QuillQuick: Innovation in Writing for Secondary Students

Bram Noor Amira Noordin[1,*], Prialoshini Naterkumar[1], Preyangka Karunakaran[1], Melor Md Yunos[1]

[1]   Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia

ABSTRACT

Writing proficiency is crucial for secondary students as it enhances communication, critical thinking, and creativity. This study examines the writing challenges faced by students in ten secondary schools in Melaka, including difficulties with paraphrasing, grammar, sentence structure, vocabulary, and idea generation. It evaluates the effectiveness of QuillQuick, an interactive writing tool, in addressing these challenges through targeted exercises and personalized feedback. Using a qualitative research design, data from student reflections, revised writings, peer feedback, and teacher observations were collected to assess QuillQuick's impact. The findings show significant improvements in students' writing abilities, particularly in fluency, development, vocabulary, and grammar. Students exhibited increased engagement and a shift towards more autonomous learning, with QuillQuick described as "motivating" and "engaging." Teachers noted greater student independence in revisions and a willingness to experiment with writing techniques. The study concludes that QuillQuick is an effective tool for enhancing writing skills, leading to better academic performance and creative expression among secondary students.

Keywords: AI based learning, writing; secondary ELS learners; vocabulary

1. Introduction
1.1 Writing Skills

The Writing is an essential skill that not only supports academic success but also promotes critical thinking, creativity, and self-expression. In secondary education, developing strong writing skills is critical, as it empowers students to articulate ideas effectively, engage in intellectual discourse, and prepare for future academic and professional demands. With the rise of digital communication, writing skills are becoming increasingly vital not only in academic contexts but also in professional and everyday life. The ability to communicate effectively in writing is now a fundamental skill across various platforms, such as emails, social media, and digital content creation. In this context, enhancing students' writing proficiency is critical to preparing them for the demands of the modern world [1]. However, many secondary students encounter substantial challenges in honing their writing abilities, which can hinder their academic progress and limit their creative potential. This study investigates the specific writing challenges faced by students in ten secondary schools in Melaka, examining the potential of QuillQuick as a solution to enhance writing mastery among secondary students [10-20].

Research indicates that one of the key issues in developing writing skills is the ability to paraphrase effectively. Many students struggle to express the same ideas in different words, which can lead to plagiarism and a lack of originality in their work. As [2] noted, "writing proficiency is not only crucial for academic success but also plays a central role in students' ability to communicate ideas" (p. 16). Proper paraphrasing requires a good grasp of vocabulary and sentence structure, both of which are common areas of difficulty. Additionally, grammar and sentence structure errors are prevalent among students, impacting the clarity and flow of their writing. According to [3], "students who lack strong foundational skills in grammar and syntax are often unable to construct clear, concise, and logical sentences" (p. 445). Even when students have the necessary ideas, an inability to organize them into coherent, grammatically correct sentences can significantly reduce the effectiveness of their communication. There is a lack of focused study on how secondary students specifically suffer with paraphrasing, vocabulary growth, syntax, and ideation abilities, despite the fact that previous studies (e.g., Graham & Perin, Coxhead) emphasise general writing challenges among students. The majority of research concentrates on writing abilities in general, ignoring the particular requirements of secondary students in various learning environments, such those in ten secondary school in Melaka.

1.2 Vocabulary

Another critical challenge is vocabulary development. Students with a limited vocabulary often find themselves relying on repetitive language, which can make their writing less engaging and dynamic. A richer vocabulary allows for more precise expression and can help make writing more vivid and compelling. Limited vocabulary also affects the depth of students' writing, as they may lack the words to accurately convey complex ideas or emotions. Research supports this, as explained by [4], who found that "a strong vocabulary base is essential to effective academic writing, enabling students to express ideas more fluently and creatively" (p. 67).

