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Lower-proficiency EFL students' use of Grammarly in writing: Behavior, cognition, and affect

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This multiple case study examines lower-proficiency EFL students' attitudes toward the use of Grammarly's free version in writing. It explores the participants' behavior, cognition, and affect, aiming to provide detailed insights into their experiences and perspectives. Utilizing Zoom recordings, stimulated recall, and semi-structured interviews, the investigation revealed that the lower-proficiency learners were product-oriented in revising their writing, showing low cognitive engagement with automated written corrective feedback (AWCF). Although one participant did not fully trust Grammarly's accuracy, all of them accepted its suggestions quickly and uncritically. The desire to increase the scores seemed to play a significant role in their engagement with AWCF. Despite this, the research primarily demonstrated how inadequate linguistic knowledge posed challenges for the students in effectively utilizing the technology. Nonetheless, the students expressed overall satisfaction with Grammarly's assistance, recognizing its ability to improve their drafts. To optimize the technology's benefits for EFL students with lower proficiencies, the study highlights the need for providing metalinguistic knowledge and user training to enhance their language learning through its feedback.

Keywords: automated written corrective feedback (AWCF), Grammarly, language learning, EFL writing

Introduction

Over the past decade, technological innovations have emerged to assist in writing tasks, including automated written corrective feedback (AWCF) software. AWCF, such as Grammarly, has gained popularity in English as a foreign language (EFL) context due to its ability to provide grammar corrections and meet students' need for feedback (O'Neill & Russell, 2019) while promoting autonomous learning (Cavaleri & Dianati, 2016). It may align with the "noticing" hypothesis (Schmidt, 1990) by offering opportunities for students to notice grammatical structures that might otherwise be overlooked (Larsen-Freeman, 2015, p. 266). Corrective feedback increases students' awareness of grammatical rules and reinforces their prior knowledge (Leow, 2019), and contributes to their long-term writing development (Bitchener, 2008; Van Beuningen et al., 2012). However, it is worth noting that effective learning only takes place when the learner actively engages with AWCF by noticing the feedback, processing it, and incorporating it into their writing practice (Heift & Vyatkina, 2019).

Research has shown that Grammarly can improve the quality of students' writing. The tool reduces grammatical errors in a text by providing error correction (Ghufron & Rosyida, 2018). Moreover, Grammarly's feedback is perceived to be beneficial for learning and writing development (Cavaleri & Dianati, 2016; Nova, 2018). However, the technology has also been shown to have its downsides: feedback inaccuracy (Nova, 2018; O'Neill & Russell, 2019) and students' overdependence on the tool, which potentially lead to inaccurate revisions and inhibit true learning (Koltovskaia, 2020). Nevertheless, given such technology's widespread availability and use, it is impractical to prohibit students from utilizing them. Instead, further research is necessary to comprehensively understand the implications of Grammarly and similar tools in the context of language learning. This knowledge is essential to effectively assist EFL students in navigating the use of technology to optimize their language learning outcomes.

An area that requires deeper exploration is EFL students' attitudes towards AWCF software, as their attitudes may affect the ways they engage with the technology, hence their language learning. More focus on lower-proficiency learners is essential as they have been indicated to be unable to use AWCF effectively (Fan, 2023; Koltovskaia, 2020). While many studies have focused on learners' perspectives of AWCF (e.g., Cavaleri & Dianati, 2016; O'Neill & Russell, 2019), there is a lack of more in-depth examination of the technology users' cognition and feelings aligned with their empirical behavior (e.g., Hoang & Storch, 2024 – minus affect; Koltovskaia, 2020; Ranalli, 2021) and research exclusively examining more-novice EFL learners. Moreover, previous research on Grammarly (e.g., Barrot 2021; Cavaleri & Dianati, 2016; Ebadi et al., 2023; Fan, 2023; Ghufron & Rosyida, 2018; Guo et al., 2022; O'Neill & Russell, 2019) emphasizes quantitative analysis and larger sample sizes, overlooking students' complex individual experiences and perspectives. These studies have primarily focused on statistical data from a more substantial number of participants, limiting our understanding of nuanced interactions between FL students and AWCF technology. Recent studies (Koltovskaia, 2020; Ranalli, 2021)

have explored individual uses of AWCF using the stimulated recall protocol. However, such empirical qualitative research remains scarce, particularly in the EFL domain, given the previous studies were conducted in English as a Second Language (ESL) contexts. To address this gap, further in-depth research is crucial to investigate how EFL students, as active technology users, engage with Grammarly and how their unique perceptions and feelings shape their attitudes towards it.

The findings from this research will be valuable to EFL scholars and educators interested in integrating technology to support students' writing development in language learning, particularly by taking into account the nuances of interactions between the students and the technology when doing their writing assignments in terms of their behavior, cognition, and affect as laid out in Eagly and Chaiken's (1998) tripartite theory. The decision to focus on the free version of Grammarly was based on its widespread accessibility and popularity among students in the research context. Therefore, the study aims to investigate Indonesian lower-proficiency tertiary EFL students' attitudes in their free version Grammarly use in their writing assignments in terms of behavior, cognition, and affect, by posing the research question: "What are lower-proficiency tertiary EFL students' attitudes towards the free version Grammarly as shown by their behavior, cognition, and affect in their use of the technology in their writing assignments?"

Literature review

Corrective feedback in EFL writing

Corrective feedback (CF) or error correction "refers to the feedback that teachers [...] give second language learners on the accuracy of the target language used in their written texts" (Bitchener, 2018, p. 1). Despite the common use of CF in EFL writing, its usefulness remains controversial as studies have shown mixed results. On the one hand, some studies have proven the effectiveness and usefulness of CF in producing a text and in students' long-term writing development (Bitchener, 2008; Van Beuningen et al., 2012). The developmental aspect is crucial because, as Bitchener and Ferris (2012) point out, the goal of writing tasks is not for students to produce a perfect, error-free end-product but to "learn from the process of developing that text" (p. 140). Therefore, the CF received by students should also support this goal by helping them build the knowledge and skills they need to develop to become better writers.

On the other hand, CF has also been perceived as ineffective and even potentially "harmful ... [to] students' ability to write accurately" (Truscott, 2007, p. 270) and to use the language correctly in practical ways in communication as it may impede learners' fluency, overemphasize form at the expense of meaning, and overlook underlying causes of errors (Truscott, 2007, 2016). In addition, a study conducted by Koltovskaia and Mahapatra (2022), which examined two ESL students' behavior, cognitive, and affective engagement with computer-mediated teacher CF, highlights that while direct CF "provides a solution

for students,” they “do not have to use a lot of cognitive resources to resolve the issue” (p. 306). In this way, it may not guarantee learning. In other words, although CF might produce immediate results, it is still debatable whether it has a lasting positive effect on learning.

