

ENHANCING ENGLISH ESSAY WRITING THROUGH AI-BASED DIGITAL TOOLS: INSIGHTS FROM INDONESIAN EFL STUDENTS

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ABSTRAK

The increasing use of artificial intelligence (AI)-based digital tools has reshaped English writing instruction, particularly in EFL contexts where students often face challenges in idea development, linguistic accuracy, vocabulary use, and textual coherence. This study examines how AI-assisted writing support is reflected in Indonesian senior high school students' English essays, with particular attention to ChatGPT, Grammarly, and DeepL. Employing a qualitative descriptive design, the study analyzed 28 final essays written by twelfth-grade students in the Language Studies major at a public senior high school in Makassar, Indonesia. The essays were examined through thematic analysis using four analytical dimensions: structure and organization, grammar and syntax, vocabulary use, and coherence and cohesion. The findings indicate that AI-assisted textual features were most visible in essay organization, lexical expansion, and local textual flow. Students' final essays showed clearer paragraph sequencing, more academic and topic-specific vocabulary, and stronger use of cohesive devices. However, grammatical accuracy and idiomatic control remained uneven, with persistent issues such as tense inconsistency, article errors, translation-like syntax, and mechanical transitions. The study contributes to AI-assisted EFL writing research by offering text-based evidence from an underexplored Indonesian secondary-school context and by conceptualizing AI support as a multi-tool writing ecology rather than a single technological intervention.

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INTRODUCTION

The rapid expansion of digital technologies has transformed contemporary educational practices, including the ways language is taught, learned, and assessed (Moybeka et al., 2023; Tuljannah et al., 2025). In English language education, this transformation is particularly visible in writing instruction, where digital tools increasingly mediate learners' processes of planning, drafting, revising, and editing texts (Ekizoglu &

Demir, 2025; Khan et al., 2024; Liu et al., 2025). Writing, however, remains one of the most demanding skills for learners of English as a Foreign Language (EFL), as it requires the simultaneous orchestration of linguistic knowledge, rhetorical awareness, and cognitive control (Maulani et al., 2025; Ponton & Rhea, 2006). To produce an effective essay, students must generate ideas, organize arguments, select appropriate vocabulary, apply grammatical rules accurately, and maintain coherence across the text (Ferretti & Graham, 2019; Hudriati et al., 2025; Mokhtar et al., 2020). As Hyland (2014) emphasizes, writing is a highly complex activity because it involves the integration of multiple linguistic and cognitive demands. For EFL learners, this complexity is intensified by limited exposure to authentic English use and restricted opportunities for sustained writing practice.

These challenges are highly relevant in the Indonesian secondary school context, where English is learned primarily as a foreign language rather than used as a medium of daily communication (Ekizoğlu & Demir, 2025; Hamdani & Abid, 2025; Yeung, 2025). As a result, many students struggle to express ideas fluently and accurately in written English, particularly when producing extended academic texts such as essays. Difficulties often emerge not only in grammar and vocabulary use but also in idea development, paragraph organization, and overall textual coherence (Aljabr et al., 2025; Fitra et al., 2022). Dizon & Gold (2023) note that Indonesian high school students frequently encounter obstacles in producing coherent and grammatically appropriate English texts due to limited practice and language exposure (Fitra et al., 2024; Tatipang et al., 2024). In many classrooms, conventional approaches to writing instruction still rely heavily on grammar exercises, vocabulary memorization, or teacher-led correction, which may not sufficiently address students' immediate and situated writing needs during the act of composing (Losi et al., 2024; Tambunan et al., 2022; Zhang et al., 2025). This mismatch between instructional practice and the real-time demands of writing suggests the need for more responsive forms of pedagogical support (Tatipang et al., 2025; Ugun & Aziz, 2020).

Within this context, the emergence of artificial intelligence (AI)-based digital tools offers a potentially significant pedagogical development (Alghannam, 2025; Elnaffar et al., 2025; Yang et al., 2025). Tools such as ChatGPT, Grammarly, and DeepL have become increasingly accessible to students and are now used not only for correcting language errors but also for generating ideas, reformulating sentences, improving lexical choice, and supporting translation across languages (Hasanah et al., 2025; Law, 2024). Their growing role in language learning reflects a broader evolution in Computer-Assisted Language Learning (CALL), from earlier rule-based systems toward more adaptive, interactive, and context-sensitive forms of support (Hyland & Hyland, 2019; Nguyen & Chu, 2024).