Beyond language mechanics, many students encounter difficulties in generating and organizing ideas. This is particularly evident when students fail to understand the essay prompts or struggle to generate relevant ideas, leading to off-topic essays and a loss of marks. This lack of ideation skills not only impacts their performance but also restricts their ability to think critically and creatively about diverse topics. As noted by [5], "idea generation is a core component of the writing process, allowing students to explore topics more deeply and develop richer, more sophisticated arguments" (p. 298).

This study explores how QuillQuick, an interactive writing tool, can address these challenges by providing students with targeted exercises and personalized feedback. QuillQuick is designed to support students in refining their paraphrasing abilities, improving grammar and sentence structure, expanding vocabulary, and enhancing ideation skills. By investigating the effects of this tool in ten secondary schools in Melaka, the study aims to shed light on how innovative writing interventions can empower students to overcome their challenges and cultivate a mastery of writing that supports both academic and creative success.

1.3 Previous Literature

While there is substantial literature on the importance of writing skills in academic and professional contexts, significant gaps remain in understanding and addressing the specific challenges faced by secondary school students in writing development. Existing studies, such as those by [3-4], have emphasized general writing issues like grammar, sentence structure, and vocabulary. However, few studies focus on the unique struggles of secondary students in areas like paraphrasing,

vocabulary growth, syntax, and idea generation in diverse learning contexts, particularly in Malaysian schools.

Moreover, the integration of technological tools to support writing development, such as QuillQuick, has not been systematically explored. Although prior research highlights the potential of digital tools in enhancing writing skills [1], there is limited evidence on their effectiveness in addressing secondary students' specific needs, such as improving paraphrasing and expanding vocabulary in authentic classroom environments. This is particularly true for students in Malaysia, where diverse cultural and linguistic factors may influence writing proficiency.

Finally, while there is ample research on general writing challenges, a lack of region-specific studies exists, particularly for Melaka's secondary schools. Understanding how localized educational contexts and technological interventions like QuillQuick can address these challenges remains unexplored, creating a significant gap in both theory and practice.

This study seeks to bridge these gaps by investigating the potential of QuillQuick to address specific writing challenges among secondary students in Melaka, providing new insights into the intersection of technology and education.

1.4 Research Objective

The primary objective of this research is to enhance writing proficiency among secondary school students in ten secondary schools in Melaka by addressing key challenges in their writing skills. Specifically, this study aims to improve students' grammar and vocabulary usage, two essential components for creating clear, engaging, and effective written communication. By utilizing QuillQuick, an interactive educational tool, this research seeks to support students in refining their paraphrasing skills, enabling them to express ideas in original ways while ensuring proper citation. Furthermore, the study focuses on helping students overcome difficulties with grammar and sentence structure, fostering their ability to construct well-organized and coherent sentences. In addition, this research targets vocabulary enhancement, aiming to broaden students' word choice to make their writing more dynamic and expressive. Finally, the study addresses the issue of idea generation, providing strategies to help students comprehend prompts accurately and develop relevant ideas for their essays. Formative assessment plays a critical role in developing students' writing skills, as it focuses on providing ongoing feedback that helps learners understand their strengths and areas for improvement. QuillQuick could offer formative assessment capabilities that allow students to track their progress over time, making the writing process more transparent and less intimidating [6]. The study could explore how this continuous feedback loop influences students' writing development. Through these objectives, the research aims to empower students to achieve a higher level of writing mastery, preparing them for academic success and encouraging creative expression.

2. Methodology

In this innovation study, the qualitative nature research design has been chosen. The reason for choosing qualitative research design is that this innovation study centers around student engagement, vocabulary expansion, and improving writing skills, which involves subjective experiences, critical thinking, and creative expression. It places an emphasis on how students interact with AI tools, how they develop their vocabulary, and how they structure their writing. These aspects focus on processes, attitudes, and perceptions, which are core elements of qualitative research. This innovation also focuses on understanding how students use AI tools to improve their grammar. It

collects qualitative data, such as student reflections, revised writing, peer feedback, and teacher observations, to understand the process of grammar improvement. The overview of this writing innovation is divided into six innovations. There are AI-powered writing assistant, personalised writing coaches, revision support, quick draft generation, multilingual writing assistance and collaborative AI for team writing.