Automated written corrective feedback (AWCF)

With the advance of technology, CF to writing has been instantly accessible through automatic writing evaluation (AWE), “a computerized program which can evaluate and rate writing automatically using online checking system [sic]” (Nova, 2018, p.81). As its use in second language learning to provide CF has increased, a new term has been introduced, namely AWCF (Ranalli, 2018). As it offers fast feedback and satisfies individual students’ need for inputs, Cavaleri and Dianati (2016) perceive the use of AWCF as the “intersection between grammar support and online automated technology” (p. 1). It can also ease teachers’ workload by allowing them to focus on unaddressed issues (Thi & Nikolov, 2022) and foster autonomous learning (Barrot, 2021). Nevertheless, Kawashima (2023) found that while participants had favorable opinions of AWCF, they highly valued human feedback, both direct and indirect, for its appropriateness and reliability. Notably, most participants considered the teacher’s direct feedback to be the most beneficial for their writing progress. Consequently, the findings suggest that machine feedback should not be used as the sole method of writing instruction but should complement teacher feedback, which is in line with Ebadi et al.’s (2023) findings. The results of this experimental study revealed that the group that had received both Grammarly and teacher feedback outperformed the two groups receiving either feedback alone in the post-test. Notwithstanding, as with any other technology, its strengths and weaknesses need to be critically evaluated. Its potential to cater to learners’ needs, goals, and abilities in each context (Ranalli, 2018) also needs to be considered while selecting and using a particular tool. As integrating AWCF, such as Grammarly, into language learning remains a challenge, it is imperative to comprehensively assess the appropriateness of the technology, including the students’ attitudes as technology users.

Previous studies on Grammarly

Research has shown different students’ attitudes toward the use of Grammarly. On the one hand, some students have shown positive attitudes toward the program. O’Neill and Russell (2019) found that Australian ESL and native English speakers who received both Grammarly’s AWCF and teachers’ feedback showed higher satisfaction levels than those who only received inputs from teachers. This increased satisfaction was attributed to the greater agreement on the technology’s usefulness and ease of use, which resulted in enhanced confidence and language skills.

Research has also found that Grammarly’s feedback is regarded as detailed (O’Neill & Russell, 2019), useful for learning (Cavaleri & Dianati, 2016; Nova,

2018; O'Neill & Russell, 2019), and helpful for improving writing (Cavaleri & Dianati, 2016; Koltovskaia, 2020). Dizon and Gayed (2021)'s experimental study shows that Grammarly could significantly enhance Japanese EFL beginner's writing accuracy and enrich their vocabulary use, hence assisting the learners to communicate more. Therefore, AWCF may increase students' confidence (Cavaleri & Dianati, 2016) and motivation (Ghufron & Rosyida, 2018). Investigating Grammarly's use among ESL and English native-speaker learners in two Australian colleges, Cavaleri and Dianati (2016) found that "most students felt that the explanations [provided by Grammarly] had helped them understand grammar rules," which, therefore, might contribute to their future writing development (p. 233). Apart from this, ease of use is also one of the benefits students experienced when using the program (Cavaleri & Dianati, 2016; Nova, 2018). The use of the program is also perceived as quick (Nova, 2018; O'Neill & Russell, 2019) and time-saving (Nova, 2018).

On the other hand, students have also shown negative attitudes towards Grammarly. Contrary to the results mentioned previously, the correction provided by the software is sometimes perceived as misleading (Cavaleri & Dianati, 2016; Koltovskaia, 2020; Nova, 2018), and thus results in less trust in the accuracy of the feedback (Koltovskaia, 2020; Nova, 2018). In Nova's (2018) study, while finding Grammarly beneficial, EFL postgraduate students majoring in English education also pointed out its weaknesses, such as providing incorrect feedback and lacking content evaluation. All students reported instances where corrections were "not in line with the user's intention" (p. 89), potentially altering the intended meaning. Consequently, Nova concludes that Grammarly is not entirely reliable. To achieve better outcomes, writers should combine Grammarly with their writing skills. Additionally, the researcher reports that the users' perspective and evaluation of the technology might be influenced by "length of experience, type of English used, and length of writing" (p. 93).

Research has also indicated students' overdependence by blindly accepting AWCF. Koltovskaia (2020) investigated two international ESL college students' engagement in using Grammarly for revision in a writing course in a US university. Their engagement with Grammarly feedback was explored through screencast analysis, stimulated recall, and semi-structured interviews. In her study, a student with lower proficiency uncritically accepted most corrections made by the tool. Thus, Koltovskaia concluded that the participant's "positive affective engagement with AWCF (trust) resulted in limited cognitive engagement" (p. 11). Koltovskaia also suggests that Grammarly might be more suitable for students with higher proficiency as they have more linguistic knowledge, which allows them to be more critical and effective in using the tool, thus making correct revisions to improve the accuracy of their writing. This conclusion supports Zhang and Hyland's (2018) and Zhang's (2020) findings that higher proficiency leads to more successful engagement. Additionally, Barrot's (2021) study of 65 ESL students showed that repeated use of AWCF significantly improved writing accuracy during posttests. This improvement was attributed to three factors: technology's adaptive feedback and metalinguistic explanations, noticing of form and gaps, and student engagement through self-directed

learning. However, participants with lower L2 proficiencies reportedly had tended to accept suggestions immediately, limiting their language learning benefits. Nevertheless, Ranalli's case studies (2021) found that trust-related issues, not L2 proficiency, were key in explaining feedback engagement. Despite the contrasting findings, the researcher contends that they are not inherently contradictory. Instead, he argues that success in AWCF engagement cannot be solely attributed to proficiency level.

The study

Context of the study

This multiple case study was conducted to explore the attitudinal aspects of lower-proficiency EFL students (B1 and A2 CEFR levels) while utilizing the free version of Grammarly in their writing. The version was chosen because EFL students in Indonesia widely use it. Attitude, defined as a person's evaluative summary based on behavior, cognition, and affect (Fabrigar et al., 2005), shapes their tendency to respond positively or negatively towards an object (Eagly & Chaiken, 1998). Additionally, the concepts of behavior, cognition, and affect will be based on the works of Eagly and Chaiken (1998) and Koltovskaia (2020). Behavior refers to the strategies, revision operations, and actions taken to improve the draft and time spent on revision. On the other hand, cognition encompasses the thoughts, processing, and understanding the students use to determine the appropriate operation during revision. Lastly, affect encapsulates the student's feelings and emotional reactions toward AWCF suggestions upon receiving them and their overall perspective towards AWCF.

Participants

The study involved three EFL undergraduate students at a private university in Central Java, Indonesia. The participants, who were second and third-year students, had given their consent to release their academic information and were given pseudonyms for anonymity: Karin, Andre, and Henny. Their GPAs ranged from 2 to 3 out of 4, reflecting average grades in the C to B range. Karin and Henny had previously taken Intermediate Grammar and completed it with moderate (B) grades after repeating the course once. In contrast, although Andre was repeating the grammar course, he had been receiving higher marks and had previously achieved a moderately high grade in Basic Grammar. All three students had completed three foundational writing courses as part of their program. While Karin and Andre tended to receive lower grades in writing, Henny consistently achieved moderate grades. Based on their academic records and self-rated CEFR levels, Henny was assessed at a B1 level, while Karin and Andre were classified as A2 level students.

Data collection

The study employed a triangulation approach to gain in-depth, comprehensive data by combining Zoom recordings, stimulated recall protocols, and semi-structured interviews. Prior to data collection, a pilot test was conducted with a non-participating student, resulting in the removal of several questions in the semi-structured interview, namely “What variety(ies) of English do you use in writing?”, “What kind of texts do you revise with Grammarly?”, and “When do you usually use Grammarly?”. This omission aimed to prioritize issues pertinent to their English writing assignments. Furthermore, two new questions, specifically “What were you thinking before starting to revise with Grammarly?” and “What did you feel then (before starting to revise with Grammarly)?”, were introduced into the stimulated recall session to elicit students’ initial thoughts and feelings in their use of Grammarly. Additionally, based on piloting feedback, the stimulated recall question “Why did you accept this?” was rephrased to a passive voice “Why was this accepted?”, as it was observed that the original wording could make participants feel judged.