Zawacki-Richter et al. (2019) describe this shift as a movement toward intelligent systems capable of providing more personalized forms of assistance. From a theoretical perspective, AI-based tools may be understood as digital scaffolding resources that mediate learners' writing performance by supplying immediate feedback and strategic support during composition (Hasanah et al., 2025). In this sense, AI does not merely automate correction; it reshapes the feedback ecology of writing by enabling learners to interact with language support in more dynamic and individualized ways. As Batubara et al. (2024) have suggested that AI tools may provide real-time writing support by offering feedback, language suggestions, and revision assistance. However, in the present study, AI tools are not treated as proven mentors; rather, they are examined as digital writing support tools whose possible effects are interpreted from students' final essay products.

Nevertheless, the pedagogical promise of AI in EFL writing should not be accepted uncritically. Previous studies on AI-assisted writing have provided valuable insights, but they have often been situated in higher education or university-level EFL contexts. For example, studies involving university students have examined learners' perceptions of AI tools, their engagement with automated writing evaluation, and the role of generative AI or grammar-checking tools in supporting feedback, revision, and writing performance (Batubara et al., 2024; Dizon & Gold, 2023; Khan et al., 2024; Li et al., 2024; Yeung, 2025). Other studies have adopted review-based, experimental, or technology-oriented approaches to explain the broader role of AI in language learning and writing instruction (Law, 2024; Liu et al., 2025; Zawacki-Richter et al., 2019; Zhang et al., 2025). While these studies are important, their contexts, participants, and methods differ from the focus of the present study. Comparatively less attention has been paid to secondary school learners, particularly Indonesian EFL students who are still developing foundational writing abilities and may engage with AI-based writing tools differently from university students. This gap is significant because adolescents' use of AI may be shaped by their linguistic readiness, digital literacy, academic expectations, and dependence on external assistance. Therefore, the present study contributes to the field by examining AI-assisted writing in an Indonesian senior high school context through a qualitative descriptive, text-based analysis of students' final English essays.

A further limitation in the existing body of research concerns analytical emphasis. Many studies on AI in writing instruction foreground student perceptions, attitudes, or reported experiences, which are useful for understanding technology acceptance and learner beliefs (Batubara et al., 2024; Moybeka et al., 2023; Tuljannah et al., 2025). However, fewer studies examine how AI-assisted writing support is reflected in students' actual

written products, especially at the secondary school level. As a result, there remains limited empirical understanding of the observable textual features that appear in students' essays when they write with access to AI-based tools. In this study, such features are examined through four dimensions of essay writing: structure and organization, grammar and syntax, vocabulary use, and coherence and cohesion. The study does not claim to measure writing improvement through a pre-test and post-test comparison. Instead, it analyzes students' final essay products to identify textual patterns that may indicate how AI-based tools supported their writing performance.

In response to these gaps, the present study investigates how Indonesian senior high school students utilize AI-based digital tools in writing English essays. Specifically, it focuses on the use of ChatGPT, Grammarly, and DeepL among twelfth-grade EFL students and examines how AI-assisted writing support is reflected in selected structural and linguistic features of their final essays. Rather than exploring students' perceptions, which are addressed in a separate inquiry, this study centers on recurring textual strengths and patterns derived from students' writing products (Haidar et al., 2025). By doing so, it seeks to offer a more grounded account of how AI-assisted support operates in actual writing practice. The significance of this study lies in its contribution to the growing scholarship on AI in English education, particularly by extending attention to the underexplored context of Indonesian secondary-level EFL writing. It also provides practical insight for teachers, curriculum designers, and researchers who seek to integrate AI-based digital tools into writing instruction in ways that are pedagogically meaningful, contextually appropriate, and academically responsible. This study is guided by the following research questions: what textual features associated with AI-assisted writing support are observable in Indonesian EFL students' final English essays? And which aspects of essay writing, particularly structure and organization, grammar and syntax, vocabulary use, and coherence and cohesion, appear to be most visibly supported when students are permitted to use AI-based digital tools such as ChatGPT, Grammarly, and DeepL?

