

AI-mediated revision in second language writing: Grammarly's contribution to EFL students' research proposal development

Hasrat Sozanolo Harefa^{1,*}, Emi Emilia¹, Ika Lestari Damayanti¹, Jefrianus Putra Zebua²

¹Universitas Pendidikan Indonesia, Indonesia

²Monash University, Australia

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Abstract: This study aims to investigate Grammarly usage as an AI-mediated revision tool in undergraduate EFL students' research proposal introductions. This study uses a convergent mixed-methods design. Data was collected through Likert-scale questionnaire responses from 20 students, semi-structured interviews with 10 participants, and document analysis of three research proposal introductions. The analysis distinguished between micro-level linguistic revision and macro-level rhetorical development, using Swales' Create-A-Research-Space (CARS) model. The findings of this study indicate that Grammarly gave positive contributions, particularly valuing its immediate feedback, error detection, and writing confidence. Document analysis highlighted revisions to grammatical accuracy, vocabulary choice, and sentence structure. Whereas interview findings suggested that using Grammarly repeatedly could help students improve their language choices and errors. Nevertheless, Grammarly had limitations for rhetorical development, particularly in establishing a research niche within the CARS model. This limitation suggests that Grammarly serves as a linguistic tool rather than a rhetorical guide. These findings imply that AI writing tools should be complemented with instructor guidance and explicit feedback-literacy instruction to support students' development as independent academic writers.

Keywords: AI-mediated revision, Grammarly, research proposal

Abstrak: Penelitian ini bertujuan untuk mengkaji penggunaan Grammarly sebagai alat revisi berbasis kecerdasan buatan (AI) pada bagian pendahuluan proposal penelitian mahasiswa sarjana EFL. Studi ini menggunakan desain metode campuran konvergen. Data dikumpulkan melalui kuesioner berskala Likert dari 20 mahasiswa, wawancara semi-terstruktur dengan 10 partisipan, serta analisis dokumen terhadap tiga bagian pendahuluan proposal penelitian. Analisis membedakan antara revisi linguistik tingkat mikro dan pengembangan retorik tingkat makro dengan menggunakan model Create-A-Research-Space (CARS) dari Swales. Temuan penelitian menunjukkan bahwa Grammarly memberikan kontribusi positif, terhadap umpan balik instan, deteksi kesalahan, dan peningkatan kepercayaan diri dalam menulis. Analisis dokumen menyoroti revisi yang berkaitan dengan akurasi tata bahasa, pemilihan kosakata, dan struktur kalimat. Sementara itu, hasil wawancara mengindikasikan bahwa penggunaan Grammarly secara berulang dapat membantu mahasiswa memperbaiki pilihan bahasa dan mengatasi kesalahan penulisan. Namun, Grammarly memiliki keterbatasan dalam hal pengembangan retorik, khususnya dalam membangun celah penelitian sesuai model CARS. Keterbatasan ini menunjukkan bahwa Grammarly lebih berperan sebagai alat bantu linguistik daripada panduan retorik. Temuan ini mengimplikasikan bahwa penggunaan alat bantu penulisan berbasis AI perlu dilengkapi dengan bimbingan instruktur serta pengajaran eksplisit mengenai literasi umpan balik guna mendukung perkembangan mahasiswa sebagai penulis akademik yang mandiri.

Kata kunci: revisi bermediasi AI, Grammarly, proposal penelitian

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*Corresponding author: hasratsozanolo@upi.edu

INTRODUCTION

Artificial Intelligence (AI) has rapidly changed second language writing by reshaping learners plan, draft, revise, and refine academic writing (Feng et al., 2025; Luo et al., 2025;

Wang, 2025). The Advance in processing nature language has enhanced technology development of AI-based writing that probably gives feedback directly, including grammar, vocabulary, sentence structure, and writing style. In higher education, AI is no longer regarded as a digital writing aid but as a pedagogical resource that mediates learners with writing and revision process (Dizon & Gayed, 2024; Warschauer et al., 2023). In second language study, revision is acknowledged as cyclical activities where writers assess their drafts and finish according to linguistic, rhetorical, and communicative requirements, rather than making grammatical changes (Ferris & Hedgcock, 2014; Hyland, 2019). Effective revision requires writers improve grammatical accuracy, reorganize ideas to strengthen arguments, and integrate linguistic knowledge, genre awareness, strategic decision-making, and produce an targeted writing (Al-Othman, 2024; Liu & Yu, 2022; Yang et al., 2024).

However, a number of researchers reported that EFL undergraduates frequently struggle with academic research tasks, writing research proposal introduction, for example. A study confirmed that apart of difficulties with grammar and vocabulary, undergraduate learners struggle to synthesize prior studies, construct coherent arguments, establishing research gap during writing research proposals (Ersyad & Cahyono, 2025). Writing an effective proposal introduction is to firstly establish research topic, seek the research gap, and occupy the topic. One of familiar introduction framework among the scholars is Swales' Create-a-Research-Space (CARS) model, which conceptualized introduction as sequence of moves establishing a territory, identifying a niche, and occupying that niche (Swales, 2004). Writing an effective CARS-based introduction requires instructors' feedback to support these higher-order processes, however, limited instructional time often restricts individualized guidance. Consequently, many students only receive feedback after completing a draft (Lee, 2017). Therefore, AI-powered writing assistants have emerged as accessible supplementary tools that probably students to engage immediate feedback while revising independently (Eid, 2025). These challenges at both micro-level (grammar, vocabulary, sentence structure) and macro-level (argumentation, research gap identification, genre realization) suggest that students need accessible, real-time supplementary support to engage in more productive revision cycles. In this context, AI-powered writing tools have emerged as promising pedagogical resources that can offer immediate feedback beyond the constraints of scheduled instructor feedback.

One of the AI-powered writing assistants is Grammarly. Grammarly has become well-known in academic context, especially college level which provide users with immediate suggestion on grammar, vocabulary, sentence clarity, and style (ONeill & Russell, 2019). This AI tool also engage repeatedly revision through immediate suggestion throughout the writing process (Thi & Nikolov, 2022). This shift reflects a broader re-conceptualization of AI from proofreading tool into a pedagogical resource (Dizon & Gayed, 2024; Warschauer et al., 2023). Research on Grammarly and similar automated writing evaluation (AWE) platforms has documented their intelligence to identify grammatical accuracy, lexical choice, and writing style, a long with more efficient error identification and iterative revision compared to delayed feedback (Dizon & Gayed, 2024; Ranalli & Yamashita, 2022; H. Yang et al., 2024; Yuan, 2023). Grammarly has replaced some instructors' roles in supporting students' writing development, particularly by providing immediate and individualized feedback on grammar, vocabulary, clarity, and writing style.

