the writing process. The survey results indicate that the perception level based on the attitude indicator falls into the positive category, with a mean score of 1.80. The interview data further confirm that students demonstrated considerable enthusiasm for utilizing chatbots in academic writing. Rather than relying on a single chatbot, they explored multiple options to identify the tools that best aligned with their expectations for producing high-quality written work.

Intention to Use Technology

The participants' intention to use chatbots in academic writing is overwhelmingly positive, with 92% expressing confidence in their willingness to adopt the technology. The average score of 1.92 indicates a strong conviction regarding chatbots' utility. The interview data further support this favorable perspective, with participants emphasizing several key benefits. They reported significant improvements in their writing abilities, including a broader vocabulary selection, enhanced sentence construction, and increased confidence, as a result of chatbots support. Chatbots were valued for their efficiency, providing immediate response and assisting in the organization of ideas, thereby making the writing process more manageable and effective. While some participants, such as S2, acknowledged the need to double-check grammatical suggestions due to potential errors, the overall sentiment remained positive. Chatbots were regarded as effective tools that improved writing quality and provided substantial assistance in idea generation and refinement, making them a reliable resource for academic writing. Moreover, the participants expressed confidence in using chatbots, as they saved time, provided significant assistance, and offered a valuable companion in academic writing process.

The following interview excerpts further illustrate these findings:

I feel that my writing has improved, and I am confident in using the chatbot because it can provide hooked ideas and topics, as well as good diction for academic writing. (S1)

As for grammar, in my opinion, when it comes to checking grammar, it's about 90% accurate. Since it's a machine, I can't say it's 100% reliable. So, if I'm unsure about ChatGPT's response, I double-check it with another application. I don't rely entirely on it. (S2)

The function of this chatbot is very convenient and helpful for academic writing. It is easy to access and is an ideal companion for writing. I also feel an improvement in my academic writing, especially in learning new vocabulary and creating well-structured sentences. (S3)

I feel confident using Windows Copilot because it provides clear, actionable suggestions and has a straightforward interface. It's enhanced my ability to organize my thoughts, refine my arguments, and present

my ideas more clearly. (S4)

I feel confident using this chatbot because it gives me quick feedback and ideas. As for improvement, I do think my academic writing has gotten better with the chatbot's help. It's not that the chatbot writes for me, but it helps me organize my thoughts and explore different ways to express ideas. (S5)

External Variables

The findings on postgraduate students' attitudes toward the use of chatbots in academic writing present a largely positive outlook. The majority of respondents (92%) expressed a favorable perception of various external variables, including subjective enjoyment, objective usability, and social influence, with an average score of 1.92. Moreover, interview participants regarded chatbots as enjoyable, efficient, compatible, and socially acceptable.

Consistent with the findings of the present study, existing research highlights the increasing value of chatbots in academic writing. Language learners generally appreciate chatbots for their ease of use, convenience, and ability to provide fast, personalized feedback (Huang et al., 2021; Haristiani, 2019). Chatbots are also valued for their responsiveness, accuracy, and 24/7 accessibility (Amelia et al., 2024). Additionally, they serve diverse instructional purposes, such as conversational practice, writing assistance, and vocabulary development (Brinegar, 2023; Huang et al., 2021).

The findings of study align with Soodan et al. (2024), who reported that 76% of respondents demonstrated high or very high adoption levels of chatbots for academic writing. However, the present study found that chatbot adoption was primarily high during the early stages of academic writing—such as planning, literature review, drafting, revising, editing, and proofreading—but significantly lower in later stages, including formatting, citing, and referencing. Similar findings were reported by Alqadi et al. (2023), who noted that while chatbots were widely used for idea generation, research assistance, and proofreading, students were hesitant to rely on them for formatting and citation tasks (Hutson et al., 2024). These results underscore the need for chatbots to be adapted to the specific requirements of different stages of academic writing and for users to select tools that align with their learning objectives (Brinegar, 2023).

