

“Noticed but not used”: The gap between AI feedback and its delayed application in L2 academic writing

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Abstract

This study investigates the linguistic forms university students notice through ChatGPT-generated feedback in second language (L2) academic writing and their subsequent application. While AI-mediated automated writing evaluation (AWE) shows promise, the transition from noticing to productive use remains under-explored. Qualitative analysis of student interviews, ChatGPT history logs, and draft revisions revealed that although participants noticed diverse academic vocabulary and complex syntactic structures, such awareness rarely transferred into independent use. Findings indicate a clear gap between receptive and productive knowledge, which may be hindered by cognitive and psychological constraints. High cognitive load, fear of making mistakes, and the pressure to prioritize task completion can often impede the retrieval and experimental use of newly noticed forms. Consequently, this study argues that providing AI feedback alone may be insufficient for long-term L2 development. Pedagogical interventions could be helpful to externalize the noticing process and provide scaffolds for retention. Specifically, utilizing ChatGPT’s dialogic features can facilitate hypothesis testing and the exploration of alternative expressions in a non-evaluative environment. This study is expected to contribute to the theoretical understanding of AI-mediated noticing and the practical design of individualized L2 writing instruction.

Keywords

ChatGPT; automated writing evaluation (AWE); L2 academic writing; feedback; noticing

Introduction

Writing in a second/foreign language (L2) is the act of expressing oneself in writing in a language other than one’s native language, and it is considered to be one of the most difficult skills in second language acquisition (Godwin-Jones, 2022; Pilotti et al., 2024; Teng & Ma, 2024). Academic writing, in particular, poses unique demands in terms of

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vocabulary, logical organization, and sentence structure, making it extremely challenging for L2 learners and often causing considerable psychological pressure (Christopher, 2024; Lin & Morrison, 2021). While continuous monitoring and insightful feedback from teachers can be effective in addressing such challenges (Lim & Phua, 2019; Olsen & Hunnes, 2024), in real classroom settings, human resources are limited, and providing such feedback can require a considerable amount of time and effort from teachers (Ji et al., 2023; Lim & Phua, 2019).

In recent years, accordingly, there has been a growing interest in using generative AI as an Automated Writing Evaluation (AWE) tool for L2 writing activities, complementing or substituting for teacher feedback. The use of generative AI offers various system affordances such as immediate feedback (Kuhail et al., 2023; Teng, 2024b; Yang et al., 2024), ubiquitous access (Barrot, 2023; Jeon, 2024; Kohnke et al., 2023), unlimited practice opportunities (Yan & Zhang, 2024; Yang et al., 2024), and support for generating and reformulating language (Escalante et al., 2023; Meniado et al., 2024). Reflecting these affordances, a number of studies have reported that these features provide significant pedagogical benefits, including improvements in writing performance (Liu et al., 2023; Yan, 2023), increased motivation (Song & Song, 2023; Zare et al., 2025), and reduced anxiety (Huang et al., 2024; Song & Song, 2023). However, how learners actually engage with feedback from generative AI, and whether such interaction promotes linguistic development, have not been fully examined.

This study investigated the process of L2 academic writing (i.e., graduation thesis) among Japanese EFL university students using ChatGPT as an AWE tool. Specifically, the study qualitatively examined what language features learners noticed in AI-generated feedback and to what extent these features were retained and utilized in their subsequent writing. By focusing on the transition from noticing to delayed application, the present study aimed to clarify the role of AI feedback in developing learners' L2 knowledge.

Literature Review

Formative Feedback in L2 Writing

In L2 writing, formative feedback—defined as “information communicated to the learner that is intended to modify his or her thinking or behavior for the purpose of improving learning” (Shute, 2008, p. 154)—has been widely shown to play a crucial role in improving learners' writing skills in numerous studies (Hyland & Hyland, 2006; Li & Zhang, 2022; Zhong & Yang, 2021; Zohrabi & Rezaie, 2012). Feedback serves as a pedagogical tool that addresses diverse learner needs in content, organization, grammar, vocabulary, and style during writing tasks, and its provision has been reported to have a substantial influence on learning outcomes (Hyland, 2003; Mahapatra, 2024; Tai et al., 2015). Academic writing, in particular, poses significant challenges for L2 learners due to its unique vocabulary and sentence structures, as well as the requirement for logical organization and persuasive expression (Coxhead, 2012; Rahimi, 2019; Staples et al., 2016). Since such writing tasks involve complex linguistic and rhetorical demands, they often impose a considerable cognitive and psychological burden on learners. Lin and Morrison (2021) argued that under these conditions, insightful teacher comments and appropriate feedback play an important role not only in improving textual quality but also in sustaining learner motivation.