The participants were contacted and asked for their consent to participate in screen recording, stimulated recall, and interviews. Due to the potentially private nature of the issue, the participants’ data were confidentially treated and only accessible to the first researcher, as the second and third authors were lecturers at the program where the data were collected. Zoom Meeting was used for screen recording to collect empirical data, allowing the students to capture videos of their screens and facial expressions. A dry run was conducted the day before using a provided document to familiarize the participants with the recording process. They were then asked to record their screens while revising their content writing final drafts using Grammarly. Individual stimulated recall sessions (Gass & Mackey, 2000) followed, where participants recalled their experiences and retrospective thoughts during the revision while watching the screen recording. The sessions lasted approximately 20 minutes, with the exception of Henny’s, which extended over an hour due to her longer essay. Semi-structured interviews, lasting around 20 minutes each, were also conducted; both sessions were audio-recorded in Indonesian. The recordings were later transcribed and sent back to the participants for confirmation.

Data analysis

The study mainly employed a thematic analysis of the data. The participants’ responses were classified into behavior, cognition, and affect based on Eagly and Chaiken’s (1998) and Koltovskaia (2020)’s categories as elaborated in the context of the study.

In the initial stage, the error types identified by Grammarly were reclassified into Han Hyland’s taxonomy, as the broad categorization of errors under “grammar” was inadequate (Koltovskaia, 2020). Furthermore, as the accuracy of the correction provided by Grammarly is subject to errors (Cavaleri & Dianati, 2016; Nova, 2018; Koltovskaia, 2020), the second stage focused on evaluating the precision of the automated writing feedback received by the students. For

instance, Grammarly suggested adding the article “a” before “various review” in the sentence “... also gets various review [sic] from...”. This suggestion was identified as inaccurate since “a various review” would be grammatically incorrect due to the mismatch between the adjective “various” and the singular noun “review.”

During the third stage, the duration of time spent by the participants on each error that received AWCF was measured, resulting in basic quantitative data. This involved recording two-time intervals: T1, the duration from the moment Grammarly presented the AWCF to the moment the participant clicked on the AWCF, and T2, the duration from the moment the participant clicked on the AWCF to the moment they moved on to the next AWCF. Then, each participant’s total time working on all errors in the draft was calculated.

Their stimulated recall and interview data were qualitatively examined to analyze the students’ attitudinal aspects. Participant comments in the recall transcript were sorted and reduced by placing them next to the corresponding error that received automated writing feedback. The comments from the recall and interview transcripts were classified into specific categories of behavior, cognition, and affect to organize the data further.

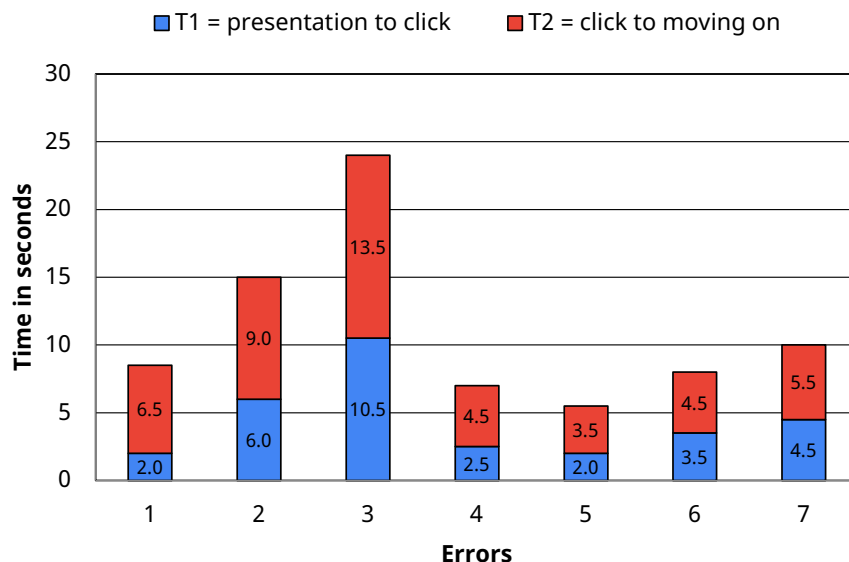
Findings

Karin

Karin was a pre-intermediate-level (CEFR A2) learner. She reported frequent use of Grammarly in every writing class and had been using it for almost two years.

Behavior

Based on the screen recording, it was observed that Karin’s 470-word draft had seven errors, for which she received AWCF via Grammarly. Four distinct error types were detected, including errors related to the use of articles (2), punctuation (2), prepositions (2), and word choice (1). Karin correctly accepted all seven AWCFs, resulting in a 100% error correction rate. She spent a total of 47 seconds revising her draft using Grammarly’s free version, which only offers spelling, grammar, and punctuation correction features. The time spent by Karin for each AWCF was an average of 6.7 seconds. This suggests she accepted the feedback relatively quickly, possibly not allowing for substantial processing. The following chart demonstrates the duration of time spent by Karin on each error that received AWCF (T1 + T2) based on the screen recording, with T1 being the duration from the moment Grammarly presented the AWCF to the moment she clicked on the AWCF, and T2 being the duration from the moment she clicked on the AWCF to the moment she moved on to the next AWCF.



Note. Two-time intervals: T1 from the presentation of AWCF to participant click and T2 from click to move on to the next AWCF.

Figure 1. The time Karin spent for each AWCF

Based on Figure 1, Karin apparently almost consistently accepted all AWCF quickly, except for the third operation. She also spent more time after making decisions to accept the inputs for the first three errors before moving on to the next AWCF but subsequently started quickly accepting and moving on to the next AWCF. This action suggests that she uncritically accepted AWCF towards the end of the revision process.

At the end of the revision process, Karin encountered 48 “additional writing issues” marked with yellow underlines by Grammarly, but no suggestions for correction were provided in the free version of Grammarly. After re-reading her draft quickly, Karin opted to leave these errors uncorrected.

Cognition

In terms of cognition, Karin displayed relatively low engagement. The stimulated recall revealed that Karin understood the causes or nature of the two errors. The following example demonstrates her understanding of one error related to conciseness (reclassified as word choice):

Revision	Original text	Error type	Participant’s comment
removal of “the period of”	... who managed to touch the 123rd rank in the period of Sunday 20–26 using Indonesian songs.	Word choice	It was better to remove it because there was already “Sunday”.

Karin's comment reflects her understanding of the nature of the AWCF because she recognized that the word "Sunday" already provided the necessary information about the time period, making the phrase "the period of" redundant.

Meanwhile, the stimulated recall showed her lack of comprehensive understanding of the grammatical principles underlying most errors identified by Grammarly. A salient illustration of this relates to the following example:

Revision	Original text	Error type	Participant's comment
through → in	"... is very valuable," said Tulus through his official statement.	Preposition	After rereading "said Tulus through his official statement" and "said Tulus in his official statement", I thought "in" makes more sense than "through".