The utility of chatbots in literature review tasks has also been widely explored. For example, large language models (LLMs) such as ChatGPT have demonstrated the potential to streamline literature reviews in undergraduate research, improving efficiency while raising concerns regarding paraphrasing and academic integrity (Aydın & Karaarslan, 2022; Antu et al., 2023). The challenges associated with obtaining authentic sources and generating accurate citations, as identified in the present study, are consistent with findings by Wollny et al. (2021). Recommendations for improvement include integrating proper referencing capabilities and establishing guidelines for responsible usage (Gervacio, 2023). Factors influencing chatbot adoption in academic writing are well-documented in the literature. In line with the Technology Acceptance Model (TAM), perceived usefulness, ease of use, attitudes, and intention to use have been identified as critical determinants (Zou & Huang, 2023; Mukred et al., 2023). The Value-Based Adoption Model further highlights enjoyment and perceived value as significant predictors, whereas perceived risk appears to be a less influential factor (Al-Abdullatif, 2023). Additionally, external variables such as task-technology fit, social network characteristics, and prior experience play a crucial role in shaping chatbot acceptance (Soodan et al., 2024; Mukred et al., 2023). Moreover, trust in chatbot design, interactivity, and ethical considerations has been shown to influence behavioral intentions in academic settings (Mohd Rahim et al., 2022).

Despite their potential, chatbots have certain limitations. Students often prefer manual approaches for tasks where chatbots are less effective, such as understanding complex contexts or generating creative content (Brinegar, 2023). Opinions regarding their accuracy and reliability remain mixed, emphasizing the need for responsible implementation and further research (Alqadi et al., 2023; Soodan et al., 2024). As Hutson et al. (2024) suggest, effectively integrating AI tools into writing instruction requires a hybrid approach that combines traditional methods with the strategic use of technology. Ongoing research is crucial to gaining a deeper understanding both the potential and limitations of chatbots in academic writing. Until then, researchers and educators are encouraged to view AI tools as complementary aids rather than replacements for human effort (Mondal & Mondal, 2023; Altmäe et al., 2023).

CONCLUSION

The findings of the present study highlight that while EFL learners have widely adopted various chatbots for academic writing – particularly in the stages of planning, literature review, drafting, revising, editing, and proofreading – their use in formatting and citation tasks remains limited due to current technological constraints. Postgraduate students perceive chatbots as valuable tools for enhancing writing quality and efficiency; however, many remain skeptical of AI-generated content and prefer to retain personal control over tasks such as editing and formatting. The study underscores the importance of integrating user feedback into the design of AI tools to better support various phases of academic writing, as well as the role of educators in helping students balance AI assistance with critical thinking and manual oversight. Overall, the positive reception of chatbots usage in academic writing, as reflected in the TAM framework, suggests a high likelihood of future adoption, albeit with caution due to the technology's current limitations.

Despite the promising findings, this study has certain limitations that should be acknowledged. The small sample size of 25 postgraduate EFL students may restrict the generalizability of the findings to a broader population. Furthermore, the study primarily relies on self-reported data, which may introduce biases in respondents' attitudes and behaviors regarding chatbot use. Furthermore, the exclusive use of the TAM framework may overlook other influential factors in chatbot adoption for academic writing, such as cultural differences, individual learning styles, or the quality

of generative AI. These limitations suggest that future research should involve larger, more diverse samples as well as a more comprehensive exploration of the variables influencing chatbot adoption. Furthermore, future studies could investigate the long-term effects of chatbot-assisted writing and the complexities of student engagement and interaction with chatbot technology across various academic writing contexts.

ACKNOWLEDGEMENTS

This study was funded by Universitas Negeri Malang through its 2024 Internal Research Grant. The authors express their sincere gratitude to Universitas Negeri Malang for its financial support and encouragement, which made this study possible. Special appreciation is also extended to all postgraduate EFL students who participated in this study; their engagement and contributions were invaluable to success of this research.