For feedback to effectively improve learners' writing skills, simply providing corrections or advice is insufficient; its manner of delivery and timing are also crucial. According to Keh (1990), effective feedback requires several conditions, one of which

is that it be provided on a continuous and regular basis. Immediacy is also a key factor contributing to learning effectiveness (Shute, 2008). Timely feedback allows learners to revise their output while their attention remains focused on the linguistic problem, which may in turn facilitate knowledge retention and support the development of learners' ability to apply linguistic knowledge. Furthermore, feedback that is personalized and adaptively tailored to each learner's level of understanding and the difficulty of the task is another factor that increases its effectiveness (Hattie & Timperley, 2007; Narciss, 2008; Shute, 2008), underscoring the importance of student feedback literacy in ensuring that learners can productively interpret and utilize such tailored interventions (Carless, 2026).

In actual educational settings, however, it is difficult for teachers to continuously provide high-quality feedback in sufficient quantity. Teachers are burdened with numerous tasks such as class preparation, grading, and student counseling, which imposes substantial time and labor constraints and makes it practically difficult to provide detailed support to all learners (Grimes & Warschauer, 2010; Ji et al., 2023; Lim & Phua, 2019). Under these limitations, ensuring both the quality and quantity of feedback has long been recognized as a persistent challenge in L2 writing instruction. This problem is particularly pronounced for tasks requiring high precision and complexity, such as academic writing.

AI-Generated Feedback

In recent years, increasing attention has been paid to the use of AWE tools utilizing generative AI as a response to persistent challenges in providing feedback for L2 writing, with a growing interest in their potential to complement or substitute for traditional teacher feedback (e.g., Mizumoto & Eguchi, 2023). These tools can provide immediate and extensive feedback by automatically identifying and correcting errors in their writing and suggesting alternative forms (Chen, 2025; Ding & Zou, 2024). AWE systems have been reported to possess numerous system affordances, including ubiquity (i.e., accessibility for learners regardless of location or time constraints; see, for example, Fryer et al, 2020; Song & Song, 2023; Yilmaz Virlan & Tomak, 2025), high processing capability (i.e., the ability to handle large volumes of text and respond rapidly; Mahapatra, 2024; Steiss, et al., 2024; Zhang, 2023), and flexibility (i.e., the capacity to provide personalized support tailored to individual learners; Ding & Zou, 2024; Yilmaz Virlan & Tomak, 2025). Furthermore, the use of such tools enables teachers to reduce the time and efforts spent on linguistic corrections, thereby allowing them to focus on more advanced aspects of instruction, such as improving students' writing content and structure (Ji et al., 2023; Pack et al., 2024; Steiss, et al., 2024; Stevenson & Phakiti, 2014), reinforcing the view that AI feedback is most effective when integrated with teacher guidance to support meaningful learning (Hyland, 2026).

Research has shown that AI-generated feedback also offers certain advantages with regard to learners' affective dimensions. For example, since AI feedback does not involve human-like subjective evaluation or overt negative judgment, it can reduce learners' anxiety about being evaluated (Biju et al., 2024; Chen & Gong, 2025; Song & Song, 2023; Wang, 2025). Furthermore, AI feedback, as a system designed to provide consistently supportive and affirmative responses, can help maintain learners' confidence and self-efficacy (Wang et al., 2022; Wei et al. 2023), which aligns with findings that EFL learners frequently perceive ChatGPT as a helpful companion rather than an enemy (Teng, 2024a). Moreover, the immediacy of AI feedback has been reported to enhance learners' motivation (Biju et al., 2024; Wang, 2025; Wang et al.,

2022). Taken together, these affective benefits may contribute to sustained engagement and learning in L2 writing (Biju et al., 2024; Huang & Teng, 2025; Zare et al., 2025).

In terms of linguistic aspects, AI-generated feedback also offers learners multiple advantages. It not only provides opportunities to recognize and correct grammatical and lexical errors (Chen & Gong, 2025; Tsai, 2022; Wei et al. 2023) but also exposes learners to expressions that they have not yet acquired or have not yet been able to use productively (Biju et al., 2024; Song & Song, 2023). Such linguistic resources can help learners improve their writing through repeated revision and refinement process (Chen & Gong, 2025; Yan, 2023; Yang et al., 2024). A number of studies have reported that revisions guided by AI feedback lead to improvements in the accuracy of L2 writing and increases in lexical diversity (Chan et al., 2024; Teng & Huang, 2026; Wiboolyasarini et al., 2024).

On the other hand, AI feedback also poses several challenges. Learners may copy suggested corrections or alternative expressions directly into their writing without thoroughly examining them, a tendency that recent studies have described as an “over-reliance” of AI-provided revisions (Koltovskaia, 2020; Song & Song, 2023; Zhai et al., 2024). This “superficial use” also raises significant concerns related to plagiarism or academic dishonesty. In addition, it may lead to inappropriate products, particularly because AI feedback cannot always provide the nuanced guidance that human teachers offer by considering learners’ intentions and the contextual demand of the task (Chen, 2025; Teng, 2024b).