Based on the research questions, AI-assisted EFL writing should be theorized not as mere tool adoption, but as a form of mediated writing activity (Alghannam, 2025). Recent review evidence shows that AI in second language learning still operates largely at the level of pedagogical enhancement rather than transformation, suggesting that technology often accelerates existing routines more than it fundamentally reconfigures writing instruction (AbdAlgane et al., 2026; Fauziah & Minarti, 2023; Lim et al., 2026). At the same time, generative AI has been theorized as redistributing agency across learners, teachers, and tools, which means that its educational value lies not only in faster correction or easier

drafting but in how it reshapes access to feedback, decision-making, and revision during composition (Baron, 2023; Johannesson, 2024). From this perspective, the present study draws on a sociocultural view of writing as a mediated process and on a distributed-agency perspective in which development emerges through interaction among the learner, the task, and the digital tools that scaffold composing.

RESEARCH METHOD

Research Design

This study employed a qualitative descriptive design to examine how AI-based digital tools were reflected in the English essay writing of Indonesian EFL students. A qualitative descriptive approach was considered appropriate because the study sought to generate a rich, context-sensitive understanding of students' written products rather than to test causal relationships or measure treatment effects (Creswell & Creswell, 2023). In the present study, students' essays were treated as naturally occurring documents that could provide recurring textual strengths and patterns possibly associated with AI-assisted writing support. The purpose was not to evaluate students' perceptions of the tools, but to analyze how AI-assisted writing support was reflected in the quality and textual features of students' final essays.

Data Sources and Research Instruments

The study was conducted at a public senior high school in Makassar, Indonesia, involving 28 twelfth-grade students enrolled in the Language Studies major. The participants were selected through purposive sampling because they met several criteria relevant to the focus of the study. First, they were twelfth-grade students enrolled in the Language Studies major, where English writing was part of their learning activities. Second, they had received classroom exposure to English essay writing, making them suitable participants for a study on EFL essay production. Third, they had access to digital devices and internet connection that allowed them to prepare and submit their essays electronically. Fourth, they were permitted to use AI-based digital tools, particularly ChatGPT, Grammarly, and DeepL, as writing support while preparing their essays. Fifth, they completed and submitted a final English essay in Microsoft Word format within the required length of approximately 500–1500 words. Students whose essays were incomplete, not written in English, or not submitted in digital form were not included in the analysis. These criteria were used to ensure that the selected participants and their essays were directly relevant to the purpose of the study (Privitera & Ahlgrim-Delzell, 2019).

Collection and Analysis Techniques

It should be clarified that the study did not collect students' pure writing before AI use, pre-AI drafts, prompt histories, or interaction logs with ChatGPT, Grammarly, and DeepL. Therefore, the analysis does not claim to demonstrate direct causal improvement from AI use through comparison between unaided and AI-assisted writing. Rather, the study analyzes the final essays as documentary evidence of writing products produced under a classroom condition in which students were permitted to consult AI-based digital tools. The contribution of AI was inferred cautiously from recurring textual patterns that were consistent with the affordances of the tools, such as clearer essay organization, more varied lexical choices, more visible cohesive devices, and localized grammatical correction. This methodological boundary was maintained to avoid overclaiming the role of AI and to preserve the qualitative descriptive nature of the study (Bailey, 2015; Srivastava & Agarwal, 2024).

In this study, AI use was treated as permitted writing assistance rather than co-authorship, since the students remained responsible for selecting, evaluating, revising, and submitting their final essays. To maintain academic integrity, the study did not present the essays as unaided writing products. Instead, it explicitly framed them as final essays produced under a condition in which AI-based writing assistance was allowed. This transparency was important to avoid misrepresenting the nature of the writing task and to ensure that the analysis focused on AI-assisted textual features rather than on claims of independent writing performance.

The data were analyzed through thematic analysis applied to the documentary corpus of student essays (Braun & Clarke, 2022). Each essay was read repeatedly to identify recurring textual patterns associated with the four analytical dimensions: structure, grammar and syntax, vocabulary use, and coherence and cohesion. During this process, segments of text were coded according to recurring textual strengths, persistent weaknesses, and notable patterns that appeared to reflect AI-assisted writing support. The analysis proceeded iteratively. This analytic process enabled the study to move beyond isolated textual examples toward a more interpretive account of how AI-based digital tools were manifested in students' final writing products (Creswell & Creswell, 2023).