REFERENCES

Al-Abdullatif, A. M. (2023). Modeling students' perceptions of chatbots in learning: Integrating technology acceptance with the value-based adoption model. *Education Sciences, 13*(11), 1151. https://doi.org/10.3390/educsci13111151

Alharbi, W. (2023). AI in the foreign language classroom: A pedagogical overview of automated writing assistance tools. Education Research International, 2023, *Article 4253331*, 1–15. https://doi.org/10.1155/2023/4253331

Aljanabi, M. (2023). ChatGPT: Future directions and open possibilities. *Mesopotamian journal of Cybersecurity, 2023*, 16-17. https://doi.org/10.58496/MJCS/2023/003

Altmäe, S., Sola-Leyva, A., & Salumets, A. (2023). Artificial intelligence in scientific writing: A friend or a foe? *Reproductive Biomedicine Online, 47*(1), 3–9. https://doi.org/10.1016/j.rbmo.2023.04.009

Alqadi, R., Airbaiyan, A., Airumayyan, N., Alqahtani, N., & Najjar, A. B. (2023). Exploring the user experience and the role of ChatGPT in the academic writing process. 2023 Congress in Computer Science, Computer Engineering, & Applied Computing (CSCE) (pp. 1082–1089). IEEE. https://doi.org/10.1109/CSCE60160.2023.00180

Alsaedi, N. (2024). ChatGPT and EFL/ESL writing: A systematic review of advantages and challenges. *English Language Teaching, 17*(5), 41–50. https://doi.org/10.5539/elt.v17n5p41

Altun, M. (2023). Developing writing abilities in L2: A review. *International Journal of Social Sciences & Educational Studies, 10*(2), 175–178. https://doi.org/10.23918/ijsses.v10i2p175

Amelia, A., Sartika, F., Murad, S., & Ufra, N. (2024). Determinants of Customer Satisfaction in Chatbot Use. *Almana: Jurnal Manajemen Dan Bisnis, 8*(1), 46-55. https://doi.org/10.36555/almana.v8i1.2345

Antu, S. A., Chen, H., & Richards, C. K. (2023). Using LLM (Large Language Model) to improve efficiency in literature review for undergraduate research. CEUR Workshop Proceedings: Empowering Education with LLMs – The Next-Gen Interface and Content Generation (pp. 1–9). https://ceur-ws.org/Vol-3487/short2.pdf

Aydın, Ö., & Karaarslan, E. (2022). OpenAI ChatGPT generated literature review: Digital twin in healthcare. In Ö. Aydın (Ed.), Emerging computer technologies 2 (pp. 22–31). *İzmir Akademi Dernegi*. http://dx.doi.org/10.2139/ssrn.4308687

Baskara, F. X. R. (2023). Integrating ChatGPT into EFL writing instruction: Benefits and challenges. *International Journal of Education and Learning, 5*(1), 44–55. https://doi.org/10.31763/ijele.v5i1.858

Brinegar, B. (2023). Chatbots as a supplementary language learning tool: Advantages, concerns, and implementation. *International Journal of Education and Social Science Research, 6*(6), 223–230. https://doi.org/10.37500/IJESSR.2023.6615

Caprioglio, A., & Paglia, L. (2023). Fake academic writing: Ethics during chatbot era. *European Journal of Paediatric Dentistry, 24*(2), 88–89. https://doi.org/10.23804/ejpd.2023.24.02.01

Chan, C. K. Y., & Hu, W. (2023). Students' voices on generative AI: Perceptions, benefits, and challenges in higher education. *International Journal of Educational Technology in Higher Education, 20*, 43. https://doi.org/10.1186/s41239-023-00411-8

Creswell, J. W. (2015). Educational research: Planning, conducting, and evaluating quantitative and qualitative research (5th ed.). Pearson.

Dale, R. (2017). The commercial NLP landscape in 2017. *Natural Language Engineering, 23*(4), 641-647. https://doi.org/10.1017/S1351324917000237

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008

Ekellem, E. A. F. (2023). Conversational AI in academia: A practical exploration with ChatGPT. 2023 7th International Symposium on Multidisciplinary Studies and Innovative Technologies (ISMSIT). https://doi.org/10.1109/ISMSIT58785.2023.10304845

Emma, O. (2024). The Role of Artificial Intelligence in Automating Disaster Recovery in Multi-Cloud Environments.

Gervacio, M. J. (2023). Breaking barriers in academic writing: The uses of chat AI models in empowering international TESOL students. *International Journal of Asian Education, 4*(4), 256–264. https://doi.org/10.46966/ijae.v4i4.361

Hakiki, G. N. R. (2021). Perception of EFL students on the use of Grammarly application in writing class. *Eduvelop: Journal of English Education and Development, 4*(2), 99–106.