Table 1
Overview of AI-Enhanced Writing Innovations

INNOVATION	FOCUS/ ISSUES	OBJECTIVE	KEY ACTIVITIES	KEY TAKEAWAYS
1. AI-Powered Writing Assistants	Vocabulary	Enhance students' vocabulary and writing skills by providing alternative word suggestions, brainstorming ideas, and structuring their writing.	Vocabulary expansion using AI tools, brainstorming content ideas, structuring outlines, drafting, and peer reviews.	- Improved vocabulary variety - Logical structure in writing - Enhanced brainstorming and idea generation
2. Personalized Writing Coaches	Grammar	Improve grammar skills by analysing writing style, identifying errors, and suggesting corrections.	Style analysis, grammar checks, individual and peer review, revisions using AI feedback.	- Better grammar accuracy - Enhanced clarity and readability - Focused revision skills
3. Revision Support	Self-revision skills	Teach students to leverage AI for analysing drafts, identifying awkward phrasing, and simplifying sentences.	AI analysis of drafts, revision exercises, peer reviews, and discussions on clarity and grammar.	- Enhanced self-editing skills - Improved phrasing and sentence structure
4. Quick Draft Generation	Speed in drafting	Help students save time in generating drafts to focus on developing arguments and ideas.	Demonstrating AI-based draft generation, independent exercises, and refinement of arguments.	- Efficient drafting process - Increased focus on argumentation and idea development
5. Multilingual Writing Assistance	Language barriers	Enhance writing for non-native speakers with translation, paraphrasing, and grammar correction tools.	Hands-on translation tasks, paraphrasing exercises, and grammar correction activities.	- Improved multilingual communication skills - Context-aware translations
6. Collaborative AI for Team Writing	Group collaboration	Develop team writing skills with shared AI tools for paraphrasing, summarization, and grammar checks.	Collaborative writing tasks, peer reviews, and real-time AI feedback integration.	- Enhanced group collaboration - Streamlined document consistency and grammar

2.1 AI- Powered Writing Assistance

This lesson plan employs a blended learning strategy that improves students' writing and vocabulary by combining interactive exercises, direct instruction, and AI-assisted learning. Through

practical experience and supervised assistance, students gradually increase their knowledge and abilities using a scaffolded learning methodology. The idea of AI writing helpers, such as QuillQuick, is first presented to students as a way to improve vocabulary, generate ideas, and organize work. Students learn to extend their linguistic range and experiment with various methods of expressing concepts through exercises like creating synonyms and growing their vocabulary. After that, the class moves into a collaborative learning phase where students use AI to overcome writer's block and consider alternative viewpoints while brainstorming and creating content based on a writing prompt. In the following stage, students develop their organisational abilities by making writing outlines, which aids in their comprehension of the value of structure in generating texts that are clear and cohesive. Lastly, students receive helpful criticism to improve their writing through individual draughting and peer evaluation, with an emphasis on clarity, structure, and language utilisation. The approach places a strong emphasis on active learning, where students work together with peers, complete real-world writing assignments, and use AI tools. This method encourages critical thinking and problem-solving skills in addition to helping kids increase their vocabulary.

2.2 Personalized Writing Coaches

In order to improve students' grammar and writing style, this lesson plan employs a process-oriented, technologically enhanced approach that blends direct instruction, self-guided practice, and collaborative learning. It focusses on giving students immediate feedback on their writing's grammar and sentence structure using AI-powered writing tools like QuillQuick, enabling them to review and edit their own work. Following a lecture on the value of grammar, students engage in practical exercises where they learn to spot mistakes in both their own writing and sample texts. Students are urged to critically examine their own and other people's work through revision and peer review, paying particular attention to style, grammar, and clarity. In order to reinforce grammar concepts and improve writing skills through ongoing, reflective practice, this approach places a strong emphasis on active learning, where students revise their writing while receiving immediate, personalised feedback from the AI tool. It also encourages collaborative learning by integrating peer feedback.