To enhance the rigor of the analysis, the study incorporated several strategies to ensure credibility, dependability, and confirmability. Inter-coder checking was conducted on approximately 30% of the dataset. A subset of essays was independently reviewed by three raters with relevant expertise in English language teaching and writing assessment:

one doctoral-level English language educator, one senior high school English teacher, and one university-affiliated English lecturer. Differences in coding and interpretation were discussed until consensus was reached, thereby strengthening the consistency of the analytical process. This study followed standard ethical principles for classroom-based educational research (Wiles, 2013).

RESULTS AND DISCUSSION

Results

The results need to be interpreted within the methodological scope of the study. Since students' unaided drafts and AI prompts were not collected, the findings do not provide direct comparative evidence between pure writing and AI-assisted writing. Instead, the analysis identifies recurring textual features in the final essays that may plausibly reflect AI-assisted support. For this reason, the expressions "AI contribution," "AI-assisted writing support," and "influence" are used in an interpretive rather than causal sense. The recurring textual features presented in this section are based on cross-case analysis of 28 final essays, not on process tracing or prompt-level analysis.

The analysis showed that AI-assisted textual features were most visible in paragraph organization, vocabulary choice, and sentence-to-sentence connection. These patterns were not derived from a single essay but from repeated evidence across the dataset. Table 1 summarizes the cross-case findings across the four analytical dimensions.

Table 1. Cross-case synthesis of the main findings

Analytical Dimension	Dominant Pattern Across Essay	Main Strength Observed	Recurring Limitations	Likely AI-Related Contribution
Structure and Organization	Essays generally showed clearer introductions, body development, and conclusions	Better thematic, chronological, and problem-solution sequencing	Some essays remained descriptive or compiled rather than deeply analytical	ChatGPT likely supported outlining and paragraph planning
Grammar and Syntax	AI-assisted textual features were visible but uneven	More attempts at complex clauses and formal sentence structures	Persistent article errors, tense inconsistency, awkward phrasing, and translation-like syntax	Grammarly likely supported local correction, but not full idiomatic control
Vocabulary Use	Lexical range increased noticeably	More academic, technical, and topic-specific diction	Sophisticated vocabulary sometimes exceeded students' grammatical control	ChatGPT and DeepL likely supported lexical expansion and rephrasing

Analytical Dimension	Dominant Pattern Across Essay	Main Strength Observed	Recurring Limitations	Likely AI-Related Contribution
Coherence and Cohesion	Essays became easier to follow	Greater use of transitions, repeated thematic markers, and paragraph linkage	Some connectors were mechanical; some essays had abrupt shifts or source-patching	AI tools likely helped with local flow and sentence-to-sentence connection

To make the findings more directly grounded in students' written products, representative excerpts from the final essays are presented in Table 2. These excerpts do not function as pre- and post-AI comparisons, since the study did not collect unaided drafts. Rather, they serve as textual evidence illustrating how the four analytical dimensions appeared in students' final essays.

Table 2. Representative Textual Evidence from Students' Essays

Analytical Dimension	Representative Excerpt	Interpretation
Structure and Organization	<i>"In the current era, with social changes, this has provided a change, namely that the world is starting to give fathers the opportunity to express themselves in the parenting process."</i> [P4]	The excerpt illustrates an attempt to frame the essay through a general contextual opening before moving into a more specific topic. The thematic focus on social change and fathers' involvement in parenting suggests that the student was able to organize the topic around a recognizable central idea.
Grammar and Syntax	<i>"Cultivation of perspective global through education is not luxury merely but necessity on the 21st century."</i> [P8]	The excerpt demonstrates a grammatically controlled and high-register sentence structure. However, when compared with recurring patterns across the wider dataset, grammatical control remained uneven, particularly in relation to article use, tense consistency, translation-like syntax, and sentence formulation.
Vocabulary Use	<i>"Continuous learning and upskilling is essential for individuals to remain competitive in the ever-evolving job market."</i> [P22]	The excerpt indicates lexical expansion through academic and topic-specific vocabulary such as "continuous learning," "upskilling," "competitive," and "ever-evolving job market." This suggests that students were able to access more formal and policy-oriented expressions, although such lexical sophistication was not always matched by stable grammatical control.
Coherence and Cohesion	<i>"Apart from that, improving public transportation services is also very necessary, so that people feel safe and comfortable using public transportation."</i> [P15]	The excerpt demonstrates local cohesion through the transitional expression "Apart from that," which connects the sentence to a preceding argument. It also shows a concluding movement by linking public transportation improvement with safety and comfort. However, this type of cohesion remains largely local and does not necessarily guarantee deeper argumentative coherence.