Haristiani, N. (2019). Artificial intelligence (AI) chatbot as language learning medium: An inquiry. *Journal of*

Physics: Conference Series, 1387(1), 012020. https://doi.org/10.1088/1742-6596/1387/1/012020

Hostetter, A., Call, N., Frazier, G., James, T., Linnertz, C., Nestle, E., & Tucci, M. (2023). Student and faculty perceptions of artificial intelligence in student writing. PsyArXiv. https://osf.io/preprints/psyarxiv/7dnk9

Huang, H.-W., Teng, D. C.-E., & Wu, R. (2023). Teaching chatbot prompt strategies in EFL essay writing instruction. The 5th International Workshop on Artificial Intelligence and Education (WAIE) (pp. 12–17). IEEE. https://doi.org/10.1109/WAIE60568.2023.00010

Huang, K. (2023, January 16). Alarmed by AI chatbots, universities start revamping how they teach. The New York Times. https://www.nytimes.com/2023/01/16/technology/chatgpt-artificial-intelligence-universities.html

Huang, W., Hew, K. F., & Fryer, L. K. (2021). Chatbots for language learning—Are they really useful? A systematic review of chatbot-supported language learning. *Journal of Computer Assisted Learning, 38*(1), 237–257. https://doi.org/10.1111/jcal.12610

Hutson, J., Plate, D., & Berry, K. (2024). Embracing AI in English composition: Insights and innovations in hybrid pedagogical practices. *International Journal of Changes in Education, 1*(1), 19–31. https://doi.org/10.47852/bonviewIJCE42022290

Irwanto. (2002). Psikologi umum. PT. Prenhallindo.

Jain, S., & Jain, R. (2019). Role of artificial intelligence in higher education—An empirical investigation. *IJRAR-International Journal of Research and Analytical Reviews, 6*(2), 144-150. http://dx.doi.org/10.47392/IRJAEM.2024.0009

Kairu, C. (2022). A review of chatbots in higher education: Current trends, applications, challenges and future implications. INTED2022 Proceedings (pp. 9928–9935). IATED. https://doi.org/10.21125/inted.2022.2615

Kellogg, R. T., & Raulerson, B. A. (2007). Improving the writing skills of college students. *Psychonomic Bulletin & Review, 14*(2), 237–242. https://doi.org/10.3758/BF03194058

Kirmani, A. R. (2022). Artificial intelligence-enabled science poetry. *ACS Energy Letters, 8*(1), 574–576. https://pubs.acs.org/doi/10.1021/acsenergylett.2c02758

Kukulska-Hulme, A. (1988). Computer-assisted reference skill development. In D. E. Ager (Ed.), Written skills in the modern languages degree (pp. 149–157). AMLC.

Kurniati, E. Y., & Fithriani, R. (2022). Post-graduate students' perceptions of Quillbot utilization in English academic writing class. *Journal of English Language Teaching and Linguistics, 7*(3), 437–451. https://doi.org/10.21462/jeltl.v7i3.852

Lucy, L., & Bamman, D. (2021, June). Gender and representation bias in GPT-3 generated stories. In *Proceedings of the third workshop on narrative understanding* (pp. 48-55).

Marzuki, Widiati, U., Rusdin, D., Darwin, & Indrawati, I. (2023). The impact of AI writing tools on the content and organization of students' writing: EFL teachers' perspective. *Cogent Education, 10*(2), 2236469. https://doi.org/10.1080/2331186X.2023.2236469

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). Qualitative data analysis: A methods sourcebook (3rd ed.). SAGE.

Mohamed, S. S. A., & Alian, E. M. I. (2023). Students' attitudes toward using chatbot in EFL learning. *Arab World English Journal, 14*(3), 15–27. https://doi.org/10.24093/awej/vol14no3.2

Mondal, H., & Mondal, S. (2023). ChatGPT in academic writing: Maximizing its benefits and minimizing the risks. *Indian Journal of Ophthalmology, 71*(12), 3600–3606. https://doi.org/10.4103/IJO.IJO_718_23