However, recent studies have concentrated on sentence-level corrections and learners' attitudes towards AI, the research related to their writing development is still limited yet (Llausas et al., 2024; O'Neill & Russell, 2019; Sanosi, 2022). There are two gaps related to the students' writing development while using Grammarly as AI-supported writing assistant. First, there are few studies examine AI-assisted revision from a perspective that treats revision as multidimensional, covering both micro-level linguistic and macro-level rhetorical development. Specifically, at the micro level, EFL students frequently encounter difficulties with grammatical accuracy, vocabulary choice, and sentence structure. At the macro level, they struggle with genre realization, argumentation construction, and research gap identification, which are higher-order rhetorical skills that are essential for producing convincing research proposal introductions (Liu & Yu, 2022). It shows that Grammarly's contribution remained poorly understood to higher-order concerns, including argumentation, genre awareness, and disciplinary voice. And second, prior studies rarely integrate multiple sources of evidence such as learners' perceptions (Ummah & Bisriyah, 2022), textual revisions (Thi & Nikolov, 2022), and genre-based analysis (Nguyen et al., 2020) within a single framework. This issue is still unclear whether gains in micro-level linguistics accuracy are accompanied by corresponding gains in macro-level rhetorical effectiveness. Specifically, at the micro level, EFL students frequently commit grammatical errors, misuse vocabulary, and produce unclear sentence structures; at macro level, they struggle to construct coherent arguments, synthesize literature critically, and identify convincing research gaps, all of which are essential components of an effective research proposal introduction (Ersyad & Cahyono, 2025). Both dimensions are crucial because academic writing experts not only correctness but persuasive, genre-appropriate argumentation (Hyland, 2019).

This present study aims to investigate Grammarly as an AI-mediated revision tool in second language writing context. This study focuses on AI as part of a dynamic revision process in which learners engage with technology tools, teacher guidance, and disciplinary expectation. Writing development is expected not only to gain linguistic improvement but also learners' capacity to critically assess feedback and produce proposal introductions that fulfill the communicative goals of academic genres. This study integrates two complementary frameworks: a distinction between micro-level linguistic revision (grammar, vocabulary, sentence structure, and style) and macro-level rhetorical development (genre realization, argument construction, research gap development, and disciplinary positioning). Additionally, Swales' (2004, 2011) CARS model is used to examine how students construct research proposal introductions through the realization of rhetorical moves.

This present study proposes the following research questions:

RQ1. How do undergraduate EFL students perceive Grammarly as an AI-mediated revision tool during research proposal writing?

RQ2. To what extent does Grammarly support undergraduate EFL students' micro-level linguistic revision during research proposal writing?

RQ3. How does Grammarly contribute to undergraduate EFL students' macro-level rhetorical development in research proposal introductions?

By addressing these questions, the study provides understanding of AI-mediated revision by examining its distinct contribution across linguistics and rhetorical dimensions of academic writing. Moreover, it offer a framework for understanding how technological and human mediation can integrate one another in supporting students' development as independent academic writers.

METHOD

Research design

This study used a convergent mixed-methods design (Creswell & Plano Clark, 2018) aimed at investigating Grammarly's contribution to undergraduate EFL students' research proposal writing from AI-mediated revision perspective. This design aligns with this study because this study explain students' perceptions on Grammarly and how AI-mediated revision was reflected in their writing practices and rhetorical performance. This design helps this study to examine AI-mediated revision both micro-level linguistic revision and macro-level rhetorical development.

Research context and participants

This study was conducted in the English Education Study Program at a private university in North Sumatra, Indonesia, during a compulsory Research Proposal Writing course. There were twenty sixth-semester undergraduate students participated in this study through purposive sampling (Patton, 2015). They were selected as participants because they were preparing research proposal introduction, and had experience using Grammarly as a supplementary revision tool. These characteristics ensured that participants had direct experiences with Grammarly as an AI-mediated revision.

Data source and instruments

Data were obtained from three sources: questionnaire, semi-structured interview, and document analysis. These three instruments captured students' perceptions on Grammarly, their experiences with AI-mediated revision, and outcomes of revision in their writing. Questionnaire consisted of closed-ended items on a five-point Likert scale (1 = very negative, 2 = negative, 3 = neutral, 4 = positive, and 5 = very positive). It addressed perceived usefulness, easy of use, linguistic support, revision behavior, writing confidence, and satisfaction. Questionnaire instrument adapted these elements from previous studies on AI-assisted writing and Automatic Writing Evaluation (AWE). It was assessed by two experts in English language education for content validity, while internal consistency was assessed by using Cronbach's alpha.

Semi-structured interview were conducted with ten selected participants, using purposive sampling (Patton, 2015). Selection used three criteria: first, questionnaire response structure, ranging from highly positive to moderately perceptions of Grammarly; second, writing performance in the proposal writing course, categorized as high, average, and low; and third, willingness to participate in interviews. This procedure enabled students' involvement with different perception of Grammarly and different levels of writing performance. The interview was aimed to know how students interpreted Grammarly feedback, the students' strategies to accept or reject automatic suggestions, their views on the strengths and limitations of Grammarly, and how they perceived

Grammarly feedback in relation to teacher feedback. To illustrate, representative interview questions include:

- (1) How did you respond to Grammarly's suggestions when revising your research proposal introduction? Did you accept all of them, and why?
- (2) In what ways do you think Grammarly helped or did not help you in improving the quality of your writing beyond Grammarly correction?
- (3) How did Grammarly's feedback compare to the feedback you received from your lecturer in terms of usefulness for developing your research proposal introduction?

Finally, document analysis provided textual evidence of AI-mediated revision through three purposely selected research proposal introduction. The proposals were chosen with different topics, including 1) pre-questioning strategy in reading comprehension; 2) implementation of problem-based learning; and 3) vocabulary learning through English song lyrics.