Overall, AI-generated feedback offers numerous advantages, including immediacy, accessibility, capability, adaptability, and affective and linguistic support, while also contributing to a reduction in teachers’ workload. However, its educational effectiveness depends heavily on how learners engage with and utilize the feedback. In particular, it remains unclear what linguistic forms learners attend to when interacting with AI feedback and how such noticing is related to their actual learning and use of language.

Noticing and Delayed Application of Feedback

Previous L2 writing research has indicated that learners first need to be aware of linguistic forms—namely, noticing—as a crucial prerequisite for effectively learning linguistic features from feedback. According to Schmidt’s (2001) noticing hypothesis, learners’ attention to linguistic features in L2 input and their conscious recognition are indispensable for internalizing L2 knowledge and improving proficiency. This perspective is grounded in a cognitive view of language learning, which holds that learning does not occur directly from input alone, but emerges through learner’s attention and conscious processing of that input. This theoretical framework represents a widely supported theory in second language acquisition research in general (Gilakjani & Ahmadi, 2011; Robinson, 1995; Tomlin & Villa, 1994), and has also been extended to feedback research in L2 writing studies (Hyland & Hyland, 2006; Sachs & Polio, 2007; Van Beuningen, 2010).

In addition to noticing, the process through which learners incorporate noticed linguistic forms into their own language use is also considered to play an important role in L2 knowledge development. Traditionally, many studies have focused on uptake, which refers to learners’ immediate responses to feedback, such as corrective actions within the same writing task (e.g., Ruegg, 2015; Storch & Wigglesworth, 2010). However, it is essential to distinguish between such immediate uptake and delayed use (i.e., the application of noticed forms in subsequent, new writing tasks), since, as Truscott (1996) argued, improving a current draft through feedback (i.e., editing) does

not necessarily lead to language learning. While immediate uptake may reflect a superficial correction or mere copying, true development is better evidenced by the delayed incorporation of linguistic resources in new contexts (Bitchener et al., 2005; Han & Hyland, 2015; Liu & Storch, 2023). Given these accounts, instead of focusing on immediate reactions, the present study regards noticing and delayed use as the significant indicators of language learning.

In AI-mediated feedback contexts, previous research has not sufficiently explained the degree of learners' noticing of linguistic features in the feedback, that is, how much learners pay attention to the suggested revisions and alternative expressions, or how deeply they process these forms. At the same time, emerging research has suggested that the specific presentation features of AI feedback may exert unique influences on learners' noticing, and consequently on learning outcomes. For example, unlike traditional teacher feedback, AI can instantly provide a large volume of corrections and expression suggestions, which may reduce learners' attention to each linguistic form (Ziqi et al., 2024). Some studies have also reported that in AWE feedback environments, learners tend to accept suggested corrections without careful consideration (Li et al., 2023; Yılmaz Virlan & Tomak, 2025). This is consistent with Truscott's (1996) argument, as the tendency to accept feedback mechanically may allow learners to improve the immediate quality of their writing, but limit their deeper cognitive processing and the long-term retention or transfer of L2 knowledge. This represents a significant challenge when considering the educational effectiveness of AI feedback.

In order to evaluate the effectiveness of AI feedback on L2 learning, it is crucial to examine not only the improvement of the learners' written product but also the process by which they notice specific linguistic features in the feedback and the extent to which they apply them to their subsequent writing over multiple stages (Bitchener et al., 2005; Han & Hyland, 2015; Liu & Storch, 2023). However, previous research has focused largely on writing outcomes such as the accuracy or fluency of revised texts, while offering limited insight into learners' internal cognitive processes and the ways in which feedback is processed for future application. Consequently, there is still a lack of empirical evidence regarding the relationship between noticing and delayed use in the context of AI-generated feedback (Crosthwaite & Sun, 2025; ElEbyary, et al., 2024). Therefore, a process-oriented investigation of learners' engagement with AI feedback is essential for understanding how such feedback may contribute to L2 development.

The Study

Based on the above review, it is essential to examine the learning process centered on noticing and retention in order to understand how AI feedback contributes to learners' L2 knowledge and writing proficiency. Therefore, this study aimed to investigate, through qualitative analysis, what linguistic features EFL university students notice within AI feedback and to what extent these are subsequently utilized in their later sections of their thesis, while writing them using ChatGPT, as an AWE tool. To this end, this study qualitatively examined their L2 academic writing process, focusing on the following Research Questions (RQs):

RQ1: What linguistic features do learners notice in the feedback from ChatGPT?

RQ2: To what extent are these linguistic features incorporated into learners' subsequent writing (i.e., delayed application)?