Karin's comment indicates that her decision to accept the suggested change was primarily driven by her judgment of which word sounded better in the sentence rather than a deeper understanding of the reasons behind the suggested change. This action suggests that she may not fully understand the nuances of the two words and why Grammarly suggested the change. Apparently, she accepted the feedback based on her intuition that the new word appeared contextually appropriate in the sentence.

In the semi-structured interview, Karin also acknowledged encountering difficulties with prepositions and articles in her writing. The following example shows one error related to the use of articles suggested by the AWCF that she accepted quickly, in only 3.5 seconds:

Revision	Original text	Error type	Participant's comment
Minister → the Minister	In addition, Minister of tourism and creative economy, Sandiaga Uno also expressed...	Articles	The correction was correct because "the minister" must have referred to Sandiaga Uno himself.

Her comment suggests that she understood that "the minister" referred specifically to Sandiaga Uno, and that adding "the" made the reference more specific and clearer. This understanding is partly consistent with using "the" as a definite article to specify a particular noun. The definite article must be used there regardless of the presence of the name "Sandiaga Uno." Here, her understanding of the correction appeared to be based more on the context and meaning of the sentence rather than explicit or implicit knowledge of how to use the definite article. In other words, she still relied on AWCF to decide. Finally, after quickly re-reading her draft at the end of the revision process, Karin opted to ignore the yellow underlines. While she expressed confidence in the result of her work, she also revealed uncertainty regarding how to address the yellow underlines and fear of potentially making the mistakes worse.

Affect

In the recall, Karin reported that her initial emotional response was uncertainty and anxiety. She underscored that:

I felt nervous about the number of corrections I was about to receive from Grammarly because I was unsure if I had used the correct grammar.

She mentioned that during one revision, she accepted AWCF because she trusted the suggestion.

Revision	Original text	Error type	Participant’s comment
Indonesian → the Indonesian	...in the achievement of Indonesian musician (Tulus) who managed to...	Articles	I trust that this (suggestion) is correct for this word (“Indonesian”).

Karin’s trust was also evident during the interview when she stated:

I trust Grammarly’s corrections. I read [the sentence] and see if it [(Grammarly’s suggestion)] fits. If I believe it does, I will change it. But mostly, I do trust that the correction is right.

The trust seemed to have been supported by her reliance on her intuition regarding the appropriateness of Grammarly’s suggestions in the sentences’ contexts. Despite this, Karin also noted that Grammarly positively affected her learning, as the tool helped her remember grammar rules she had previously learned through the errors she made.

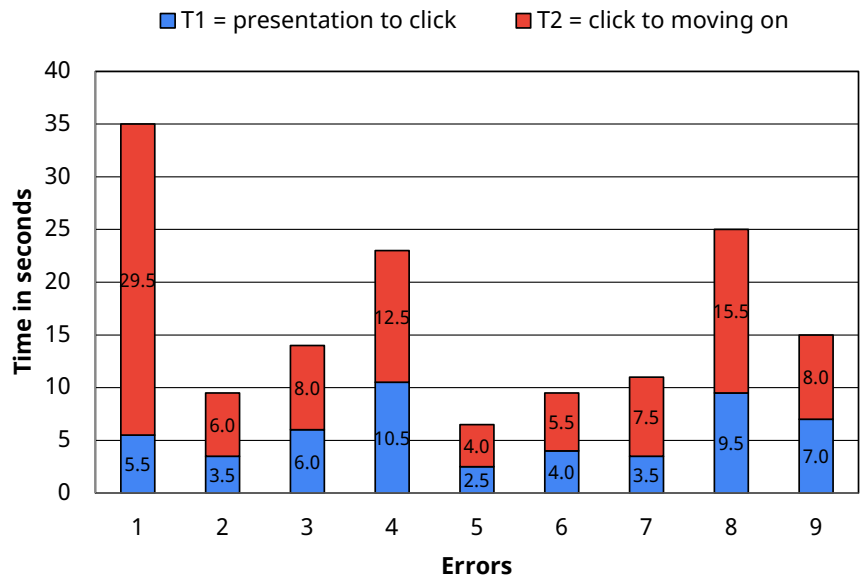
In the interview, Karin also highlighted several positive aspects of using Grammarly. Firstly, she asserted that the tool was “helpful, especially in writing assignments.” She mentioned that it was easy to use, fast, and accurate. In addition, Karin found it reliable, as even if the internet was disconnected, her work was not lost. Furthermore, she acknowledged that using Grammarly also eased her burden in writing, allowing her to focus on higher-order concerns.

Although the free version of Grammarly has limited features, Karin found no other downsides of it other than the ambiguities with the parts with yellow underlines. She expressed her intention to use Grammarly again in the future, as she needed it to check her grammar in writing. Lastly, Karin expressed her trust in Grammarly more than in other AWCF applications, such as Reverso and Ginger, as she found that Grammarly provided more thorough feedback.

Andre

Andre was a pre-intermediate-level (CEFR A2) EFL learner. He reported frequent use of Grammarly daily for many different purposes, such as assignments and social media interaction, and had been using Grammarly for almost two years.

Nine errors were detected in Andre's 273-word draft based on the screen recording. Four distinct error types were detected, including errors related to the use of word choice (4), punctuation (2), sentence structure (2), and singular-plural (1). Prior to making changes, Andre scanned the errors marked by Grammarly. He correctly accepted 8 AWCFs and incorrectly accepted 1, thus fixing 89% of his total errors. He spent a total of 96.5 seconds revising his draft, with the time spent for each suggestion an average of 10.7 seconds, which was moderately fast since it might provide enough time for some processing but not for consulting external resources. The following chart demonstrates the time he spent on each error:



Note. Two-time intervals: T1 from the presentation of AWCF to participant click and T2 from click to move on to the next AWCF.

Figure 2. The time Andre spent for each AWCF

Based on Figure 2, Andre apparently spent more time after, rather than before, making the decision to accept AWCF. This action might suggest his need to reevaluate his decisions.

At the end of the revision process, Andre encountered 11 “additional writing issues” marked with yellow underlines by Grammarly. After skimming them quickly, like Karin, he also decided to leave these errors uncorrected.

Cognition

Regarding cognition, Andre, who received better Intermediate Grammar grades, demonstrated moderate engagement by understanding most errors. The stimulated recall revealed that he understood the causes or nature of 6 out of 9 errors and accurately accepted the suggested revisions. The following example illustrates his understanding of the error:

Revision	Original text	Error type	Participant's comment
and → ,and (add a comma)	For her, reading is not just looking for information, but entertaining herself, getting new experiences and relieving stress from busyness.	Punctuation	I accepted the suggestion because it was grammatically correct that we use "and" when we want to mention the last thing after mentioning a few things.

Andre correctly identified the grammatical rule for using "and" to join the last item in a list after mentioning a few things. This action suggests that he had explicit knowledge of this grammatical rule and understood why the correction was made.

However, Andre appeared to lack knowledge of the grammar rules for the other four errors, yet he still accepted the AWCF provided by Grammarly without critically verifying its accuracy. The following stimulated recall demonstrates how he accepted a suggestion from Grammarly without fully understanding the cause or nature of the correction:

Revision	Original text	Error type	Participant's comment
it is possible that she often experiences → she may often experience	Since her first year at university, her schedule is very busy and it is possible that she often experiences stress due to fatigue, but...	Sentence structure	I was thinking and reading the sentence. Does it fit if I change it? After changing it, I read it and thought it fitted. I accepted it because it fitted the sentence.