Data collection and analysis

There were several procedures to collect and analyze data in this study. Questionnaire was administered for 20 participants through Google Doc. The data from questionnaire were analyzed using descriptive statistics (mean, standard deviation, and percentages to summarize response patterns. Semi-structured interview participants as mentioned before were then purposely selected from questionnaire respondents. This interview was conducted with ten students and audio-recorded with the participants' consent. Each student responded to ten interview questions in approximately 20 minutes. Interview data furthermore were transcribed verbatim. The transcripts were analyzed using thematic analysis following Braun and Clarke's (2021) six phase framework: (1) familiarization with the data through repeated reading of transcripts; (2) generalization of initial codes from data segments relevant to the research questions; (3) searching themes by clustering related codes; (4) reviewing and refining themes against the full datasets; (5) defining and naming themes; and (6) producing the final report. Specifically, codes were organized around three analytical domains aligned with the research questions: students' perceptions of Grammarly, revision strategies at the micro-level, and rhetorical decision-making at the macro-level. To ensure the credibility of thematic interpretation, two researchers independently coded a subset of transcripts, and built inter-rater agreement through discussion and consensus.

Another data collection instrument was students' written products, consisting of the introduction sections from three students. The documents were collected after the students finished writing their research proposal introductions. The three students' research proposal introductions were purposely selected as the representative cases from the twenty participants, following maximum variation strategy (Patton, 2015) to capture a range of writing performance and Grammarly usage patterns. Specifically, one student was selected from each performance band (high, average, and low) as determined by the course instructor's assessment of the research proposal writing task. The documents were analyzed using two-level framework described above. Micro-level revision was identified by comparing drafts before and after Grammar-mediated revision, following Nugroho and Benecia (2022) and (Ummah & Bisriyah, 2022). In addition, macro-level rhetorical

development was examined through the realization of the three CARS move (establishing a territory, establishing a niche, and occupying the niche). The data collection results (questionnaire, interview, and document analysis) were integrated during interpretation, aimed to know areas of convergence and divergence across data sources.

RESULTS AND DISCUSSION

This section presents the findings of the study in relation to Grammarly as an AI-mediated revision tools in the process of writing research proposal introduction among EFL undergraduate students. The findings are organized according to three research questions, namely students' perceptions of Grammarly as an AI-mediated revision tool, Grammarly's contribution to micro-level linguistics revision (encompassing grammar, sentence structure, punctuation, mechanics, and style and clarity), and Grammarly's contribution to macro-level rhetorical development based on Swales' CARS model. Data obtained from questionnaires, interviews, and document analysis were integrated to provide a comprehensive understanding of the extent to which AI-mediated revision contributes to improving the quality of students' writing.

Students' perceptions of Grammarly as an ai-mediated revision tool (RQ1)

For the first research question, the study examined how undergraduate EFL students perceived Grammarly when revising their research proposal introductions. In general, the results suggest that students had positive attitude towards Grammarly. This AI tool was well-received because it provides immediate feedback, identify linguistic mistakes, and increase the students' confidence. The description of students' perceptions of Grammarly as AI-mediated writing tool is shown in Table 1.

Table 1. Students' perceptions of Grammarly

Elements	Mean	SD	Interpretation
Perceived usefulness	4.46	0.51	Very positive
Ease of use	4.38	0.55	Positive
Grammar support	4.62	0.47	Very positive
Vocabulary support	4.18	0.61	Positive
Confidence in writing	4.27	0.58	Positive
Revision efficiency	4.41	0.53	Very positive
Satisfaction	4.34	0.56	Positive

As presented in Table 1, all elements received positive to very positive rating, reflecting a consistently favorable attitude toward Grammarly across dimensions. The particularly high rating for grammar support (M = 4.62) indicates that students valued Grammarly most for identifying and addressing grammatical problems in their writing. This finding is consistent with the function of automated written corrective feedback (AWCF), which provides learners with immediate information about linguistic errors and can support their revision process (Barrot, 2023). It is also in line with Guo et al. (2022), who found that EFL students could use Grammarly feedback to identify and revise language-related problems in research writing. the high rating for revision efficiency (M = 4.41) further suggests that students appreciated the convenience of receiving automated

feedback during revision. Rather than waiting for instructor feedback, students could respond to Grammarly's suggestions while revising their own text. However, vocabulary support received the lowest mean among the reported dimensions ($M = 4.18$), suggesting that students may have been somewhat less reliant on Grammarly for lexical decisions that for grammatical correction. This may be because appropriate vocabulary choices in academic writing require attention to context, meaning, and rhetorical purpose, which cannot always be determined through automated suggestions. As a whole, students' perception of Grammarly was as a linguistic assistant tool that facilitated independent revision. Grammar support received the highest mean score, suggesting that students regularly use Grammarly to identify grammatical error before submitting writing assignments.

Interview data further emphasized these perceptions. Participant A explained:

"Before using Grammarly, I always asked my lecturer to check my grammar. But now, I can correct many mistakes by myself before submitting my proposal." (Participant A)

This remark indicates a shift from relying on the lecturer for routine checking toward independent revision. Another participant stressed the motivational value of AI-mediated revision:

"Seeing the corrections immediately made me feel more confident because I knew what needed to be improved before meeting my supervisor." (Participant D)

The interview results showed that Grammarly could assist the users for linguistic aspects. Participants could identify language corrections and develop academic writing. Several students explained that Grammarly successfully identified grammar and vocabulary errors but it rarely provided guidance on strengthening research arguments or identified research gaps. Another participant stated:

"Grammarly helps my English, but it doesn't tell me if my research problem is interesting. And it never tell me when my literature review is appropriate for my argument." (Participant F)

These perceptions can be better understood through the idea that AI-mediated revision functions as a form of linguistic self-regulation. It primarily supports students' self-monitoring of their own writing performance by providing alternative linguistic choices and prompting revision decisions (Llaugas et al., 2024; Zhai, 2025). This interpretation aligns with previous studies reporting that AI-automated writing tools can strengthen learners' engagement with iterative revision and contribute to linguistic accuracy development (Dizon & Gayed, 2024). Furthermore, participants tend to evaluate Grammarly's suggestions critically when they provided contradicted disciplinary terminology or intended meaning. The educational value of AI-generated feedback depends not merely on the sophistication of the tool itself but also on students' capacity to interpret and use that feedback productively (Gozali et al., 2024; Kränge et al., 2023; Yang et al., 2025).

