

Exploring an Artificial Intelligence as Automated Feedback Program in EFL Writing

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Abstract. This study investigates the effectiveness of Artificial Intelligence (AI) tools, namely Grammarly, QuillBot, and Ginger Software, in providing automated feedback for English as a Foreign Language (EFL) writing among Indonesian undergraduate students. It examines the potential of these AI-powered applications in identifying and correcting grammatical, punctuation, and clarity issues and paraphrasing in student writing. This research applied a descriptive qualitative method involving document analysis and interviews. The study involved comparing these tools' corrective feedback and conducting interviews with EFL writing students to understand their perceptions of using these tools. The research findings indicate varying levels of error detection and correction suggestions across the tools, with some differences in their efficiency. While Grammarly, QuillBot, and Ginger Software show promise in enhancing EFL writing skills, the study highlights the importance of not solely relying on these tools. Key findings reveal that Grammarly excels in grammatical accuracy, QuillBot offers superior paraphrasing capabilities, and Ginger provides limited feedback in comparison. It suggests that integrating AI feedback with traditional methods of teacher and peer reviews can lead to optimal writing outcomes. The paper also discusses students' perceptions of using these tools, noting a preference for Grammarly due to its simplicity and effectiveness. Students reported improved grammar and motivation but exhibited tendencies toward over-reliance, potentially limiting critical thinking and independent writing skills. However, some students exhibited over-reliance on these tools, potentially hindering their critical thinking and independent writing skills. The study emphasizes the importance of using AI-powered tools strategically, alongside human editing and critical thinking practices, to maximize EFL writing development.

Keywords: Artificial Intelligence, Automated writing evaluation, Writing

Introduction

The advancement of contemporary technology has accelerated the expansion of human existence. A significant number of products are now equipped to deliver "intelligent services" that emulate human cognition or behavior. This is made possible through the application of machine learning techniques, encompassing both traditional and contemporary deep learning methodologies (Hwang et al., 2020). The educators' paradigm has shifted from conservatism to modernity following the transformation of the educational environment. Technology has contributed to new educational language instruction trends and language evaluation. Artificial Intelligence (AI) has redefined teaching and learning practices by enabling more adaptive, personalized, and data-driven approaches, making education more inclusive and effective for diverse learners. The existence of technology has altered education and made it more engaging and convenient. In addition, instruments and media are required for students to learn English properly. According to Ahmadi, (2018), technology has revolutionized language education approaches. Technology has brought about a significant revolution in language education approaches, especially in the field of English as a Foreign Language (EFL) learning. Artificial Intelligence (AI) has emerged as a game-changer in the teaching and learning of languages. AI-powered applications and programs have made it possible for language learners to receive personalized feedback, practice speaking with virtual tutors, and engage in interactive activities that simulate real-life communication scenarios. In the specific context of EFL writing, AI tools provide immediate corrective feedback on grammar, vocabulary, and coherence, offering students invaluable support in developing their academic writing skills while addressing common challenges faced by non-native speakers. As such, AI technology has opened up new possibilities for language learners to improve their proficiency levels and achieve their learning goals more efficiently (Lee et al., 2023). Artificial intelligence has been used as a powerful tool in education. Teachers should encourage students to identify relevant activities using technology for language learning to be effective (Kessler, 2018). Adapting their learning approaches, such as through online learning, online games, YouTube, and videos, can be aided by using technology to improve students' English skills.

Technology, particularly AI-powered tools like AWE systems, has the potential to enhance writing development significantly. These tools offer immediate, personalized feedback, allowing learners to focus on specific areas for improvement and fostering autonomous learning. However, it's important to note that the effectiveness of such tools depends on various factors, including the type of feedback provided, student perceptions of the technology, and how it's integrated with other feedback sources. Recent research indicates that learners are more engaged with artificial intelligence compared to other technologies (e.g., Ferris, 2014; Zhang & Hyland, 2018). Currently, technology is required for learning academic writing. One of the main challenges of academic writing is the need for precision and accuracy in language. This can be particularly challenging for those who are not native speakers of the language they are writing in. Even for native speakers, the process of refining ideas and arguments to be more concise and precise can be time-consuming and frustrating. Writing has been identified as a crucial aspect of foreign language learning and has been extensively studied by researchers in the field (Mozaheb et al., 2013). Writing can be defined as the

process of transforming ideas into coherent and unified text through the use of language and grammatical structures (Setiawan, 2021). It plays a vital role in a student's academic life and serves an essential function by allowing students to communicate their thoughts, promote engagement, and construct logical and convincing arguments. Bou et al., (2015) stated writing is an effective technique for students to increase their vocabulary and grammar skills, enhancing their language proficiency. A pupil with solid writing skills can read and speak the text more successfully. EFL students in Indonesia must learn how to compose a sentence and build paragraphs into stories or texts with proper structure, organization, grammar, punctuation, and spelling. Based on the current curriculum of Higher Education in Indonesia, students' language skills are strongly emphasized, and students must be able to communicate both orally and in writing and understand literature widely in English.