In the above instance, Grammarly suggested paraphrasing a clause to make it more concise and natural by using "may." However, based on Andre's comment, it seems that he, just like Karin, used his intuition to determine whether the correction was appropriate in the context. He mentioned reading and thinking about the sentence before accepting the suggestion, but his explanation does not demonstrate an adequate understanding of the need to use "may" in the context.

In addition, another example demonstrates that Andre excessively relied on AWCF and inaccurately accepted it, despite considering a more appropriate form. Specifically, although he thought of using "and", he opted to use Grammarly's misleading suggestion "but."

Revision	Original text	Error type	Participant's comment
she → but she	...and has participated in activities held by the Indonesian Ministry of Social Affairs, she can't seem to stop doing something.	Sentence structure	After revising the previous sentence, this new suggestion about "but" appeared so I just clicked it even though I thought "and" could also be used.

In this specific context, using "and" instead of "but" would be more appropriate since the sentence lists a series of activities and accomplishments of the subject, and the phrase "she can't seem to stop doing something" is supposed

to enforce all that has been mentioned, suggesting that the subject is highly active and involved in multiple things. Adding “but” before “she can’t seem to stop doing something” would create a contrast between her busy schedule and her inability to stop doing something, which does not accurately reflect the sentence’s intended meaning.

Nevertheless, Andre recalled, “‘but’ appeared ..., so I just clicked it.” Based on Andre’s comment, he seemed to partially understand the cause or nature of the AWCF since he mentioned that he thought “and” could also be used. However, he still accepted the AWCF to add “but,” suggesting that AWCF outweighed his own judgment.

Like Karin, Andre left the “additional writing issues” uncorrected. He mentioned in the recall that he lacked the ability to understand the errors and make appropriate revisions.

Affect

Andre’s initial emotional response was uncertainty, dissatisfaction, and surprise. In the recall, he mentioned feeling unsure and dissatisfied about the accuracy of his work and surprised by the number of corrections provided by Grammarly, which exceeded his expectations. When encountering the “additional writing issues,” he mentioned that he was initially curious but later became confused as he could not understand the errors and, therefore, could not correct them. He acknowledged that he wished he had had the premium version to address the additional issues. However, he also reported that he smiled at the end of the revision process because he felt satisfied and happy about the result.

During the interview, Andre expressed his positive experience with using Grammarly, noting that it had helped him improve his confidence in writing. He also reported that it had helped him with sentence structure, word choice, and punctuation. Additionally, he mentioned that he had received less feedback from his teachers since using Grammarly. Although he sometimes received different feedback from AWCF and his teacher, he believed that both sources had the same purpose, and the differences were not significant. Nevertheless, he tended to choose the teacher’s feedback due to their authority and expertise.

Andre also found Grammarly’s AWCFs helpful and appreciated its corrections’ great results based on his experience. Moreover, Grammarly had not only eased but also accelerated his writing process. In addition, he appreciated how Grammarly’s AWCFs helped him learn from his past mistakes and remember the grammar rules he had previously learned in grammar courses. He would like to continue using Grammarly and expressed his loyalty to the tool, stating that he had never explored other applications and had always been satisfied since using it for the first time. However, he also noted a downside of the tool, which was its inability to paraphrase:

Grammarly cannot facilitate a more extensive change. It cannot paraphrase a whole sentence according to our intention because it does not fully understand what we have in our mind.

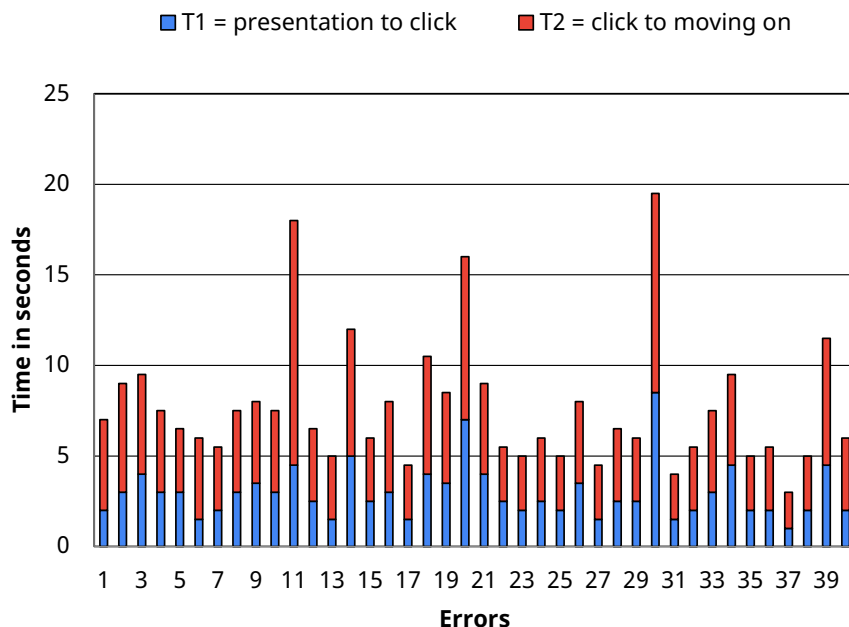
Finally, Andre emphasized how he often felt challenged when using Grammarly. In every assignment, he aimed to receive a higher score from Grammarly before making revisions, as he perceived the score as a credible benchmark for his writing improvement. He trusted that the Grammarly scoring system was based on reliable math and algorithms.

Henny

Henny was an intermediate-level (CEFR B1) EFL learner who had been using Grammarly for about 1.5 years. She reported frequent use of Grammarly for every writing assignment.

Behavior

In Henny's 1023-word draft, 40 errors were identified, for which she received AWCFs via Grammarly. Ten distinct error types were detected, including errors related to the use of articles (13), spelling (5), singular-plural (5), prepositions (5), verb form (4), sentence structure (2), verb tense (2), pronouns (2), word choice (1), and punctuation (1). Henny correctly accepted all 35 of the 40 AWCF suggestions and incorrectly accepted 5, resulting in an 87.5% error correction rate. She spent a total of 187.5 seconds revising her draft using Grammarly's assistance, averaging 4.7 seconds per AWCF. The number indicates that Henny made decisions at a rapid pace, which may not allow for any substantial thoughts or external resource consulting. The following chart demonstrates the time she spent for each error:



Note. Two-time intervals: T1 from the presentation of AWCF to participant click and T2 from click to move on to the next AWCF.

Figure 3. The time Henny spent for each AWCF

From Figure 3, it can be inferred that Henny mostly spent relatively the same amount of time before and after accepting AWCF. It also highlights that she almost constantly spent a short amount of time making decisions and moving from one AWCF to the next throughout the revision process.

At the end of the revision process, Henny encountered 48 “additional writing issues” marked with yellow underlines by Grammarly. In contrast to Karin and Andre, Henny chose to address these issues herself, spending slightly over 50 minutes. Henny employed various strategies such as consulting external sources (Google Translate and dictionaries), substituting words, combining short sentences, and breaking longer sentences. As a result of her efforts, she was able to reduce the number of “additional writing issues” from 48 to 35.