2.3 Revision

This lesson plan focuses on teaching students how to utilize QuillQuick to evaluate and enhance their drafts in order to acquire self-revision skills. The approach places a strong emphasis on self-directed learning, where students actively use the AI tool to identify and fix grammatical errors, poor word choice, and excessively complicated sentences in their own work. The lesson presents QuillQuick as a revision tool and explains how it may identify typical writing issues like complex sentence construction or imprecise wording. Before moving on to their own work, students practise with a sample draft that includes deliberate errors. They then use QuillQuick's suggestions to improve and streamline their writing. Peer review opportunities, where students share drafts and offer extra feedback to one another, are incorporated into the class to further emphasise the value of both individual and collaborative revision. By directing students to concentrate on particular areas for development, QuillQuick's Guided Revision Mode which provides step-by-step prompts and tailored feedback supports active learning and aids in the development of critical writing abilities for both academic and professional settings. This approach encourages students to take responsibility for their writing by combining AI with conventional revision techniques, which enhances both the technical grammar and overall intelligibility of the work.

2.4 Generating Draft Quickly

In order to teach students how to use QuillBot efficiently in their writing process, this session combines direct instruction, demonstration, practical experience, and reflection. After outlining the advantages of using QuillBot to produce quick drafts, the instructor gives a live demonstration of how the program can transform a prompt into an early draft. After that, students practise independently by using QuillBot to draft their work on certain subjects. This enables them to observe how the AI responds to various writing challenges. The lesson then reinforces the value of critical thinking and argumentation by asking students to concentrate on developing one main point from their draft and enhancing it with more information or supporting data. Throughout, there are reflection and discussion exercises to help students examine how QuillBot helps with the draughting process and how they might utilize it to get better at writing. By focussing on the more advanced abilities of argument formulation and revision, students should be able to apply AI to boost their writing by the end of the course.

2.5 Multilingual Writing Assistance

This lesson's teaching strategies emphasise peer cooperation, practical experience, and interactive learning. A live demonstration of QuillQuick's capabilities, such as paraphrase, translation, and grammar correction, follows the direct instruction that introduces these features at the beginning of the course. After that, students work through real-world tasks using QuillQuick to translate and paraphrase text while receiving immediate feedback on how tone and meaning are preserved between languages. After that, students complete a grammar correction activity in which they use QuillBot's grammatical feedback tool to improve their writing and find and fix common mistakes. By giving students, the opportunity to comment on each other's work, peer review promotes teamwork and critical thinking. Through a combination of solo practice, group discussion, and reflection, the class makes sure that students use QuillBot's capabilities in ways that improve their language and writing abilities.

2.6 Collaborative AI for Team Writing

This lesson plan's techniques focus on active, hands-on learning by utilising QuillBot's AI-powered features, including as grammar correction, summarisation, and paraphrase. To help students grasp QuillBot's potential, the class starts with a live demonstration of how it operates. Individual exercises where students use the technology to summarise lengthy texts, paraphrase passages, and fix grammar mistakes in their work come next. Peer review and group projects, where students use QuillBot's features to improve each other's writing and promote critical thinking and feedback sharing, highlight the collaborative element. With an emphasis on enhancing writing quality through repeated practice, AI-assisted refining, and helpful peer criticism, these approaches promote both autonomous and cooperative learning.

2.7 Evaluation of Students' Work

Students' written work will be evaluated based on a comprehensive set of criteria designed to assess their overall writing proficiency. The first criterion is holistic reading evaluation, which considers the overall coherence and effectiveness of the piece. This includes the clarity of ideas, the writing's ability to achieve its intended purpose, and the overall impact it leaves on the reader. A

well-written piece should communicate its message effectively and engage the audience with its depth and precision.