In conclusion, the findings highlighted that students perceived Grammarly as an effective AI-mediated revision tool for improving linguistic accuracy and increasing revision confidence. Also, Grammarly functions as a mediational resource whose value depends on

learners’ active engagement rather than on automatic tool. However, learners also viewed instructor feedback as necessity for higher-order aspects of academic writing.

Grammarly’s contribution to micro-level linguistic revision (RQ2)

The purpose of second research question was to know what extent Grammarly can facilitate students’ micro-level linguistic revision during writing research proposal introduction. Grammarly helped students analyze writings for grammar, vocabulary, sentence structure, punctuation, mechanic, and linguistic clarity. The result of questionnaire analysis provide initial evidence of Grammarly’s contribution to micro-level linguistic revision. Grammar support received the highest rating ($M = 4.62$, $SD = 0.47$), followed by revision efficiency ($M = 4.41$, $SD = 0.53$), overall satisfaction ($M = 4.34$, $SD = 0.56$), and vocabulary support ($M = 4.18$, $SD = 0.61$). These findings suggest that, from students’ perspective, Grammarly is effective particularly to detect and correct surface-level errors, as well as provide automated feedback to revise, which is more efficiently than relying on instructor feedback. This is in line with previous studies reporting that automated writing evaluation tools basically support form-focused revision such as grammar, mechanics, and word choice (Fitria, 2021; Ranalli & Yamashita, 2022). The lower rating for vocabulary indicates that lexical suggestions were helpful but less decisive than grammatical corrections. It is possible because context-appropriate word choice in academic writing still requires learners’ own judgment. The document analysis in Table 2 corroborates these perceptions.

To analyze structures of micro-level linguistic revision, the proposal introductions were code and compared before and after Grammarly-assisted revision. This study classified the revisions into six dimensions, based on the analytical framework described in the Method section. Table 2 presents the revision category.

Table 2. Distribution of micro-level linguistic revision

Revision category	Frequency	Percentage
Grammar	168	38.5%
Vocabulary	92	21.1%
Sentence structure	71	16.3%
Punctuation	52	11.9%
Mechanics (capitalization, spelling, formatting)	34	7.8%
Style and clarity	19	4.4%
Total	436	100%

Table 2 shows 436 micro-level revision across the three research proposal introductions, spread over six categories. Grammar was the most common category, with 168 times (38.5%), which suggests that Grammarly primarily enabled corrections of local rule-governed errors such as subject-verb agreement, article use, verb forms, prepositions, and plural marking. This result aligns with evidence that Grammarly enhance grammatical accuracy in L2 writing more distinctly than other dimensions (Tambunan et al., 2022). Vocabulary revision was the next most frequent category, with 92 times (21.1%), indicating that Grammarly also supported students in making more precise lexical choices and

achieving greater lexical variation. Revisions to sentence structure made up 71 times (16.3%), while punctuation, mechanics, and style/clarity occurred less often, indicating that Grammarly's contribution was concentrated on surface-level editing rather than deeper rhetorical development. In this sense, Grammarly seems especially helpful for minimizing grammatical errors and improving word choice, while its influence on syntactic complexity, fluency, and broader rhetorical quality is either more limited or not clearly evidenced (Dizon & Gayed, 2021; Tambunan et al., 2022).

These quantitative patterns confirm that Grammarly's contributions were heavily concentrated on the surface level of language, with reduced representation as the revision category moved toward higher-order concerns such as style and clarity. This pattern also matches conclusions from prior studies on AI-writing tools, which have noted that automated feedback systems are more reliable for rule-based grammatical correction than for nuanced stylistic guidance (Dizon & Gayed, 2024; Ranalli & Yamashita, 2022). Vocabulary revision again emerged as the second most frequent category. Grammarly recommended replacing repetitive or less suitable words with alternative choices that better fit academic style. Students typically accepted these suggestions when they improved lexical precision without altering the intended meaning. The results further indicated numerous revisions tied to sentence structure. Grammarly often suggested reorganizing long and awkward sentences into clearer and more concise versions. These changes improved readability and textual fluency, although the underlying ideas generally remained unchanged.

The sentences below illustrates a typical grammatical revision identified during document analysis.

Example 1. Grammatical revision

Before revision

Students has difficulty in comprehending text because they do not understand the ways of reading.

After Grammarly-mediated revision

Students have difficulty comprehending text because they do not understand how to read.

The revision corrected subject-verb agreement (students have), improved verb complementation (difficulty comprehending), and enhanced lexical precision by replacing lexical substitution with "how to read". Although these revisions improved linguistic accuracy, the whole argument stayed basically unchanged.

The sentences below illustrated the improvement of vocabulary element during students' document analysis. Vocabulary improvement was similarly observed in numerous students' texts.

Example 2. Vocabulary revision

Before revision

This topic is very important for students

After Grammarly-mediated revision

This issue is highly significant for undergraduate students.

Grammarly, in this example, gave more formal lexical choices that was in line with academic writing conventions. Such changes enhanced the tone of previous example without modifying its main meaning.

Interview data further supported these document analysis results. Students reported that Grammarly helped them find errors in language that they had overlooked. One participant said:

“I usually focus on my ideas, so I don’t notice grammar mistakes. Grammarly can show where the problems are, and I can correct them before submitting my proposal.” (Participant B)

Another participant highlighted Grammarly’s contribution to sentence clarity:

“Sometimes my sentences were too long. Grammarly suggested shorter and clearer sentences. It made my writing easier to read.” (Participant G)

A number of participants emphasized that Grammarly not only functioned as a correction tool, but also as a learning resource. Students did not accept every suggestion automatically; instead, they read the explanations associated with some or all corrections and, over time, developed an awareness of grammar problem in their writing. For instance, one participant commented:

“At first I accepted every suggestion, but later I began to understand why Grammarly made the corrections. Eventually I could avoid making the same mistakes.” (Participant E)

Another participant also described how he engaged with Grammarly’s feedback explanations fostered a gradual shift toward independent error recognition:

“I did not just click ‘accept.’ I always read the explanation first to understand what was wrong. After a while, I started catching similar mistakes myself before Grammarly even flagged them.” (Participant I)

The findings indicates that Grammarly functions to improve students’ texts and foster their metalinguistic awareness. Students seemed more aware of structures in their own language use through repeated exposure to AI-mediated revision. In addition, they can increasingly identify similar mistake on their own.