Mukred, M., Asma, M. U., & Hawash, B. (2023). Exploring the acceptance of ChatGPT as a learning tool among academicians: a qualitative study. J. *Komunikasi Malays. J. Commun, 39*(4), 306-323. http://dx.doi.org/10.17576/JKMJC-2023-3904-16

O'Brien, T. (2004). Writing in a foreign language: Teaching and learning. *Language Teaching, 37*(1), 1–28. https://doi.org/10.1017/S0261444804002113

Pitychoutis, K. M. (2024). Harnessing AI chatbots for EFL essay writing: A paradigm shift in language pedagogy. *Arab World English Journal* (Special Issue on ChatGPT), 197–209. https://doi.org/10.24093/awej/ChatGPT.13

Reichelt, M. (2002). A critical review of foreign language writing research on pedagogical approaches. *The Modern Language Journal, 85*(4), 499–648. https://doi.org/10.1111/0026-7902.00127

Salmi, J., & Setiyanti, A. A. (2023). Persepsi mahasiswa terhadap penggunaan ChatGPT di era Pendidikan 4.0. *Jurnal Ilmiah Wahana Pendidikan, 9*(19), 399-406. https://doi.org/10.5281/zenodo.8403233

Saltina, W. O., Kamaluddin, K., & Sapan, Y. T. (2022). Students' perception toward the use of Google Translate to their writing assignment at English Department of Halu Oleo University. *Journal of Teaching of English, 7*(4), 78–90. https://jte.uho.ac.id/index.php/journal/article/view/133

Sasikumar, A., & Sunil, M. V. (2023). Students' preference in using chatbots for academic writing. *Indian Journal of Science and Technology, 16*(36), 2912–2919. https://doi.org/10.17485/IJST/v16i36.1850

Selim, A. S. M. (2024). The transformative impact of AI-powered tools on academic writing: Perspectives of EFL university students. *International Journal of English Linguistics, 14*(1), 14–29. https://doi.org/10.5539/ijel.v14n1p14

Smutny, P., & Schreiberova, P. (2020). Chatbots for learning: A review of educational chatbots for the Facebook Messenger. *Computers & Education, 151*, 103862. https://doi.org/10.1016/j.compedu.2020.103862

Soodan, V., Rana, A., Jain, A., & Sharma, D. (2024). AI chatbot adoption in academia: Task fit, usefulness,

and collegial ties. *Journal of Information Technology Education: Innovations in Practice, 23*, 1–27. https://doi.org/10.28945/5260

Sumakul, D. T. Y., Hamied, F. A., & Sukyadi, D. (2022). Students' perceptions of the use of AI in a writing class. *TEFLIN-ICOELT 2021* (pp. 52–57). Atlantis Press. https://doi.org/10.2991/assehr.k.220201.009

Sumakul, D. T. Y. G., Hamied, F. A., & Sukyadi, D. (2022). Artificial intelligence in EFL classrooms: Friend or foe? *LEARN Journal: Language Education and Acquisition Research Network, 15*(1), 232–256. https://so04.tci-thaijo.org/index.php/LEARN/article/view/256723

Wang, Y. (2024). Reviewing the usage of ChatGPT on L2 students' English academic writing learning. *Journal of Education, Humanities and Social Sciences, 30*, 173–178. https://doi.org/10.54097/dvjkj706

Wollny, S., Schneider, J., Mitri, D. D., Weidlich, J., Rittberger, M., & Drachsler, H. (2021). Are we there yet? - A systematic literature review on chatbots in education. *Frontiers in Artificial Intelligence, 4*, 654924. https://doi.org/10.3389/frai.2021.654924

Yuan, Y., Li, H., & Sawaengdist, A. (2024). The impact of ChatGPT on learners in English academic writing: Opportunities and challenges in education. *Language Learning in Higher Education, 14*(1), 41–56. https://doi.org/10.1515/cercles-2023-0006

Zhao, X. (2023). Leveraging artificial intelligence (AI) technology for English writing: Introducing Wordtune as a digital writing assistant for EFL writers. *RELC Journal, 54*(3), 890–894. https://doi.org/10.1177/00336882221094089

Zou, M., & Huang, L. (2023). To use or not to use? Understanding doctoral students' acceptance of ChatGPT in writing through technology acceptance model. *Frontiers in Psychology, 14*, 1259531.

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.