Cognition

In the recall, Henny exhibited relatively low engagement. Out of the 40 errors, she was only able to understand the causes or nature of 9 errors, the majority of which were related to spelling. The following stimulated recall demonstrates her understanding of one of the errors:

Revision	Original text	Error type	Participant's comment
start → started	As we know, this movie start since 2002...	Verb tense	I accepted it because I was wrong. It was in past tense so I should have used Verb 2. I was not careful.

Her comment reflects her understanding of the cause and nature of the AWCF. She recognized that the sentence was in the past tense and needed to use the correct form of the verb, which is the second form (verb two) for “start.” She also acknowledged that her mistake was due to not being careful enough when writing the sentence. The acknowledgment highlights how AWCF helped Henny to identify errors that she may not have noticed otherwise.

However, Henny appeared not to have an adequate understanding of the underlying grammatical problems leading to most of the errors identified, particularly those related to articles. For instance, when prompted to remove the indefinite article “a” in the excerpt “... and distributed by 20th Century Fox, this movie has a good animation,...” she accepted the AWCF without being able to explain the rationale behind the recommended change in the recall.

Revision	Original text	Error type	Participant's comment
a good → good	... and distributed by 20th Century Fox, this movie has a good animation,...	Articles	I accepted it because maybe “a” was not used because it was already an adjective, and maybe because it was followed by animation. It was suggested by Grammarly to use “good” so I just followed it.

Her comment demonstrates her lack of understanding of the nature of the correction. The reason for removing “a” is not because “good” is used as an adjective but because “animation” is an uncountable noun. The comment indicates that Henny accepted the feedback without comprehending its accuracy.

Moreover, the following example suggests that Henny may have relied on her intuition and the context of the sentence to determine the accuracy of AWCF rather than an adequate understanding of the relevant grammatical rules.

Revision	Original text	Error type	Participant's comment
the → In the	... started in 2002 until 2022 [add “In” here] the new Ice Age movie Series “The Ice Age Adventure of Buck Wild” before watch the new series we should know how...	Prepositions	Actually I was kind of confused about that one. Why use “in the”? But I accepted it because it fit the sentence. I was still confused about which was the right one. This part was a result of paraphrasing, and I was confused about how to paraphrase it. So, for this paragraph, I accepted all suggestions.

It appears that Grammarly was trying to correct a run-on sentence by suggesting the addition of “In” to begin a new sentence. However, Henny accepted the suggested correction while appearing unsure about what was correct. Additionally, she recalled feeling confused while trying to paraphrase the construction, leading her to accept all other suggestions provided by Grammarly for the paragraph. This recall indicates Henny’s overreliance on AWCF.

It is also important to note that Henny encountered the same error twice in her text regarding “various reviews” during the screen recording. At the beginning of the revision process, Grammarly suggested removing the indefinite article “a” from “a various review.” However, Grammarly then suggested adding “a” back into “various review”, leading to an inconsistent and inaccurate AWCF. The phrase “a various review” would be grammatically incorrect because “various” is an adjective used to describe a plural noun. After making a few other operations, she accepted Grammarly’s suggestion to change “review” to “reviews” and remove the indefinite article “a” from “a various reviews”, which would be the correct usage.

Revision	Original text	Accuracy	Error type
a various → various	...good animation, have a various review from...	Accurate	Articles
various → a various	..., this movie has good animation, have various review from ...	Inaccurate	Articles
review → reviews	... has good animation, a various review from the public ...	Partly accurate	Singular-Plural
a various → various	... has good animation, a various reviews from the public ...	Accurate	Articles

In the second instance of the error, towards the end of the revision process, Grammarly suggested the same misleading feedback to add the indefinite article “a” to “various review”, but Henny also accepted it. However, after that, Grammarly’s feedback became inconsistent, while she continued to follow its suggestions. Eventually, Grammarly provided the correct input, but throughout this process, she faced challenges due to her lack of agency and having to conform to the tool’s suggestions.

Revision	Original text	Accuracy	Error type
various → a various	..., this movie has good animation, have various review from ...	Inaccurate	Articles
review → reviews	... has good animation, a various review from the public ...	Partly accurate	Singular-Plural
a various → various	... has good animation, a various reviews from the public ...	Accurate	Articles

The two similar misleading operations highlighted both the inaccuracy and inconsistency of Grammarly and Henny’s uncritical decision-making and lack of attention toward the AWCF. While she had dealt with the same problem, she did not appear to be mindful of what she had previously done.

Furthermore, Henny was observed addressing the errors marked by yellow underlines in the screen recording. She employed various strategies such as consulting websites like Google Translate, dictionaries, and thesauruses; substituting words with their synonyms; combining short sentences into longer ones; and breaking longer sentences into two parts. Her use of these strategies demonstrated her greater cognitive engagement when dealing with these “additional writing issues.” However, Henny’s revisions appeared to be based on a trial-and-error approach based on the scores she obtained rather than true understanding. For instance, when Grammarly underlined “gave” in the sentence “but as time goes by, Diego gave up his intention and...”, the number of “additional writing issues” was 44. Henny then consulted an online Indonesian-English dictionary to look up the word “menyerah,” which means “to give up” in Indonesian. She subsequently changed “gave” to “given up,” which was an inaccurate revision. Despite this, Grammarly reduced the number of “additional writing issues” from 44 to 42, prompting Henny to move on to the next error.

Affect

Henny’s initial emotional response was one of surprise. In the recall, she mentioned feeling surprised about the number of corrections and the low score she received because she believed that she had used correct grammar based on what she had learned.

During the stimulated recall, Henny expressed dissatisfaction with her score before addressing the “additional writing issues.” This feeling and curiosity motivated her to deal with them and continue revising. However, she also reported feeling stressed during the revision process. Towards the end of the process, she experienced confusion but decided to continue revising. In the end, she felt happy and relieved because her score had improved.

During the interview, she shared that she found Grammarly helpful in addressing grammatical issues and identifying other types of errors, specifically punctuation. She appreciated how it made her more mindful of grammar structures in her writing. However, she did note that, at times, Grammarly’s suggestions did not match her intentions:

However, we need to be more careful. Grammarly’s suggestions sometimes do not match our expectations, our intention that we want to put in the draft.

This statement contradicts Henny’s actions for most of the errors, where she did not carefully think about AWCF when making decisions to accept them.

Henny also mentioned that she found the score provided by Grammarly helpful in her efforts to improve her writing. She expressed that she would probably continue using the tool, as it had helped her streamline her writing process and reduced the time and effort needed for grammar checks, further demonstrating her positive experience with the tool.

Discussion and conclusion

This study offers details describing lower-proficiency EFL students' behavior, cognition, and affect in using the free version of Grammarly in writing, drawing on the tripartite theory of attitudes (Eagly & Chaiken, 1998). The participants' behaviors in the study included strategies, revision operations, and actions employed to improve their drafts and the time spent on the revision process (Eagly & Chaiken, 1998; Koltovskaia, 2020). Karin and Andre, who worked on shorter drafts, received similar amounts of AWCF, while Henny, who worked on a significantly longer text, received a higher volume of AWCF. Interestingly, Henny spent considerably less time on each AWCF suggestion, averaging only 4.7 seconds, suggesting a tendency to make revisions quickly in her notably longer essay. This action indicates that the length of the writing submitted can influence the use of the program (Nova, 2018). Nevertheless, it is worth noting that all three participants – Karin, Andre, and Henny – accepted AWCF at a relatively fast pace, averaging 6.7 seconds, 10.7 seconds, and 4.7 seconds, respectively. These processing times fall within the lower range of the AWCF operation durations reported in Koltovskaia's (2020) study, possibly not allowing for substantial cognitive engagement. This previous research reported that a participant who spent an average of 23.8 seconds on each AWCF demonstrated extensive cognitive engagement, while another participant who spent an average of 12.4 seconds showed dependence on AWCF.