This increasing self-awareness suggests that AI-mediated revision contributes to learners’ metalinguistic awareness, which is regarded as an important component of successful second language writing development. Viewed from a sociocultural perspective on writing development, Grammarly can be understood as a mediating tool artifact that offers temporary support during task completion. Grammarly also expands learners’ opportunities to realize language problems, assess alternative linguistic choices, and refine their texts through repeated cycles of revision (ElEbyary et al., 2024; Osawa, 2024; Rastgou, 2024). This findings extend the development of literature on AI in second language writing by shifting attention from technological effectiveness toward learner agency, so that AI-mediated revision is best understood as a collaborative process in which technological feedback, learner reflection, and pedagogical guidance together shape writing development (Jiang et al., 2026; Wang, 2025; Wen, 2023; Zhu et al., 2025; Zulkefli & Ismail, 2025).

However, the document analysis also show a number of limitations. Grammarly sometimes provided suggestions that they were grammatically correct by contextually wrong for academic writing purpose. In this condition, students stated that they used feedback from the instructor or their own opinion to decide if the revision would be accepted. This suggests that Grammarly's recommendations still require critical judgment from students and instructors to ensure their appropriateness for academic writing.

Grammarly's contribution to macro-level rhetorical development (RQ3)

The third research questions explored whether Grammarly contributed to students' macro-level rhetorical development during the revision of research proposal introductions. Unlike the findings presented for micro-level linguistic revision, the results indicate that Grammarly's contribution to rhetorical development was more limited. Although students' revised texts showed significantly improvement in linguistic accuracy and readability, the overall rhetorical organization of the proposal introduction changed at a limited pace after AI-mediated revision.

Seeking the effectiveness of Grammarly to students' macro-level rhetorical development, their research proposal introduction were analyzed by using Swales' (2004, 2011) CARS-A-Research-Space (CARS) models. CARS consists of three moves, namely establishing a territory, establishing a niche, and occupying the niche, as shown in Table 3.

Table 3. Realization of CARS moves before and after Grammarly-mediated revision

CARS move	Before revision	After revision	Interpretation
Move 1: Establishing a territory	82%	90%	Slight improvement
Move 2: Establishing a niche	41%	49%	Limited improvement
Move 3: Occupying the niche	56%	63%	Moderate improvement

As presented in Table 3, the document analysis revealed incremental improvements across all three CARS moves in Swales (2004) framework, following Grammarly-mediated revision, though the degree of progress varied considerably across moves. Move 1 (Establishing a Territory) showed the highest realization both before and after revision, increasing from 82% to 90%. This represents a marginal improvement of 8 percentage points, suggesting that students were generally able to introduce their research topics and provide relevant background information. Grammarly may have helped improve the clarity of these introductory sections by suggesting more appropriate vocabulary and clearer sentence structure. However, these changes mainly concerned language use rather than the development of ideas themselves (Miranty et al., 2025; Thi & Nikolov, 2022). In contrast, Move 2 (Establishing a Niche) remained the most challenging component, with the realization rate increasing from 41% to 49%. Despite this improvement, the relatively low post-revision percentage suggests that many students still struggled to identify a research gap and explain why their studies were necessary. This difficulty may be related to the nature of the move, which requires more than grammatical accuracy. Students need to evaluate previous studies, identify unresolved issues, and establish a clear rationale for their research. Grammarly can assist with language-related problems, but its suggestions may not be sufficient to help students develop these rhetorical skills (Tran, 2025).

Move 3 (Occupying the Niche) increased from 56% to 63%, representing a gain of 7 percentage points. The improvement suggests that some students expressed their research objectives more clearly after revision. Nevertheless, clearer wording did not necessarily mean that the rhetorical purpose of this move had been fully achieved. In research proposal introductions, students are expected not only to state their objectives but also explain the significance of their studies and establish their relevance to the field. These aspects appeared less responsive to Grammarly's language suggestions. As Mekheimer (2025) suggests, improvements in language use should not automatically be interpreted as improvements in the organization and development of academic argument. Overall, Move 1 remained the strongest component in the students' research proposal introduction. Most students were able to present their topics and provide background information relevant to their studies. Grammarly's suggestions sometimes helped them express these ideas more concisely and use more formal academic vocabulary. However, the selection of supporting evidence and the organization of ideas still depended largely on the students' own decisions and disciplinary knowledge. This pattern suggests that Grammarly was more useful for improving linguistic clarity than for addressing the rhetorical demands of research proposal writing.

Move 2 provided the most challenge for students. They struggled to establish a clear research gap, synthesize previous studies critically, or explain the need for further research. Although Grammarly indicated lexical or grammar changes, there was rarely feedback referred to the conceptual justification for conducting the studies. This following example illustrates this limitation.

Example 3. Limited support for establishing a research niche

Before revision

Many researchers have studied problem-based learning. Therefore, this research discusses problem-based learning.

After Grammarly-mediated revision

Numerous studies have investigated problem-based learning. Therefore, this study examined problem-based learning

Grammarly still shows limitation to establish a clear research gap although the revised version offer improvement in grammatical accuracy and stylistic formality. The linguistic changes did not substantially strengthen the rhetorical function of Move 2. The introduction continues to describe an existing research area rather than identifying what remains unknown or why the purposed study is necessary. Document analysis revealed patterns across many proposal introductions. The students often summarized previous studies but did not critically evaluate or compare the findings, or to identify unresolved issues. Consequently, many introductions lacked a clearly articulated rationale for the purposed investigation despite linguistic quality improved.

Move 3 demonstrated slightly better improvement than Move 2. Grammarly occasionally clarified how students expressed the objectives of studies by recommending more concise sentences structures and appropriate academic vocabulary. This following example illustrates this issue.

Example 4. Improved linguistic clarity without substantial rhetorical change.

Before revision

The researcher wants to know students opinion about pre-questioning strategy.

After Grammarly-mediated revision

This study aims to investigate students' perceptions of pre-questioning strategy.

The revised sentence shows a development in academic style and grammatical accuracy. Nevertheless, the revision does not strengthen the broader rhetorical argument explaining why this study is academically significant. As in many analyzed texts, linguistic refinement occurred independently of rhetorical development.