Across the four analytical dimensions, AI-assisted writing support appeared most visible in structure and organization, vocabulary use, and coherence and cohesion. Grammar and syntax also showed some recurring textual support, but this dimension remained less stable than the others. Figure 1 summarizes the conceptual synthesis of these AI-assisted writing outcomes.

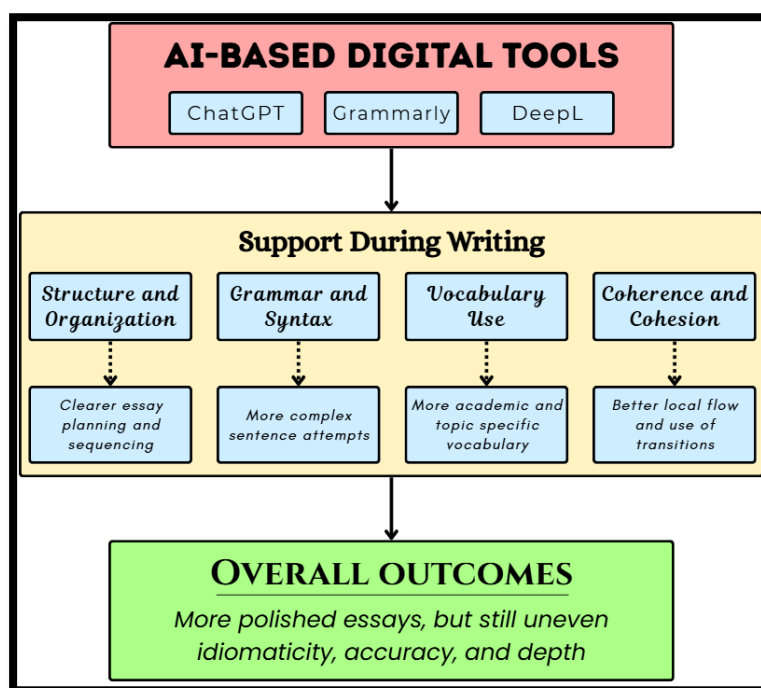


Figure 1. Conceptual synthesis of AI-assisted writing outcomes

Theme 1: AI-Assisted Support in Essay Structure and Organization

Structure and organization emerged as one of the most visible dimensions in students' final essays. As shown in Table 1, many essays displayed identifiable introductions, body development, and concluding moves. The representative excerpt in Table 2 further illustrates this pattern: the student begins with a broad contextual statement about social change before narrowing the discussion to fathers' involvement in parenting. This suggests that students were able to organize their ideas around a central theme and present them in a more recognizable academic structure. However, this structural clarity should not be interpreted as evidence of full rhetorical mastery. Some essays remained descriptive, mechanical, or source-dependent, particularly when the organization was clear but the analytical depth was limited.

The pattern in Figure 1 suggests that AI tools, especially generative tools, may have functioned as organizational scaffolds that helped students arrange loosely formed ideas into more coherent essay structures. This finding is consistent with Zhang et al. (2025), who show that learners often use generative AI more productively during idea generation and

early-stage composition than across all stages of writing. Yeung (2025) also supports the broader argument that AI can enhance learners' control over planning and text development, particularly when writing demands exceed their unaided composing capacity. However, the findings also indicate that students may produce essays that appear more academic structurally than they are analytically. This interpretation aligns with Lim et al. (2026), Zawacki-Richter et al. (2019), and Losi et al. (2024), who caution that AI can support visible textual performance without necessarily ensuring deeper writer judgment or rhetorical ownership.

Theme 2: Uneven Grammatical and Syntactic Control

Grammar and syntax showed a more mixed pattern. As summarized in Table 1, students' essays contained more attempts at complex clauses, formal sentence structures, and academic phrasing. The excerpt in Table 2, "The cultivation of a global perspective through education is not merely a luxury but a necessity in the 21st century," demonstrates a controlled and high-register sentence that reflects grammatical and syntactic sophistication. This suggests that AI-assisted support may have helped some students move beyond simple sentence patterns, which is consistent with Guba et al. (2024).