Fluency is another key criterion, focusing on the smoothness and flow of the writing. This involves logical transitions between sentences and paragraphs, a consistent tone and style, and an engaging rhythm that makes the text easy to read. Writing that flows well maintains the reader's interest and ensures that ideas are communicated seamlessly. The evaluation also includes mechanics, which emphasize technical accuracy in spelling, punctuation, and capitalization. Proper mechanics ensure that the writing is polished and free from distractions caused by errors. Students are expected to adhere to standard conventions of writing, which reflect attention to detail and mastery of language fundamentals.

Development assesses the depth and breadth of ideas within the text. This includes the richness and relevance of content, the level of elaboration through examples and evidence, and the coherence of ideas as they connect to form a unified argument or narrative. A well-developed piece demonstrates critical thinking and the ability to explore topics thoroughly. Sentence structure is evaluated based on the correctness and variety of sentence construction. Students are expected to use diverse sentence types while maintaining clarity and grammatical accuracy. This includes proper use of tenses, subject-verb agreement, and modifiers, ensuring that sentences are both clear and engaging.

Finally, vocabulary is assessed to measure the range and appropriateness of word choice. Effective writing incorporates a diverse vocabulary that avoids repetition and selects precise words to convey meaning accurately. Additionally, words should align with the tone, audience, and purpose of the writing, demonstrating the writer's linguistic competence. By assessing these aspects, the evaluation process ensures a holistic understanding of students' writing strengths and areas for improvement, guiding them toward enhanced proficiency.

This rubric provides a holistic evaluation framework to assess students' writing skills based on fluency, mechanics, development, sentence structure, and vocabulary. Each category is scored on a scale of 1–5, with descriptions for performance levels (Table 2).

Table 2
Writing descriptors according to proficiency level

Criteria / Scale	5 Excellent	4 Good	3 Moderate	2 Needs help	1 Needs work
First reading (holistic evaluation)	Fully and easily meets objective	Meets objective	Meets most of objective	Still needs some help to meet objective	Needs a lot of work
Fluency	Very extensive (about 400 words); 5 paragraphs on topic	Extensive. (350 - 250 words);4 paragraphs on topic	A group sentences about 200 - 170 words broadly related to topic	Related ideas, but not coherent as a paragraph	Does not meet basic requirements
Mechanics	Paragraph indentation. Good control of spelling and basic punctuation	Paragraph indentation. Occasional errors in spelling and punctuation	Paragraph indentation. Errors in spelling or punctuation, but meaning is clear.	Difficult to understand due to errors in spelling or punctuation.	Meaning overwhelmed by errors in spelling or punctuation.
Development	A coherent essay on a developed topic. Has topic sentence, examples and an ending	A coherent essay. Has a topic sentence and end. Some development	A coherent paragraph organized on one theme. Integrates limited examples	A paragraph or several single unrelated paragraphs strung together. Fully lacking in development.	No coherence. Unable to determine direction/purpose of writer.
Sentence structure	Usually accurate in simple and compound sentences. Complete subject and verb; subject shows person and number, accurate use of present, past and future forms, subject matches verb.	Some control of simple sentences. Complete subject and verb; subject shows person and number; present, past and future forms evident but occasional problems, subject matches verb.	Errors in simple and compound sentences, but still able to be understood. May have some missing subject or subject may not match verbs. Verbs may not always reflect time.	Errors impede understanding of some of passage	No evidence of correct structures.
Vocabulary	Demonstrates variety in vocabulary	Able to address topic clearly	Adequate to address theme but only in a narrow sense	Limited vocabulary causes awkward sentences	Very limited vocabulary. Unable to form correct sentences

3. Results
3.1 Findings and Discussion

Across all ten secondary schools in Melaka, SMK A, SMK B, SMK C, SMK D, SMK E, SMK F, SMK G, SMK H, SMK I and SMK J, there is an average improvement of +1.2 points across all criteria, showing the effectiveness of the QuillQuick intervention. The greatest improvements were seen in fluency and development, reflecting stronger coherence and expanded essay lengths post-intervention. Mechanics and vocabulary also showed significant progress, but these remained slightly lower than fluency and development, suggesting areas for ongoing focus. Table 3 provides a clear overview of student progress and highlights areas for potential improvement in future interventions.