Interview findings further explained these patterns. Most participants reported that Grammarly rarely provided suggestions concerning all organization of their proposal introductions. One participant commented:

"Grammarly corrected my English, but it never told me whether my research gap wasn't convincing." (Participant C)

Another participant similarly commented:

"When I finished revising with Grammarly, my lecturer still asked me to rewrite the background because the argument was not strong enough."
(Participant H)

Some students explained that they continued to rely on their instructor when they revised research problems, research gaps, and research objectives. Grammarly was regarded as an assistant of language rather than a source of language or rhetorical guidance. One participant commented this distinction:

"Grammarly improves how I write, but my lecturer helps me decide what I should write." (Participant J)

Document analysis and interview findings indicates that rhetorical development remained largely dependent on genre knowledge of students and teaching support. AI-mediated revision contributed to improving linguistic expression within existing rhetorical structures, but rarely encouraged students to reorganize arguments, reconsider the positioning of previous studies, or construct stronger research justification.

This limitation was in accordance with genre-based perspectives on academic writing, which have long argued that grammatically accurate language production is not a sufficient condition for successful academic writing (Hyland, 2019; Swales, 1990). Writing an effective research proposal introduction requires students to establish their study within an existing body of literature, identify a meaningful gaps in previous research, and construct a persuasive rationale for the proposed investigation (Bailey & Lee, 2020; Jwa, 2024; Kuteeva & Negretti, 2016). The limited improvement for Move 2 supports the view that establishing a research niche relies on interpretation, disciplinary understanding, and rhetorical decision-making more than on explicit linguistic rules. Then, Grammarly is not designed to evaluate literature review that successfully construct a research gap or to provide a meaningful contribution to ongoing disciplinary (Cotos, 2011; Haddadian et al.,

2026; Rabbi, 2020). These results indicate that Grammarly functions primarily as a mediation resource supporting the linguistic dimension of writing rather than as an autonomous writing expert or secondary writing instructor, leaving rhetorical and epistemological aspects of academic writing dependent on human expertise, instructor feedback, and disciplinary learning (Fan et al., 2024; Wilson et al., 2024; Woodworth & Barkaoui, 2020).

In summary, the findings explained that Grammarly functioned fundamentally as an instrument for linguistic mediation rather than rhetorical mediation. AI-mediated revision had a significant impact on the grammatical and stylistic quality of proposal introduction, however, its role in genre realization, argument construction and achievement regarding Swales' CARS mover was relatively limited. High-order revision requires human guidance, disciplinary expertise, and a growing understanding of academic writing conventions.

CONCLUSION

This study examined how undergraduate EFL students use Grammarly as an AI-mediated revision tool across writing research proposal introductions. The results of this study indicate that students generally believed Grammarly as tool that helped them revise their writing confidently. They particularly valued its immediate feedback and ability to identify language errors. The tool was most useful for micro-level revision, especially in grammar, vocabulary, and sentence structure. Repeated use also appeared to encourage students more focus on language choices and errors in their writing. However, Grammarly offered more limited support for macro-level revision. In particular, it was less effective in helping students establish a clear research niche and develop persuasive academic arguments within the CAR model. This difference indicates that Grammarly was more useful for addressing linguistics difficulties than for developing the rhetorical elements of research proposal introductions.

This finding suggest that AI-mediated tools are best used alongside, rather than in place of, instructor guidance. Writing instruction should therefore include explicit training in feedback literacy so that students can evaluate Grammarly's suggestions critically and decide which revisions are appropriate for their intended meaning and academic purpose. Instructors also remain important in guiding students' argument development, genre awareness, and positioning within their academic disciplines. Future research could investigate how students' revision practices develop over time, particularly across larger and more diverse groups of learners. It could also examine how generative AI tools interact with Grammarly during the revision process and whether combining these tools leads to meaningful improvements in students' linguistic and rhetorical development.

This study examined Grammarly's as an AI-mediated revision tool in EFL students' research proposal introductions. This study found that students adopted a positive view of Grammarly as an accessible and confidence-building revision tool, in particular, for the immediate feedback and error identification. Grammarly supported micro-level linguistic revision, contributing to improvements in grammar, vocabulary, and sentence structure, while fostering students' metalinguistic awareness through repeated engagement. . However, Grammarly's contribution to macro-level rhetorical development was limited, especially in helping students establish a research niche and construct persuasive academic

argumentation within the CARS model. Thus, Grammarly's main function is as a linguistic mediator rather than a rhetorical one.

Based on these findings, AI-mediated revision tools, like Grammarly, should not be regarded as a replacement of human (teacher) guidance but as complementary resources within a broader pedagogical framework. Writing instruction should integrate explicit feedback-literacy training to help students critically evaluate and productively use AI-mediated revision, while instructors continue to guide higher-order aspects such as argument development, genre awareness, and disciplinary positioning. For future research, it is expected to investigate larger and more diverse samples, longitudinal writing development, and also the integration of generative AI tools alongside Grammarly to further understand their combined pedagogical potential.