However, this pattern was not consistent across the dataset. Article omission, tense inconsistency, awkward phrasing, punctuation problems, and translation-like syntax remained visible in several essays, particularly in texts that appeared to rely heavily on translated or reformulated source material (Sobari et al., 2024). Thus, grammar and syntax were the least stable dimensions in the corpus. This finding suggests that AI-based grammar support may assist with local correction, but it does not automatically produce idiomatic or internally controlled language. This interpretation is consistent with Dizon & Gold (2023), who report the benefits of Grammarly for revision and noticing while also emphasizing that automated feedback does not replace teacher mediation or guarantee meaningful uptake.

Theme 3: Lexical Expansion and Academic Vocabulary Use

Vocabulary use was one of the strongest and most visible features in the students' final essays. As shown in Table 1, students frequently used academic, abstract, technical, and topic-specific vocabulary across essays on education, business, social issues, environment, and history. The representative excerpt in Table 2, particularly the phrase "continuous learning and upskilling" and "ever-evolving job market," illustrates how students used more formal and policy-oriented language. This lexical pattern suggests that

AI-assisted writing support may have expanded students' access to academic and topic-specific expressions.

This finding resonates with recent work on ChatGPT (Yang et al., 2025), machine translation (Kamaluddin et al., 2024), and AI-mediated lexical support (Guba et al., 2024), which shows that such tools can expand learners' expressive range and provide reformulation support. However, the lexical enrichment observed in the essays did not always correspond to stable grammatical control. In several cases, students appeared able to sound more academic before they could consistently write with grammatical precision. This mismatch suggests that AI tools may accelerate access to lexical sophistication faster than they support full linguistic integration (Baa, 2022; Hasanah et al., 2025).

Theme 4: Local Cohesion and Surface-Level Textual Flow

Coherence and cohesion were also visible in the students' final essays, particularly through the use of transitional expressions, repeated thematic markers, and clearer sentence-to-sentence connection. The excerpt in Table 2 demonstrates this pattern through the phrase "Apart from that," which connects the sentence to a preceding point and helps maintain local textual flow. The sentence also links the improvement of public transportation services with safety and comfort, creating a sense of closure within the paragraph.

However, the cohesion observed in the essays was not always rhetorically mature. Some connectors were overused, mechanically inserted, or unable to resolve abrupt shifts, duplicated content, tonal inconsistency, or source patching. This indicates that AI tools may be useful for improving local connectivity, but they do not necessarily ensure global coherence unless learners actively evaluate the relevance and integration of ideas. This interpretation is consistent with AbdAlgene et al. (2026), Yang et al. (2025), and Zhang et al. (2025) who argue that AI feedback becomes most pedagogically valuable when learners engage with it critically rather than accept it passively.

Synthesis of the Findings

Taken together, the findings address the two research questions by showing that AI-assisted textual features were most visible in organization, vocabulary expansion, and local cohesion. In relation to the first research question, AI contribution was reflected in recurring textual features such as clearer paragraph sequencing, more academic lexical choices, and stronger sentence-to-sentence connection. In relation to the second research question, the most visibly supported dimensions were structure and organization, vocabulary use, and

coherence and cohesion, while grammar and syntax remained less stable. This pattern suggests that AI-assisted writing support was uneven across essay dimensions and should be interpreted as recurring textual evidence from final writing products rather than as direct causal evidence of writing improvement.

Discussion

Taken together, these findings support a functional interpretation of AI-assisted writing. Although this study did not include process logs or direct tool-tracking, the patterns in the final essays suggest a plausible division of pedagogical labor across the three tools: ChatGPT appears most strongly associated with idea generation, outlining, and discourse-level expansion; these findings are supported by Li et al. (2024); Grammarly with local correction and sentence-level polishing; these findings are supported by Guba et al. (2024); and DeepL with lexical reformulation and cross-linguistic mediation; these findings are supported by Kamaluddin et al. (2024). Importantly, however, the data also show that the benefits of these tools were complementary rather than self-sufficient. Students' final essays appeared more textually effective when AI seemed to enhance rather than replace writer decision-making. This interpretation aligns with recent research (AbdAlgane et al., 2026) showing that AI support is most effective when paired with human judgment, teacher mediation, or deliberate learner monitoring, rather than when it is treated as an autonomous writing solution.