Research Methodology

Participants

Five Japanese female university students participated in this study. All were fourth-year English majors with TOEIC®L/R scores ranging from 550 to 820, which correspond to levels B1 to B2 on the Common European Framework of Reference for Languages (CEFR). To ensure anonymity and track individual data, participants are referred to by IDs (S1-S5). Their specific English proficiency levels are summarized in Table 1.

Table 1. Participant IDs and English proficiency Scores

ID	TOEIC®L/R Score	CEFR Level
S1	620	B1
S2	550	B1
S3	640	B1
S4	700	B2
S5	820	B2

Before entering university, they had studied English for eight years as part of the formal school curriculum starting from elementary school. They developed a strong interest in the English language during high school and chose to major in English at university. Since then, they have continued to improve their English-related knowledge and skills with the goal of pursuing English-mediated careers after graduation.

At this university, English majors are required to write a graduation thesis in English during their final year as part of the degree requirements. In this study, the participants worked on their theses throughout the fall semester (September to January) under the supervision of the seminar instructor. As they were relatively inexperienced in academic writing, they required frequent support and feedback to make steady progress. Accordingly, they composed their theses section by section, submitting each draft for the instructor's proofreading, receiving AWE feedback, and moving on to the next section.

All participants were fully informed of the research objectives, their roles, and the measures taken to protect their privacy, and written consent to participate was obtained prior to the study. This study was approved by the Institutional Ethics Review Committee of the authors' university (Approval No. 24-54).

Materials

Throughout the writing process, the participants used ChatGPT-4 as an AWE tool for their theses. They were instructed to use a standardized prompt when requesting feedback: "Proofread the following academic paragraphs, focusing on grammar, vocabulary, and expressions. Provide suggested revisions as needed." In response, ChatGPT generated a revised version of each draft, which served as model feedback. The students then compared the AI-generated version with their original drafts and produced their final versions.

Procedures

The theses written by the students comprised six sections—Introduction, Literature Review, Method, Results, Discussion, and Conclusion—which they wrote sequentially

in English through a three-step process (Figure 1). First, they produced the first draft in Japanese. The instructor reviewed this draft and provided feedback focusing on logic, organization, and content development. Next, while incorporating this feedback, the students independently wrote the second draft in English. While composing this version, they were allowed to use either an electronic or paper dictionary and were strictly prohibited from using online AI tools or machine translation in order to maintain the pedagogical aim of fostering L2 academic writing ability through independent composition. After completing the English draft, the students used ChatGPT-4 for proofreading and received AI-generated feedback in the form of a revised model. Referring to this model, they revised and produced their final drafts.

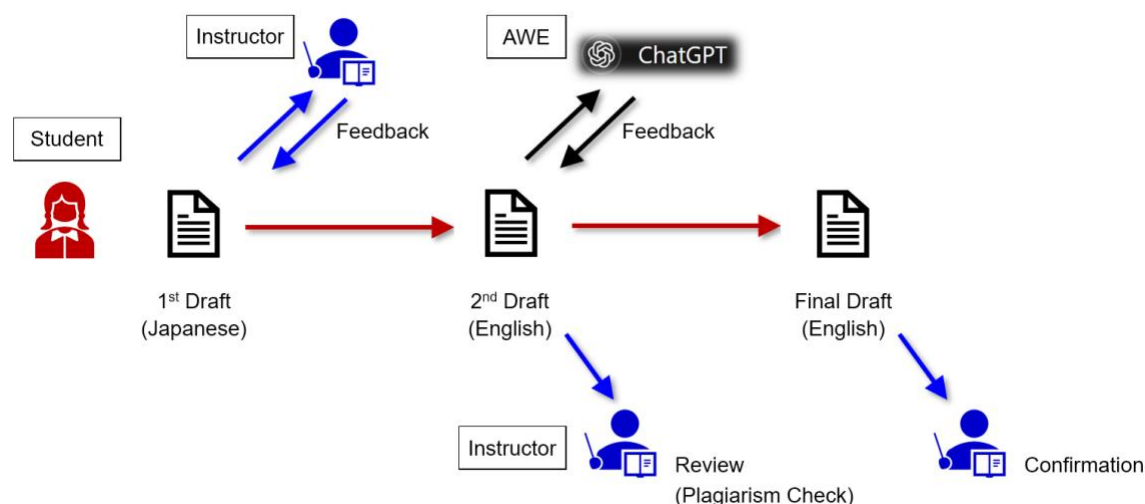


Figure 1. The Three-Step Writing Process for Each Thesis Section

Both the second and final drafts were reviewed by the instructor for the purpose of course evaluation. The second drafts were additionally checked for plagiarism and inappropriate use of AI tools (e.g., DeepL, ChatGPT, and Gemini). If any academic misconduct (e.g., the direct use of AI-generated translation without self-editing) was detected or suspected at this stage, the student was reprimanded and required to rewrite the draft on their own.¹

In the final versions, the instructor focused on confirming that all previously identified errors had been appropriately corrected. This three-step writing procedure was repeated for each of the six thesis sections, from Introduction to Conclusion.