Regarding the acceptance and accuracy of AWCF, Karin, Andre, and Henny accepted 100% of the suggestions and accurately corrected 100%, 89%, and 87.5% of their total errors, respectively. These significantly high scores echo Guo et al.'s (2022) finding on AWCF's effectiveness in reducing errors. While Andre spent more time on each error, all participants accepted the feedback relatively quickly without resorting to external resources or revision strategies, indicating their reliance on the tool and product-oriented approach in revising their writing. They primarily relied on their limited knowledge and intuition to determine whether or not to accept the AWCF suggestions. This suggests that accurate acceptance of AWCF can lead to draft improvement without requiring extensive understanding or cognitive processing, which echoes Koltovskaia's (2020) observation. Nonetheless, true learning requires cognitive processing, highlighting the need for a process-oriented approach when using such technology for language learning (Heift & Vyatkina, 2019).

Furthermore, it is worth noting that Henny showed greater cognitive engagement and learner agency by attempting to resolve the "additional writing issues" marked with yellow underlines in the free version of Grammarly using various strategies. Despite quickly accepting free Grammarly's other suggestions for revisions, she had to find her own solutions due to the absence of provided corrections for those specific issues. This echoes Koltovskaia and Mahapatra's (2022) finding that learners rely less on cognitive resources when solutions are readily available. Nevertheless, Henny's engagement with the additional issues was more of a trial-and-error method to increase her scores, a desire which Andre also shared during the interview. Despite Henny's significant effort to revise the draft using the tool, her revisions were ineffective,

which deterred Karin from revising her additional issues. Karin pointed out that she did not deal with the problems because she did not want to worsen them. In such contexts, learners with adequate explicit knowledge of grammar may be better equipped to analyze the errors and make informed decisions to resolve the problems, as such knowledge may be used to monitor mistakes (Ellis, 2004).

The participants' cognition encompasses their thoughts, processing, and understanding to determine the appropriate operation during revision (Eagly & Chaiken, 1998, Koltovskaia, 2020). Among the three participants, Andre, who seemed to have a more metalinguistic understanding with better grammar grades, was the only one who displayed relatively higher cognitive engagement when dealing with Grammarly's suggestions with explanations. He spent more time on each suggestion and was able to articulate the cause or nature of most of the AWCF he received. This observation suggests that metalinguistic knowledge may enhance students' learning process when working independently with AWCF.

Regardless, all three participants showed a similar pattern in their engagement with AWCF. When the grammatical rules for the suggested revisions were easy to understand, they tended to make decisions about accepting the feedback with minimal cognitive effort. However, when faced with a more challenging structure that they lacked knowledge of, they often avoided struggling and uncritically accepted the suggested revision, sometimes relying on their intuition to determine its fit within the meaning context of the sentence. While this approach to learning may be common in implicit grammar acquisition, their limited implicit English knowledge made it ineffective and prevented them from capitalizing from the experience for their grammar learning. Furthermore, although Henny attempted to revise additional writing issues independently, she was unable to resolve many of them and tended to fail to understand the nature of her problems. All these findings show that lower-proficiency EFL students are unable to use the tool efficiently due to their inadequate linguistic knowledge and mastery. While the tool can enhance the quality of their writing, their language learning may not be optimized as they are unable to achieve adequate cognitive engagement with the provided feedback. This finding strongly corroborates the initial indication in Koltovskaia's study (2020) that lower proficiency may lead to excessive reliance on AWCF.

Regarding the participants' affect, which encompasses their feelings and emotional reactions to AWCF suggestions and their overall perspective towards Grammarly's feedback (Eagly & Chaiken, 1998; Koltovskaia, 2020), they experienced various feelings. Initially, they experienced negative emotions such as uncertainty, dissatisfaction, anxiety, and surprise at the number of corrections during the revision process. In terms of trust, Karin and Andre consistently expressed confidence in the accuracy of Grammarly's suggestions, demonstrating a strong reliance on the tool. When this is connected with their speed in accepting revisions, this might relate to Koltovskaia's (2020) assertion that questioning (negative affect) positively impacts cognition, whereas trust (positive affect) leads to limited cognitive processing.

Henny, the only participant who expressed doubts about the tool in the interview, also seemed uncritical in her decision-making when accepting AWCF, despite being aware of its weakness in detecting the writer's intention. Her inadequate grammar knowledge evidently influenced her engagement style, but other factors like text length or the desire for a higher Grammarly score may have also played a role. Unlike in Ranalli's case study (2021), this research did not demonstrate the centrality of trust in students' interaction with Grammarly. The EFL intermediate students in this study had lower proficiencies compared to Ranalli's ESL participants in US higher education, potentially affecting their control over their interaction with AWCF. However, as Ranalli points out, further research is needed to explore the complex nature of students' engagement with AWCF.

In addition, despite acknowledging the free version's limited features, they expressed their desire to continue using Grammarly and overall satisfaction with its assistance in their writing process, especially its ability to ease their burdens and provide reliable scores. The significant role of scores was also highlighted in Barrot's (2021) study as it enabled students to control their learning, providing them with their performance insights and motivating them to strive for higher scores (p. 15). This present study's participants' positive evaluation of the tool's usability and usefulness also indicated their acceptance of the technology (Davis, 1989). These findings correspond with earlier research that found that students generally appreciate Grammarly (Cavaleri & Dianati, 2016; Koltovskaia, 2020; Nova, 2018; O'Neill & Russell, 2019). Despite this, this study's participants' evaluation was shown to be based more on how the tool can improve their writing rather than on how it may help them with their language learning. As such, they were instead shown to be more product oriented.

In conclusion, this research provides valuable insights into Grammarly's use among lower-proficiency EFL students in writing. Based on this study, we can make several recommendations to help such students benefit more from Automated Writing Correction Feedback (AWCF). For lower-proficiency students, utilizing AWCF would be more beneficial if they receive scaffolding from teachers or peer tutors. Additionally, it is crucial to equip them with adequate explicit grammar knowledge, which will enhance their feedback comprehension during independent learning. Training on using AWCF for language learning would also be helpful as it raises awareness of the tool's limitations and encourages critical thinking and reflection on Grammarly's feedback, deepening understanding of grammar and language use. Moreover, students should be encouraged to use Grammarly alongside other writing resources to promote more engagement when they are well-equipped.

It is crucial to acknowledge the study's limitations, such as the small sample size and focus on a single draft, which may limit the generalizability of the findings. To gain a deeper understanding of lower-proficiency EFL students' use of AWCF, it is necessary to conduct more in-depth qualitative research. A larger and more diverse sample would provide more insights into such students' AWCF utilization, allowing for a better exploration of potential factors influencing their engagement and the technology's impact on their language

learning and writing skills. Additionally, examining their experiences over an extended period would enable researchers to capture any changes and developments in their attitudes and usage patterns, shedding further light on the long-term effectiveness of these tools.