REFERENCES

- Al-Othman, A. A. A. M. (2024). EFL Students Develop Cognitive and Metacognitive Self-Regulated Writing Strategies Using Automated Feedback: A Case Study. *Theory and Practice in Language Studies*, 14(5), 1525–1536. <https://doi.org/10.17507/tpls.1405.26>
- Bailey, D., & Lee, A. R. (2020). An exploratory study of Grammarly in the language learning context: An analysis of test-based, textbook-based and Facebook corpora. *TESOL International Journal*, 15(2), 4–27
- Barrot, J. S. (2023). Using automated written corrective feedback in the writing classrooms: Effects on L2 writing accuracy. *Computer Assisted Language Learning*, 36(4), 584–607. <https://doi.org/10.1080/09588221.2021.1936071>
- Braun, V., & Clarke, V. (2021). Thematic Analysis. In 978-1-4739-5324-6. Sage Publications.
- Cotos, E. (2011). Potential of Automated Writing Evaluation Feedback. *CALICO Journal*, 28(2), 420–459. <https://doi.org/10.11139/cj.28.2.420-459>
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and Conducting Mixed Methods Research (3rd ed.)* (3rd ed.). Sage.
- Dizon, G., & Gayed, J. M. (2021). Examining the impact of Grammarly on the quality of mobile L2 writing. *The JALT CALL Journal*, 17(2), 74–92. <https://doi.org/10.29140/jaltcall.v17n2.336>
- Dizon, G., & Gayed, J. M. (2024). A systematic review of Grammarly in L2 English writing contexts. *Cogent Education*, 11(1), 2397882. <https://doi.org/10.1080/2331186X.2024.2397882>
- Eid, A. H. A. (2025). *AI-Enhanced Writing Instruction and Learner Autonomy: A Mixed-Methods Quasi-Experimental Study with Bahraini EFL Undergraduates*. https://doi.org/10.35542/osf.io/86vfg_v1
- ElEbyary, K., Shabara, R., & Boraie, D. (2024). The differential role of AI-operated WCF in L2 students' noticing of errors and its impact on writing scores. *Language Testing in Asia*, (1), 1–24. <https://doi.org/10.1186/s40468-024-00312-1>
- Ersyad, Z. M., & Cahyono, B. (2025). Investigating English Language Students' Difficulties in Research Article Writing. *PANYONARA: Journal of English Education*, 7(2), 460–477. <https://doi.org/10.19105/panyonara.v7i2.21296>
- Fan, Y., Tan, S., & Lim, G. Y. W. (2024). EAP teacher feedback in the age of AI: Supporting first-year students in EFL disciplinary writing. *Australian Journal of Applied*

- Linguistics*, 7(3), 19–43. <https://doi.org/10.29140/ajal.v7n3.1943>
- Feng, H., Kexin Li, & Lawrence Jun Zhang. (2025). What does AI bring to second language writing? A systematic review (2014-2024). *Language Learning & Technology*, 29(1), 1–27. <https://doi.org/https://doi.org/10.64152/10125/73629>
- Ferris, D., & Hedgcock, J. (2014). *Teaching L2 composition: Purpose, process, and practice* (Third Edition). Routledge, Taylor & Francis Group.
- Fitria, T. N. (2021). Grammarly as AI-powered English Writing Assistant: Students' Alternative for Writing English. *Metathesis: Journal of English Language, Literature, and Teaching*, 5(1), 65. <https://doi.org/10.31002/metathesis.v5i1.3519>
- Gozali, I., Wijaya, A. R. T., Lie, A., Cahyono, B. Y., & Suryati, N. (2024). Leveraging the potential of ChatGPT as an automated writing evaluation (AWE) tool: Students' feedback literacy development and AWE tools integration framework. *The JALT CALL Journal*, 20(1), 1–22. <https://doi.org/10.29140/jaltcall.v20n1.1200>
- 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>
- Haddadian, G., Kim, M. K., & Haddadian, N. (2026). A Systematic Review of Automated Writing Evaluation Tools in Argumentative Writing for English as Foreign Language Education. *Research Synthesis in Applied Linguistics*, 2(1), 52–102. <https://doi.org/10.1080/29984475.2025.2598266>
- Hyland, K. (2019). *Second language writing* (Second edition). Cambridge University Press.
- Jiang, Y., Wu, Q., Yang, Y., Jian, C., & Zhao, J. (2026). Learner agency in revising GenAI-generated statements of purpose. *British Journal of Educational Technology*, 57(4), 965–983. <https://doi.org/10.1111/bjet.70041>
- Jwa, S. (2024). L2 College Students' Disciplinary Literacy Development: The Mediating Role of Writing Practice. *Journal of Language, Identity & Education*, 23(5), 658–674. <https://doi.org/10.1080/15348458.2022.2029449>
- Krange, I., Segaran, M., Gamlem, S., Moltudal, S., & Engeness, I. (2023). A Triple Challenge: Students' Identification, Interpretation, and Use of Individualized Automated Feedback in Learning to Write English as a Foreign Language. *Interaction Design and Architecture(s)*, (59), 37–61. <https://doi.org/10.55612/s-5002-059-001>
- Kuteeva, M., & Negretti, R. (2016). Graduate students' genre knowledge and perceived disciplinary practices: Creating a research space across disciplines. *English for Specific Purposes*, 41, 36–49. <https://doi.org/10.1016/j.esp.2015.08.004>
- Lee, I. (2017). Teacher Feedback in L2 Writing. In I. Lee, *Classroom Writing Assessment and Feedback in L2 School Contexts* (pp. 65–82). Springer Singapore. https://doi.org/10.1007/978-981-10-3924-9_6
- Liu, S., & Yu, G. (2022). L2 learners' engagement with automated feedback: An eye-tracking study. *Language Learning & Technology*, 26(2), 78–105. <https://doi.org/10.64152/10125/73480>
- Llausas, S. M., Ruiz, E., Ayucan, S. M., & Evardo Jr., O. J. (2024). A Systematic Literature Review on the Use of Grammarly in Improving the Writing Skills of ESL/EFL Students. *International Journal of Multidisciplinary: Applied Business and Education Research*, 5(9), 3507–3516. <https://doi.org/10.11594/ijmaber.05.09.10>
- Luo, Y., Xia, Y., & Lu, X. (2025). A Systematic Review of the Role of Artificial Intelligence in