Data Collection

Data on students' noticing was collected through stimulated recall interviews using their second drafts and the corresponding AI feedback as stimuli. After the submission of the second and final drafts for each section, the lead author conducted individual interviews with each student. During these interviews, the student was asked to review the ChatGPT feedback on her second draft of the relevant section and recall which linguistic features she had noticed. The interviews were conducted in Japanese to allow participants to express their thoughts and cognitive processes freely without linguistic constraints. The data were subsequently translated into English by the lead author. This addressed the first research question (RQ1).

To examine the second research question (RQ2), this study defined *delayed application* as the autonomous and correct use of previously noticed AI feedback in subsequent thesis sections. Since the six sections were written sequentially over five months (September to January), the time between the initial noticing of a feature and its later use ranged from about two weeks to four months.

To verify these instances, the author used a two-step process. First, during the interviews, each student was asked to review her second draft of the current section and identify the linguistic features she had previously noticed in ChatGPT's feedback from earlier sections and successfully incorporated into her writing. Second, to ensure accuracy and not rely only on the students' memory, the author compared these descriptions with the actual texts of the students' second drafts and their ChatGPT history. The author checked whether the reported linguistic features were actually and appropriately used in the new writing context.

All interviews were audio-recorded and transcribed. This process was repeated for all subsequent sections to track how students used the features over time.

Data Analysis

The transcriptions and the verified writing samples were analyzed qualitatively using conventional content analysis (Hsieh & Shannon, 2005). This approach was chosen because it allows coding categories to come directly from the data rather than using fixed frameworks, which is suitable for exploring learners' actual noticing. First, the data were coded and segmented according to the linguistic features mentioned by the students and confirmed in their texts. To develop the coding categories, the author used an inductive approach based on the data, while also referring to previous studies on L2 writing feedback. Through this process, the identified codes were organized into major categories and subcategories based on their linguistic nature.

To ensure coding reliability, the lead author repeated the coding and segmentation process three times at intervals of two to four weeks. When any inconsistencies were found among the three rounds of coding, the author carefully checked the original transcripts and writing samples again to reach a complete agreement, thereby enhancing intra-rater reliability. The resulting data were analyzed qualitatively to identify patterns of noticing and later use.

Results

RQ1: What linguistic features do learners notice in the feedback from ChatGPT?

A total of 151 linguistic features were noticed and reported by the students (Table 2). These features were categorized into two major groups according to their linguistic nature: vocabulary-related features ($n = 100$) and sentence-structure-related features ($n = 51$). The vocabulary group was further divided into parts of speech: verbs ($n = 62$), nouns ($n = 7$), adjectives ($n = 9$), adverbs ($n = 11$), prepositions ($n = 7$), and conjunctions ($n = 4$). The sentence structure group consisted of inanimate-subject sentences ($n = 26$), clause reduction ($n = 10$), and sentence-final adverbial clauses ($n = 6$), and other sentence simplification/reformulation features that did not fit into the above types ($n = 9$).

Table 2. Linguistic Features Students Noticed in ChatGPT's Feedback (N = 151)

Categories	Types (number)
Vocabulary (n = 100)	verbs (62) nouns (7) adjectives (9) adverbs (11) prepositions (7) conjunctions (4)
Sentence structure (n = 51)	inanimate subject sentences (26) clause reduction (10) sentence-final adverbial clauses (6) sentence simplification/reformulation (9)

Table 3 presents examples of vocabulary items that students noticed through ChatGPT's feedback. The bolded words represent the expressions suggested by ChatGPT, whereas the words in parentheses indicate the original forms used by the students in their second drafts.

Table 3. Examples of Vocabulary Items Students Noticed in ChatGPT's Feedback

Parts of Speech	Vocabulary Items
verbs	abandon (give up) address (deal with, focus on) advocate (suggest) assume (think) conduct (do) consent (agree) develop (make) demonstrate/illustrate/indicate/present/reveal/suggest (show) earn (get) encompass (include) examine/explore/investigate/study (research) identified (found) incorporate/leverage/utilize (use) offer (give)
nouns	challenge (problem) drawback (unsatisfactory point) shift (change)
adjectives	alternative (other) diverse (different) evident (clear) superior (better)
adverbs	Additionally, /Furthermore, /Moreover, (Also,) exclusively (only)
prepositions	behind (for) following (after) in terms of (for) regarding (about)
conjunctions	as well as (and) due to (because of) while (although)

The alternatives proposed by ChatGPT were generally more appropriate for formal academic writing than the expressions originally chosen by the students. Their interview comments also showed that they themselves recognized the suggested expressions sounded more academic. Several representative comments are presented below.

I noticed a lot of thesis-like vocabulary. (S2)

Looks like the kind of word we'd see in university English textbooks. (S1)

The students also noted that ChatGPT frequently suggested synonyms, particularly for verbs. Several students remarked that these verb variations helped them avoid repeating the same expressions.