Table 3
Student Writing Improvement Across Ten Secondary Schools in Melaka

School	Fluency (Pre)	Fluency (Post)	Mechanics (Pre)	Mechanics (Post)	Development (Pre)	Development (Post)	Sentence Structure (Pre)	Sentence Structure (Post)	Vocabulary (Pre)	Vocabulary (Post)	Overall Improvement
SMK A	3.0	4.2	2.8	4.0	3.1	4.3	2.9	4.1	3.0	4.2	+1.2
SMK B	2.7	4.0	2.6	3.8	2.9	4.1	2.7	3.9	2.8	4.0	+1.2
SMK C	3.2	4.4	3.0	4.2	3.3	4.5	3.1	4.3	3.2	4.3	+1.1
SMK D	2.9	4.1	2.7	3.9	3.0	4.2	2.8	4.0	2.9	4.1	+1.2
SMK E	2.6	3.9	2.5	3.7	2.8	4.0	2.6	3.8	2.7	3.9	+1.3
SMK F	3.1	4.3	3.0	4.1	3.2	4.4	3.0	4.2	3.1	4.3	+1.2
SMK G	2.8	4.0	2.6	3.8	3.0	4.2	2.7	4.0	2.8	4.0	+1.2
SMK H	3.0	4.2	2.9	4.0	3.2	4.3	2.9	4.1	3.0	4.2	+1.2
SMK I	2.7	4.1	2.5	3.9	2.8	4.2	2.7	4.0	2.8	4.1	+1.3
SMK J	2.9	4.0	2.7	3.8	3.0	4.1	2.8	3.9	2.9	4.0	+1.1

The implementation of QuillQuick in the classroom demonstrated a notable increase in student engagement with writing tasks. Qualitative data shown above, including student reflections, peer feedback, and teacher observations, indicated that students were more invested in their writing activities when aided by QuillQuick. Many students described QuillQuick as "motivating" and "engaging," suggesting that the tool helped reduce common anxieties associated with writing. Teachers similarly observed that students were more inclined to make independent revisions and exhibited a greater willingness to experiment with different expressions and structures. Students' reflections highlighted an increased enjoyment and engagement in writing, with terms like "more confident" and "exciting to use" frequently mentioned. Observations indicated that students became less reliant on teacher feedback and displayed a proactive approach to revising their work, signaling a shift toward greater self-directed learning. These findings suggest that QuillQuick can enhance student engagement by fostering a supportive environment where students feel empowered to explore and refine their writing without fear of judgment.

QuillQuick's ability to suggest synonyms and alternative phrases contributed to a noticeable improvement in students' vocabulary usage. Analysis of student drafts revealed an expansion in lexical variety, as well as a more nuanced approach to word choice. Students reported that QuillQuick's suggestions exposed them to new vocabulary, which they began to incorporate into their writing, enhancing both clarity and expressiveness. A comparison of initial and revised drafts showed that students utilized a wider range of vocabulary, often replacing simple terms with more sophisticated alternatives. Student reflections underscored the value of learning context-appropriate vocabulary, with many stating that QuillQuick "helped me sound more professional" and "introduced better word choices."

This aspect of the findings aligns with the research objective of enhancing vocabulary usage, as students gained both an expanded vocabulary and a more refined understanding of word selection in different contexts. QuillQuick's real-time grammar feedback facilitated improvements in grammatical accuracy and sentence structure, as evidenced by the reduction of common errors in student drafts. Teacher observations noted a decline in issues such as subject-verb agreement, punctuation errors, and tense inconsistencies. Many students expressed appreciation for QuillQuick's grammatical corrections, describing it as "helpful for spotting mistakes" and "useful for making sentences clearer." Reflections indicated that students valued QuillQuick's role in highlighting errors, which allowed them to build a stronger understanding of grammatical conventions. These improvements in grammar align closely with the study's objective of enhancing students' grammatical proficiency, as QuillQuick encouraged students to apply correct structures and revise with greater confidence.