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References

- Barrot, J. S. (2021). Using automated written corrective feedback in the writing classrooms: effects on L2 writing accuracy, *Computer Assisted Language Learning*. <https://doi.org/10.1080/09588221.2021.1936071>
- Bitchener, J. (2008). Evidence in support of written corrective feedback. *Journal of Second Language Writing*, 17(2), 102–118. <https://doi.org/10.1016/j.jslw.2007.11.004>
- Bitchener, J., & Ferris, D. R. (2012). *Written corrective feedback in second language acquisition and writing*. Taylor & Francis. <https://doi.org/10.4324/9780203832400>
- Bitchener, J. (2018). Direct versus indirect grammar feedback. *The TESOL Encyclopedia of English Language Teaching*, 1–8. <https://doi.org/10.1002/9781118784235.eelt0055>
- Cavaleri, M., & Dianati, S. (2016). You want me to check your grammar again? The usefulness of an online grammar checker as perceived by students, *Journal of Academic Language and Learning*, 10(1), 223–236.
- 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>
- Dizon, G., & Gayed, J. M. (2021). Examining the impact of Grammarly on the quality of mobile L2 writing. *The JALT CALL Journal*, 17(2), pp 74–92. <https://doi.org/10.29140/jaltcall.v17n2.336>
- Eagly, A. H., & Chaiken, S. (1998). Attitude structure and function. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The Handbook of Social Psychology* (4th ed., pp. 269–322). Oxford University Press.
- Ebadi, S., Gholami, M., & Vakili, S. (2023). Investigating the effects of using Grammarly in EFL writing: The case of articles. *Computers in the Schools*, 40(1), 85–105. <https://doi.org/10.1080/07380569.2022.2150067>.
- Ellis, R. (2004). The definition and measurement of L2 explicit knowledge. *Language Learning*, 54(2), 227–275. <https://doi.org/10.1111/j.1467-9922.2004.00255.x>
- Fabrigar, L. R., MacDonald, T. K., & Wegener, D. T. (2005). The structure of attitudes [e-book]. In *The Handbook of Attitudes* (pp. 79–124). Routledge. <https://doi.org/10.4324/9781410612823.ch3>

- Fan, N. (2023). Exploring the effects of automated written corrective feedback on EFL students' writing quality: a mixed-methods study. *SAGE Open*, 13(2). <https://doi.org/10.1177/21582440231181296>
- Gass, S. M., & Mackey, A. (2000). *Stimulated recall methodology in second language research*. Lawrence Erlbaum Associates.
- Ghufron, M. A., & Rosyida, F. (2018). The role of Grammarly in assessing English as a foreign language (EFL) writing. *Lingua Cultura*, 12(4), 395. <https://doi.org/10.21512/lc.v12i4.4582>
- Grammarly. (2021). About Grammarly. Retrieved from <https://support.grammarly.com/hc/en-us/categories/115000018611-About-Grammarly>
- Guo, Q., Feng, R. & Hua, Y. (2022). How effectively can EFL students use automated written corrective feedback (AWCF) in research writing? *Computer Assisted Language Learning*, 35(9), 2312–2331. <https://doi.org/10.1080/09588221.2021.1879161>
- Heift, T., & Vyatkina, N. (2019). Technologies for teaching and learning L2 grammar. In S. Loewen & M. Sato (Eds.), *The Routledge handbook of instructed second language acquisition* (pp. 399–413). Routledge.
- Hoang, G. T. L. & Storch, N. (2024). *How do EFL learners process and uptake criterion automated corrective feedback? Insights from two case studies*. Available at: <https://ssrn.com/abstract=4425277> or <http://dx.doi.org/10.2139/ssrn.4425277>
- Kawashima, T. (2023). Student perceptions of Grammarly, teacher's indirect and direct feedback: Possibility of machine feedback. *The JALT CALL Journal*, 19(1), pp. 113–139. <https://doi.org/10.29140/jaltcall.v19n1.1017>
- Koltovskaia, S. (2020). Student engagement with automated written corrective feedback (AWCF) provided by Grammarly: A multiple case study. *Assessing Writing*, 44, 100450. <https://doi.org/10.1016/j.asw.2020.100450>
- Koltovskaia, S., & Mahapatra, S. (2022). Student engagement with computer-mediated teacher written corrective feedback: A case study. *Journal of Educational Computing Research*, 60(5), 1065–1086. <https://doi.org/10.1177/0735633121992705>
- Larsen-Freeman, D. (2015). Research into practice: Grammar learning and teaching. *Language Teaching*, 48(2), 263–280. <https://doi.org/10.1017/s0261444814000408>
- Leow, R. P. (2019). Noticing hypothesis. *The TESOL Encyclopedia of English Language Teaching*, 1–7. <https://doi.org/10.1002/9781118784235.eelt0086.pub2>
- Nova, M. (2018). Utilizing Grammarly in evaluating academic writing: A narrative research on EFL students' experience. *Premise: Journal of English Education*, 7(1), 80. <https://doi.org/10.24127/pj.v7i1.1300>
- O'Neill, R., & Russell, A. (2019). Stop! Grammar time: University students' perceptions of the automated feedback program Grammarly. *Australasian Journal of Educational Technology*, 35(1), 42–56. <https://doi.org/10.14742/ajet.3795>

- Ranalli, J. (2018). Automated written corrective feedback: How well can students make use of it? *Computer Assisted Language Learning*, 31(7), 653–674. <https://doi.org/10.1080/09588221.2018.1428994>
- Ranalli, J. (2021). L2 student engagement with automated feedback on writing: Potential for learning and issues of trust. *Journal of Second Language Writing*, 52, 100816. <https://doi.org/10.1016/j.jslw.2021.100816>
- Schmidt, R. W. (1990). The role of consciousness in second language learning. *Applied Linguistics*, 11(2), 129–158. <https://doi.org/10.1093/applin/11.2.129>
- Thi, N.K., Nikolov, M. (2022). How Teacher and Grammarly feedback complement one another in Myanmar EFL students' writing. *Asia-Pacific Edu Res*, 31, 767–779. <https://doi.org/10.1007/s40299-021-00625-2>
- Truscott, J. (2007). The effect of error correction on learners' ability to write accurately. *Journal of Second Language Writing*, 16(4), 255–272. <https://doi.org/10.1016/j.jslw.2007.06.003>
- Truscott, J. (2016). The effectiveness of error correction: Why do meta-analytic reviews produce such different answers? In Y-N. Leung (Ed.), *Epoch making in English teaching and learning: Evolution, innovation, revolution*. Taipei: Crane.
- Van Beuningen, C. G., De Jong, N. H., & Kuiken, F. (2012). Evidence on the effectiveness of comprehensive error correction in second language writing. *Language Learning*, 62(1), 1–41. <https://doi.org/10.1111/j.1467-9922.2011.00674.x>
- Zhang, Z., & Hyland, K. (2018). Student engagement with teacher and automated feedback on L2 writing. *Assessing Writing*, 36, 90–102. <https://doi.org/10.1016/j.asw.2018.02.004>
- Zhang, Z. (2020). Engaging with automated writing evaluation (AWE) feedback on L2 writing: Student perceptions and revisions. *Assessing Writing*, 43, Article 100439. <https://doi.org/10.1016/j.asw.2019.100439>