It is important to interpret these findings within the methodological boundaries of the study. Since the research did not collect students' unaided drafts, pure writing samples, prompt histories, AI-generated responses, or interaction logs, the findings cannot be used to establish a direct causal comparison between writing before and after AI use. The term AI contribution in this study is therefore used in a cautious and interpretive sense, referring to recurring textual features in the students' final essays that are consistent with the affordances of ChatGPT, Grammarly, and DeepL. If students' original drafts and prompts had been collected, the study would have been able to trace more precisely how learners negotiated, accepted, modified, or rejected AI suggestions during the writing process. Future research should therefore adopt a process-oriented design by documenting students' initial drafts, AI prompts, AI-generated outputs, revised drafts, and reflective notes.

The study makes three main contributions to the literature. First, it extends current AI-in-writing research into the still underexplored context of Indonesian secondary-level EFL writing, whereas much previous work has focused on higher education. Second, it

contributes a text-centered perspective, examining the written products themselves rather than relying primarily on perceptions or self-reports. Third, it shows that AI assistance should be understood not as a single intervention but as a multi-tool ecology in which different tools appear to support different aspects of writing performance. This helps refine the field's understanding of AI-mediated writing by shifting attention from the broad question of whether AI helps to the more analytically useful question of which tools appear to help which aspects of writing, and with what limitations.

These findings also carry clear pedagogical implications. The data do not support either a celebratory view of AI as a writing substitute or a dismissive view of it as merely a shortcut. Rather, they suggest that AI tools can be pedagogically productive when teachers explicitly guide students in using them for planning, revising, and evaluating language choices. In particular, students need support in recognizing the difference between surface sophistication and genuine control, especially when AI-generated phrasing appears fluent but remains grammatically, rhetorically, or contextually weak. The persistence of awkward collocations, translation-like structures, informal register intrusions, duplicated material, and occasional metadata residue indicates that students also need instruction in post-editing, source integration, and critical acceptance of AI suggestions. This implication is especially important in school contexts, where learners are still developing feedback literacy and may be more vulnerable to overreliance on fluent-looking output.

Overall, the findings suggest that AI-based digital tools can meaningfully strengthen EFL essay writing, but the nature of that strengthening is uneven. Their most visible contribution lies in helping learners produce texts that are more organized, more lexically elaborated, and more cohesively shaped. Their weakest area lies in guaranteeing consistent grammatical accuracy, idiomaticity, and deep rhetorical control. For that reason, the present study argues that AI should be conceptualized not as an automatic enhancer of writing quality, but as a mediational resource whose value depends on how learners and teachers use it. This is precisely the significance of the present study: it shows that, in a secondary EFL context, AI may support more visible textual quality in student writing, but it does so most effectively when its affordances are pedagogically framed and critically managed.

CONCLUSION

This study examined how AI-based digital tools were reflected in Indonesian senior high school students' English essay writing by focusing on recurring textual features in their final written products. Based on a qualitative descriptive analysis of 28 essays

produced with access to ChatGPT, Grammarly, and DeepL, the findings show that AI-assisted textual features appeared most visible in structure and organization, vocabulary use, and coherence and cohesion. Students' final essays showed clearer paragraph sequencing, more academic and topic-specific vocabulary, and stronger local textual flow. However, grammar and syntax remained less stable, as several essays still showed tense inconsistency, article errors, awkward phrasing, translation-like syntax, and limited idiomatic control. Therefore, AI support in this study should not be interpreted as direct causal evidence of writing improvement, but as recurring textual evidence observed in final AI-assisted writing products.

The main contribution of this study lies in its focus on Indonesian secondary-level EFL learners, a context that remains less represented in AI-assisted writing research. It also offers a text-centered perspective by examining students' actual essays rather than relying primarily on perceptions or self-reported experiences. The findings suggest that AI-based tools are best understood as a multi-tool writing ecology: ChatGPT may support ideation and macro-organization, Grammarly may support local correction, and DeepL may support lexical reformulation and cross-linguistic mediation. For teachers and curriculum designers, these findings indicate the importance of integrating AI tools with explicit pedagogical guidance, particularly in prompting, revising, post-editing, evaluating AI suggestions, and distinguishing surface-level sophistication from genuine authorial control. Future studies should collect students' unaided drafts, AI prompts, AI-generated outputs, revised drafts, and reflective notes to examine more directly how learners interact with AI during the writing process.

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