- Second Language Writing Education. *Digital Studies in Language and Literature*, 2(2), 302–325. <https://doi.org/10.1515/dsll-2025-0001>
- Mekheimer, M. (2025). Generative AI-assisted feedback and EFL writing: A study on proficiency, revision frequency and writing quality. *Discover Education*, 4(1), 170. <https://doi.org/10.1007/s44217-025-00602-7>
- Miranty, D., Widiati, U., Yudi Cahyono, B., & Intan Suzila Tengku Sharif, T. (2025). The effectiveness of Grammarly application and teacher feedback for undergraduate EFL students' writing skills. *Innoeduca. International Journal of Technology and Educational Innovation*, 11(1), 108–133. <https://doi.org/10.24310/ijtei.111.2025.20521>
- Nguyen, P. N. T., Rijlaarsdam, G., Janssen, T., & Admiraal, W. (2020). Effects of rhetorical text analysis on idea generation and text quality. *ITL - International Journal of Applied Linguistics*, 171(2), 280–306. <https://doi.org/10.1075/itl.16013.rij>
- Nugroho, A., & Benecia, C. (2022). Investigating the use of automated written corrective feedback to improve undergraduate EFL students' writing performance. *Prosiding Konferensi Linguistik Tahunan Atma Jaya (KOLITA)*, 20(20), 16–23. <https://doi.org/10.25170/kolita.20.3773>
- ONeill, R., & Russell, A. (2019). Stop! Grammar time: University students' perceptions of the automated feedback program Grammarly. *Australasian Journal of Educational Technology*, 35(1). <https://doi.org/10.14742/ajet.3795>
- Osawa, K. (2024). Integrating Automated Written Corrective Feedback into E-Portfolios for second language Writing: Notion and Notion AI. *RELC Journal*, 55(3), 881–887. <https://doi.org/10.1177/00336882231198913>
- Patton, M. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). SAGE Publications, Inc.
- Rabbi, S. (2020). Mapping Rhetorical Knowledge in Advanced Academic Writers: The Affordances of a Transactional Framework to Disciplinary Communication. *Across the Disciplines*, 17(3), 69–91. <https://doi.org/10.37514/ATD-J.2020.17.3.03>
- Ranalli, J., & Yamashita, T. (2022). Automated written corrective feedback: Error-correction performance and timing of delivery. *Language Learning & Technology*, 26(1), 1–25. <https://doi.org/10.64152/10125/73465>
- Rastgou, A. (2024). Cyclical interplay between L2 writing, WCF processing and rewriting: Explaining modification and consolidation in L2 development. *Journal of Second Language Writing*, 63, 101078. <https://doi.org/10.1016/j.jslw.2023.101078>
- Sanosi, A. (2022). To Err is Human: Comparing Human and Automated Corrective Feedback. *Information Technologies and Learning Tools*, 90(4), 149–161. <https://doi.org/10.33407/itlt.v90i4.4980>
- Shah. (2025). Rhetorical Strategies in Research Article Introductions: An Analysis of Pakistani English Journals. *Journal of Arts and Linguistics Studies*, 3(2), 2273–2300. <https://doi.org/10.71281/jals.v3i2.329>
- Swales, J. (1990). *Genre analysis: English in academic and research settings*. Cambridge University Press
- Swales, J. (2004). *Research genres: Explorations and applications*. Cambridge University Press.
- Tambunan, A. R. S., Andayani, W., Sari, W. S., & Lubis, F. K. (2022). Investigating EFL students'

- linguistic problems using Grammarly as automated writing evaluation feedback. *Indonesian Journal of Applied Linguistics*, 12(1), 16–27. <https://doi.org/10.17509/ijal.v12i1.46428>
- Thi, N. K., & Nikolov, M. (2022). How Teacher and Grammarly Feedback Complement One Another in Myanmar EFL Students' Writing. *The Asia-Pacific Education Researcher*, 31(6), 767–779. <https://doi.org/10.1007/s40299-021-00625-2>
- Tran, T. T. T. (2025). Enhancing EFL Writing Revision Practices: The Impact of AI- and Teacher-Generated Feedback and Their Sequences. *Education Sciences*, 15(2), 232. <https://doi.org/10.3390/educsci15020232>
- Ummah, L. K., & Bisriyah, M. (2022). EFL students' perception of Grammarly's feedback and how they deal with the inaccuracy. *JEES (Journal of English Educators Society)*, 7(2). <https://doi.org/10.21070/jees.v7i2.1687>
- Wang, C. (2025). Exploring Students' Generative AI-Assisted Writing Processes: Perceptions and Experiences from Native and Nonnative English Speakers. *Technology, Knowledge and Learning*, 30(3), 1825–1846. <https://doi.org/10.1007/s10758-024-09744-3>
- Warschauer, M., Tseng, W., Yim, S., Webster, T., Jacob, S., Du, Q., & Tate, T. (2023). The Affordances and Contradictions of AI-Generated Text for Second Language Writers. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4404380>
- Wen, D. (2023). A Technology-Enhanced Multi-Source Feedback Model for L2 Writing Classes. *2023 3rd International Conference on Educational Technology (ICET)*, 204–208. <https://doi.org/10.1109/ICET59358.2023.10424169>
- Wilson, J., Cruz Cordero, T., Potter, A., Myers, M., MacArthur, C. A., Beard, G., Fudge, E. A., Raiche, A., & Ahrendt, C. (2024). Recommendations for Integrating Automated Writing Evaluation with Evidence-Based Instructional Practices. *International Journal of Changes in Education*, 2(1), 46–54. <https://doi.org/10.47852/bonviewIJCE42024011>
- Woodworth, J., & Barkaoui, K. (2020). Perspectives on Using Automated Writing Evaluation Systems to Provide Written Corrective Feedback in the ESL Classroom. *TESL Canada Journal*, 37(2), 234–247. <https://doi.org/10.18806/tesl.v37i2.1340>
- Yang, H., Gao, C., & Shen, H. (2024). Learner interaction with, and response to, AI-programmed automated writing evaluation feedback in EFL writing: An exploratory study. *Education and Information Technologies*, 29(4), 3837–3858. <https://doi.org/10.1007/s10639-023-11991-3>
- Yang, Y., Hussin, S., & Hashim, H. (2025). Feedback Literacy and EFL Learner Engagement With ChatGPT Feedback: Predicting Feedback Uptake and Perceived Usefulness. *Theory and Practice in Language Studies*, 15(11), 3760–3771. <https://doi.org/10.17507/tpsls.1511.30>
- Yuan, X. (2023). The Impact of Automated Evaluation Feedback on Students' Writing Revision. *International Journal of Languages, Literature and Linguistics*, 9(4), 526–529. <https://doi.org/10.18178/IJLLL.2023.9.6.464>
- Zhai, Y. (2025). Automated written corrective feedback: Fostering writing accuracy, self-regulation, and motivational dynamics in EFL learners. *BMC Psychology*, 14(1), 46. <https://doi.org/10.1186/s40359-025-03765-y>
- Zhu, X., Wang, C., & Sears Smith, D. (2025). *Writing With Machines and Peers: Designing for*

Critical Engagement with Generative AI (Version 1). arXiv.
<https://doi.org/10.48550/ARXIV.2511.15750>

Zulkefli, N. H., & Ismail, H. H. (2025). The Impact of AI on ESL Writing Autonomy: A Systematic Review. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 10(8), e003555. <https://doi.org/10.47405/mjssh.v10i8.3555>