Even if the meaning is the same, there are so many variations in verb choice. (S4)

In the Results section, I repeated "This shows that ...," but ChatGPT used "This result presents ...," "indicates" and "illustrates." These words helped me avoid repetition. (S5)

While recognizing these academic expressions and variations, the students also expressed disappointment that, although they had knowledge of these words and expressions, they could not readily retrieve and apply them when composing their second drafts.

I knew many of these words, but I couldn't actually use them in my new writing.

(S1)

Instead of "say," ChatGPT used "mention," "refer to," "indicate," and "argue." I knew these words, but they didn't come up when writing a second draft. (S5)

Overall, the students noticed academically suitable and varied vocabulary suggested by ChatGPT, but sometimes felt struggled to retrieve these words in their subsequent writing.

Sentences (1)–(4) below are the examples of the inanimate-subject constructions that students noticed in ChatGPT's feedback (inanimate subjects are bolded, and the students' original expressions are in parentheses). An inanimate subject sentence is a structure in which a non-human entity serves as the grammatical subject of an action verb. Although such constructions are natural and widely used in English academic writing, they are not typical in Japanese (e.g., Ikegami, 1981), making them difficult for Japanese learners to produce independently. In this study, ChatGPT frequently proposed these constructions in place of the "there is/are" sentences that Japanese learners typically overuse (Examples 1–2). It also suggested inanimate-subject alternatives to sentence-initial adverbial phrases such as "According to ..." or "In this section ...," which are characteristic of topic-prominent languages like Japanese (Examples 3–4).

(1) **The university** offers a study abroad program ...

(There is a study abroad program in the university ... [S5])

(2) **Other reasons** may have contributed to ...

(There may have been other reasons ... [S4])

(3) **Previous research** indicated that ...

(According to previous research, it was found that ... [S1])

(4) **This section** presents the results ...

(In this section, the results are shown ... [S3])

Several students commented on the inanimate-subject sentences suggested by ChatGPT.

I came across a lot of inanimate subject sentences I had learned in high school.

(S5)

Sentences with inanimate subjects are concise, objective, and sound more academic. I feel like I could never write that myself. (S1)

According to the students, in their high school English classes, they learned the form and meaning of inanimate-subject sentences as a common feature of English academic writing but rarely practiced using them in writing. This background seems to explain their perception of such sentences as more academic and their sense of being unable to produce them independently.

Presented below are the examples of clause reduction and sentence-final adverbial phrases (these constructions are bolded, and the students' original expressions are in parentheses). ChatGPT identified clauses containing explicitly stated subjects and verbs in the students' drafts and suggested condensing them into noun phrases (Example 5), adjective phrases (Example 6), and adverb phrases (Example 7). It also pointed out peripheral information that students had placed in parentheses at the ends of sentences and proposed alternative sentence-final adverbial constructions, often using "with" phrases (Example 8) or present participle phrases (Example 9).

- (5) [Author] reported **improvements** in listening comprehension ...
 ([Author] reported that listening comprehension had improved ... [S4])
- (6) ... students **majoring** in English
 (... students who majored in English [S4])
- (7) ... participated in the program **during** their sophomore year
 (... participated in the program when they were sophomores [S5])
- (8) ... proficiency was intermediate **with** TOEIC scores ranging from 600 to 750
 (... proficiency was intermediate (TOEIC scores: 600–750) [S1])
- (9) ... involved 34 students, **ranging** from first-year to fourth-year students,
 (... involved 34 students (from 1st year to 4th year students) [S3])

Students responded positively to the concise expressions created through clause reduction (Examples 5–7), regarding them as easier to read and more academic.

It's easier to read because the phrase is shorter than full SV (subject-verb) clause. (S4)

Using fewer words to say the same thing feels more like academic writing. (S5)

In contrast, their comments on sentence-final adverbial phrases (Examples 8–9) suggested that while students did notice these constructions, their awareness of them was comparatively limited.

I've occasionally seen these types of sentences in reading textbooks we use at university. (S3)

I think I learned these structures in high school, but I hadn't seen them for a long time. (S1)

The differences in these two types of students' comments suggest that their familiarity with given linguistic forms may influence the depth of their noticing. According to Japan's English National Curriculum Standards (MEXT, 2017, 2018), phrases like Examples 5–7 are introduced in junior high school, whereas constructions such as Examples 8 and 9 appear as "participle constructions" in high school and are considered challenging for learners to master. Thus, students' prior exposure and proficiency within English education appear to shape the depth of their awareness and understanding of the form.

RQ2: To what extent are these linguistic features incorporated into learners' subsequent writing (i.e., delayed application)?