The findings underscore the positive impact of QuillQuick on student engagement, suggesting that it can help shift students from passive to active participants in their learning. QuillQuick allowed students to engage with their writing tasks in a more autonomous manner, fostering a sense of ownership over their revisions and reducing reliance on immediate teacher intervention. This observed increase in engagement and independence is consistent with literature indicating that technology-enhanced feedback can encourage students to take greater initiative in the learning process [7]. QuillQuick's ability to provide supportive, non-judgmental feedback appears to have created a learning environment in which students felt free to experiment and improve.

QuillQuick's impact on vocabulary acquisition is another significant finding of this study. By offering contextual word suggestions, QuillQuick enabled students to expand their lexical range and learn nuanced vocabulary usage. This contextual approach to vocabulary development is critical, as students not only gained new words but also learned how to apply them effectively within different contexts. Such findings align with studies that emphasize the importance of vocabulary exposure and

context-based learning for meaningful language acquisition [8]. The observed increase in students' lexical variety and precision indicates that QuillQuick can serve as a valuable resource in vocabulary instruction, allowing students to make more informed and expressive word choices.

The enhanced grammatical accuracy in student writing provides strong evidence for the potential of QuillQuick to improve students' understanding of grammar. QuillQuick's instant feedback enabled students to correct errors as they occurred, reinforcing grammatical rules and structures through practical application. Teachers noted that students appeared to internalize these rules over time, as evidenced by the reduction in repeated errors across drafts. This process aligns with cognitive theories of learning that emphasize the importance of immediate feedback in error correction and skill acquisition [9]. The use of QuillQuick to support grammar instruction thus holds promise for helping students develop a stronger foundation in grammatical conventions, especially in contexts where individual feedback may be limited.

The integration of QuillQuick has contributed positively to students' overall writing proficiency, meeting the study's objectives of enhancing grammar, vocabulary, and engagement. By addressing fundamental components of writing, QuillQuick provided a comprehensive support system that allowed students to approach writing with greater confidence and skill. This finding suggests that QuillQuick-based feedback mechanisms can be effectively integrated into writing curricula to support students in achieving higher levels of writing competence. Moreover, the reduced stigma associated with AI-driven corrections may encourage students to view the writing process as iterative, thus fostering a growth-oriented mindset.

Table 4
Tools for Understanding the Process of Grammar Improvement

ASPECT	DESCRIPTION	PURPOSE	KEY OUTCOMES
1. Student Reflections	Students share their experiences with AI tools, focusing on what they learned and challenges faced.	Understand student perspective and engagement.	Insight into how students perceive grammar improvement and the impact of AI tools on their writing.
2. Revised Writing	Students submit drafts revised using AI feedback and peer suggestions.	Evaluate progress in grammar and clarity.	Evidence of applied learning, showing changes in sentence structure and grammar accuracy.
3. Peer Feedback	Students review and provide constructive comments on their peers' work, focusing on grammar and style.	Encourage collaboration and critical thinking.	Highlights shared learning, identifies common challenges, and reinforces correct grammar usage.
4. Teacher Observations	Teachers monitor engagement during activities and review student revisions and feedback sessions.	Provide guidance and assess overall progress.	Ensures alignment with learning objectives and identifies areas

3.2 Longitudinal Study
3.2.1 Sustained engagement and autonomy in writing

Over multiple writing sessions, a clear pattern emerged: students' engagement with QuillQuick tools increased consistently. Initial observations highlighted a novelty-driven motivation to explore the tool, which evolved into a sustained interest in improving writing quality. For example, in early sessions, students primarily relied on QuillQuick for error correction. However, longitudinal data show a gradual shift toward proactive experimentation with language and sentence structure, suggesting a deepening of intrinsic motivation. Teacher observations across different writing tasks

confirmed that students became progressively less reliant on teacher-led feedback, instead leveraging QuillQuick's suggestions to independently refine their work. This aligns with longitudinal studies showing that consistent exposure to supportive tools fosters self-directed learning over time.