In the interviews, students reported that they incorporated a small number of vocabulary items from ChatGPT's feedback in their later writing of the second drafts. Only one student (S4) mentioned that she intentionally attempted to use several suggested words,

including verbs, nouns, and prepositions, and inanimate subject sentences, with the aim of “making it sound more objective.” Examples of the vocabulary and inanimate subject constructions students reported applying from previous AI feedback to their subsequent thesis writing are presented in Table 4. While each participant (S1-S5) reused various words of this list multiple times, the inanimate subject sentences were applied by S4.

Table 4. Examples of Words and Inanimate Subject Sentences Students Used in Subsequent Writing

Types	Examples				
Words	develop	investigate	illustrate	utilize	present
	suggest	address	conduct	enhance	refer to
	aspect	following	regarding	Furthermore,	
Sentences	These data indicate that ...				
	The program offered the opportunity to ...				

Note. The specific words reused varied by student. Sentences were used only by S4.

All five participants, including the one who made intentional efforts (S4), expressed hesitation or difficulty in applying the forms they had noticed in the feedback. Their comments included:

The English in the feedback was good, but I’d forgotten about it when I was writing. (S3)

When I wrote a new section, I was struggling just to write. I couldn’t really recall the previous feedback. (S2)

Thesis [writing] is hard for me, so I just wanted to get it done and used only the words I knew well. (S5)

If I use difficult English, I may make mistakes, so I just use the safe words I already know. (S1)

These comments suggest that although students noticed and valued the feedback, the cognitive load (e.g., difficulty in retrieving appropriate forms at the right moment) and affective pressures (e.g., anxiety of making mistakes) of thesis writing limited their ability to apply the suggested forms. Their responses further indicate that noticing a linguistic form does not immediately translate into the ability to use it independently, particularly when students must prioritize content, organization, and task completion over language choice—a common challenge in the complex, cognitively demanding task of L2 academic writing.

Discussion

In relation to the first research question (RQ1), this study examined the linguistic features Japanese university students noticed in the language feedback they received from ChatGPT when using it as an AWE tool for thesis writing. The results showed that students noticed not only linguistic forms, such as vocabulary items (mainly verbs) and grammatical constructions including inanimate-subject sentences and clause reductions, but also the functions of these forms in academic writing. For example, students recognized that the suggested vocabulary sounded more academic, that inanimate-subject sentences could make the tone more objective, and that using synonyms could reduce repetition. In contrast, although students also noticed the

sentence-final participle constructions that ChatGPT frequently provided, their awareness of this structure seemed more superficial. Even though this type of construction is common in academic writing, students may not have encountered it very often and therefore may have had limited familiarity with it. Overall, these findings suggest that while ChatGPT's feedback can lead students to notice various forms and their functions, the depth of their noticing may depend on how familiar students already are with each feature.

This tendency is consistent with Hyland's (2026) argument that the usefulness of AI feedback depends on how learners understand and evaluate the suggestions based on their prior knowledge. Furthermore, as Han and Hyland (2015) point out, the extent to which learners are cognitively engaged (i.e., whether they are merely noticing or actually understanding) varies depending on the difficulty and types of linguistic features. Therefore, when encountering less familiar and syntactically complex structures like participle constructions, students may only notice them superficially, without fully understanding how these forms work in academic writing.

Regarding the second research question (RQ2), which focused on whether students could apply the noticed forms in their subsequent writing, the results revealed a clear difficulty in delayed application. Students recognized a variety of academic vocabulary items and appropriately evaluated them as "thesis-like." They also identified sentence structures, such as inanimate-subject constructions and clause reductions, as structures they had learned in high school. However, when it came to writing their own sentences, they struggled to retrieve these complex structures at the appropriate moment, resulting in limited application. This indicates a gap between receptive and productive knowledge in academic writing. In other words, many participants remained in a state of *noticing but not using*. This gap can be explained by established theoretical frameworks in second language acquisition. Within the framework of Skill Acquisition Theory (DeKeyser, 2015; Suzuki, 2021), for example, understanding the received feedback represents the acquisition of "declarative knowledge (knowing what)," but translating this into actual writing requires "procedural knowledge (knowing how)." According to DeKeyser, this transition does not happen automatically and requires extensive practice.

In the context of AI-assisted academic writing, this difficulty in turning declarative knowledge into procedural knowledge (i.e., proceduralization) can be further explained by learners' cognitive and affective constraints. As Teng and Huang (2026) argue, deeper cognitive processing of AI feedback is not automatic but rather highly contingent on learner-specific factors, particularly language proficiency. Consistent with this perspective, the participants in this study—who lacked sufficient proficiency and familiarity with academic writing—experienced exceptionally high task demands during English composition, which may have largely consumed their attention, making it difficult to recall and apply the AI feedback. This cognitive overload and the resulting psychological pressure often drive learners to use what Han and Hyland (2015) call an "avoidance strategy" (p. 39). In fact, as noted in their comments, the students in this study chose to write using only familiar language to avoid making errors under such high task demands, simply wishing to "just get it done." Therefore, the failure to apply noticed forms may not have been due to a lack of appreciation of the feedback, but rather to the cognitive and affective constraints of the writing task, which likely hindered the development of procedural knowledge.