3.2.2 Vocabulary growth through contextual learning

A longitudinal analysis of student writing drafts revealed an incremental yet substantial improvement in vocabulary usage. In the initial phases, students incorporated a limited number of QuillQuick-suggested synonyms into their work. However, repeated observations across subsequent tasks showed an expanded lexical range, with students confidently integrating advanced vocabulary into their writing. By the end of the study, the majority of students demonstrated an ability to use new words contextually, as reflected in peer feedback and teacher evaluations. Notably, reflective journals collected at various intervals revealed that students increasingly valued this aspect of the tool, describing it as a means to "sound more professional" and "express ideas more clearly." These findings underscore the cumulative benefits of regular interaction with AI-driven vocabulary tools.

3.2.3 Progressive improvement in grammatical accuracy

Over time, longitudinal data revealed a marked reduction in common grammatical errors, such as subject-verb agreement and tense inconsistencies, across student drafts. In early observations, students often relied on QuillQuick to highlight and correct these errors. However, by the later stages of the study, students began internalizing grammatical conventions, as evidenced by a significant decrease in repeated errors. Teacher logs noted that students displayed increased confidence in their grammar skills during peer-review sessions, suggesting that the iterative feedback process reinforced learning over time. These observations align with cognitive learning theories that emphasize the role of consistent practice and immediate feedback in achieving mastery.

4. Conclusions

The findings of this study underscore the efficacy of QuillQuick in enhancing writing proficiency among secondary school students in ten schools in Melaka. By addressing critical challenges such as paraphrasing, grammar, vocabulary, and idea generation, QuillQuick has proven to be a valuable resource in developing essential writing skills. The tool facilitated increased student engagement, confidence, and ownership of their writing. Students appreciated the non-judgmental, supportive feedback provided by QuillQuick, which enabled them to make independent revisions and approach writing with a proactive mindset. This research highlights QuillQuick's capacity to cater to the diverse needs of secondary students, who exhibit varying levels of language proficiency, learning styles, and educational backgrounds. The tool provided adaptive learning experiences tailored to individual needs, offering personalized exercises and feedback to support students facing different writing challenges, including English language learners (ELLs) and those with learning disabilities.

In addition to fostering engagement and confidence, QuillQuick significantly impacted vocabulary development and grammatical accuracy. Students expanded their lexical range and applied more nuanced word choices, resulting in clearer and more engaging writing. The real-time grammar feedback improved their understanding of sentence structure and syntax, facilitating the internalization of grammatical rules over time. The study advocates for the integration of interactive tools like QuillQuick into writing curricula, suggesting that such tools can effectively address the complex needs of young writers. Future research could explore QuillQuick's potential in diverse

educational settings and its long-term effects on writing development, contributing to the growing body of research on technology-based writing interventions.

While QuillQuick has demonstrated success in improving writing skills, it is essential to address the potential risk of students becoming overly reliant on AI tools. Encouraging the use of QuillQuick alongside independent writing practice can help sustain students' progress. Combining conventional and technology-based methods, such as free writing, peer evaluations, and group discussions, allows QuillQuick to serve as a supplementary tool rather than the sole solution. Promoting introspection and critical thinking is also crucial. Teachers can help students identify recurrent mistakes and develop self-management strategies by guiding them in analyzing QuillQuick feedback. This balanced approach ensures that students develop robust writing skills that extend beyond the use of technology, fostering a growth-oriented mindset and enhancing their overall academic and professional competence.

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