From a pedagogical perspective, these observations suggest that simply providing learners with linguistic feedback generated by ChatGPT may not lead to consistent application in their subsequent writing. While students improved their paper quality

through immediate rewriting, they rarely applied these forms independently later. This aligns with prior research on digital learning, which notes that technological input may not automatically translate into productive skills (Lee, 2023). Therefore, pedagogical interventions may be necessary to scaffold the transition from noticing language features to using them in practice. One way this could be achieved is by helping learners retain and revisit the forms they have noticed. To prevent the loss of these forms, for instance, teachers could encourage students to externalize their noticing and make it visible. Keeping a physical or digital “feedback notebook” to record and consult noticed forms during writing can serve as one effective way to bridge the gap between initial noticing and later production.

In addition to such reference tools, the dialogic features of ChatGPT can provide a highly supportive environment for language production. Although the linguistic features discussed in this study are not unique to AI feedback, the true advantage of AI lies in this opportunity for real-time interaction. In this study, as noted earlier, while students recognized the value of the feedback, they often used avoidance strategies by choosing familiar language due to anxiety about making mistakes. Engaging in dialogue with AI could help mitigate these challenges by allowing learners to ask about the appropriateness of expressions they intend to use, thereby enabling them to test their linguistic hypotheses in real time. Furthermore, AI-mediated tools act as “tireless language-learning assistants” (Kohnke et al., 2023, p. 538) in that they can respond repeatedly to learners’ questions without reluctance. This characteristic enables learners to ask about the reasoning behind feedback or about alternative expressions as many times as needed, without the hesitation that often accompanies interpersonal communication (Stojanov, 2023). Such a non-evaluative, supportive, and repeatable dialogic environment may help reduce learners’ anxiety, increase their confidence, and promote more individualized learning. Notably, this interactive process aligns well with foundational SLA theories, potentially facilitating hypothesis testing through pushed output (Swain, 2005) and negotiation of meaning (Long, 1996). Through such dialogic interaction, learners may be able to move beyond surface-level noticing toward a deeper understanding and actual language production.

Limitations and Future Directions

Several limitations of this study suggest important future directions. First, the number of participants was small (five female English majors at the same university). While this small sample size allowed for a detailed, close examination of students’ specific behaviors, caution is needed when applying these results to other groups, such as male students or students in different majors. Future research should include larger and more diverse groups of students to see if the findings apply more widely. Second, this study focused on graduation thesis writing. Future studies should explore different writing genres or shorter tasks to see if similar patterns of AI-mediated noticing and application occur.

Another limitation is the reliance on retrospective self-reported data. Although text analysis and ChatGPT history logs were used to cross-check these student comments, the data were still limited by participant memory. Furthermore, the findings regarding cognitive load and psychological pressure stemmed from the interviews rather than direct measurement. To provide stronger support for these cognitive and psychological barriers, future studies should incorporate objective measures to examine these factors during the writing process. Finally, because this study was cross-sectional, longitudinal

research is needed to explore how learners' engagement with AI feedback changes over time.

Conclusion

This study investigated the linguistic forms university students noticed when using ChatGPT as an AWE tool for academic writing, and their subsequent application of these forms in their own writing. The results revealed that students not only noticed diverse linguistic forms such as vocabulary and sentence structures but also understood their functions in academic writing. However, such awareness did not sufficiently transfer into independent use in subsequent writing, indicating that many learners experience a gap between receptive and productive knowledge. Factors such as cognitive load while writing, fear of making mistakes, and psychological pressure to prioritize task completion were found to hinder the narrowing of this gap.

Based on these findings, this study suggests the pedagogical implication that, to maximize the learning effectiveness of AWE tool use in English writing, it may be necessary to incorporate mechanisms that not only utilize feedback for immediate correction but also support learners in retaining noticed linguistic forms for reuse in subsequent writing. In this regard, the use of ChatGPT's dialogue functions would enable learners to individually test linguistic hypotheses and explore alternative expressions.

While many previous studies in this field have utilized quantitative methods, this study demonstrates the value of a qualitative approach. By analyzing the data qualitatively, this study helps to better understand how learners actually interact with AI feedback. This suggests that qualitative research can be valuable for exploring the detailed processes of learner engagement in AI-assisted L2 learning research.

Note

1. Throughout this study, no improper practices were observed.

Declaration of Generative AI Use

During the preparation of this manuscript, the lead author used Google Gemini to refine linguistic expressions and improve the clarity of the discussion. The lead author has thoroughly reviewed and edited the output and takes full responsibility for the final content.

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