In light of the preceding facts, lecturers should be more attuned to their students' needs. Lecturers should seek out online technology as a sophisticated linguistic tool to assist pupils with writing difficulties. Automated writing evaluation (AWE), automated essay scoring (AES), and automated written corrective feedback (AWCF) are examples of computer-based writing aids that are becoming increasingly prevalent (Nazari et al., 2021). Students should be familiar with artificial intelligence that can assist them in teaching and learning. In order to attain the desired results in developing writing skills, computer technology is utilized in language learning. Grammarly, Quillbot, and Ginger Software are online writing assistants and grammar checker tool that uses advanced algorithms and artificial intelligence to help users improve their writing.

Improving writing skills through technology has been discussed by different researchers. Technology can help language learning, including EFL writing, effectively. Using technology to teach writing in English as a Second Language has increased motivation to revise, awareness of the writing process, text productivity, language use, and paragraph development. Chen & Cheng, (2008); Little et al., (2018); Tran & Nguyen, (2021) informed that technology-based instruction has been shown to be an effective method for improving writing skills, especially for struggling writers and students in early grades. Additionally, automated writing evaluation (AWE) has been shown to have potential benefits, such as improving efficiency and providing immediate feedback, according to teachers. AI-powered tools such as Grammarly, QuillBot, and Ginger Software contribute specifically to writing instruction by offering real-time, tailored feedback on grammar, structure, and coherence, enabling students to address errors and refine their texts independently. However, concerns have also been raised regarding the impact of AWE on writing instruction and students' writing skills. Critics argue that over-reliance on AI tools can hinder students' development of critical thinking and independent writing abilities, as these tools may not always align with contextual nuances or pedagogical goals. Moreover, technology-based communication has been found to positively impact EFL students' writing skills, particularly in terms of motivation and engagement. However, challenges associated with technology-based communication were also highlighted, including the need for teacher guidance and support to ensure effective communication and writing outcomes. Overall, these studies provide valuable insights into the potential benefits and challenges of incorporating technology into writing instruction and

highlight the importance of considering pedagogical practices when designing and implementing technology-based tools in EFL writing classes.

Artificial intelligence (AI) has the potential to revolutionize education. In particular, English language learning has seen significant advancements with the application of AI, providing learners with personalized, adaptive, and interactive learning experiences. Recent research conducted in this area is reviewed by (Hwang et al., 2020; Pikhart, 2020; Sun et al., 2021) these studies explore the design and implementation of an online intelligent English teaching platform that utilizes various AI techniques to enhance the quality of language teaching. This platform encompasses automated speech recognition, natural language processing, and personalized learning paths, among other features. Computer-assisted language learning provides a comprehensive overview of the potential benefits of AI in language learning, such as personalized learning paths, automated feedback, and improved speech recognition. The primary objective of language learning is not just a mere course or learning activity, but it aims to equip English as a foreign language (EFL) learners with the necessary language skills to navigate their daily life, such as working, learning, social events, and entertainment as if they were native English speakers.

The significance of grammatical accuracy in academic writing has spurred scholarly interest in investigating the application of corrective feedback in evaluating EFL students' writing. Koltovskaia, (2020); Shang, (2022); Zhang, (2020) discussed that automated writing evaluation has been increasingly used in English language learning, and here is a review of some recent research in this field. AWE can provide a reliable and valid evaluation of students' writing, and can help improve students' writing skills. However, the study also highlights some challenges, such as the need for appropriate data and algorithms, and the potential for over-reliance on AWE and reduced teacher feedback. The research indicates that One-Page Feedback had a more positive effect on sentence-level revisions, grammatical accuracy, and lexical diversity compared to Automatic Corrective Feedback. Although no previous research did not delve into the specific impact of learner factors like proficiency and motivation on writing outcomes, these variables may contribute to the overall effectiveness of feedback interventions.

Method

Participant

A total of 63 undergraduate English language students were initially considered for participation. Following an assessment process, 30 students (23 female, 7 male) were deemed eligible and enrolled in the trial. Participants were selected based on specific criteria, including enrollment in advanced EFL writing courses. Eligibility was further determined through a screening test assessing their writing abilities to ensure that participants faced challenges in grammar, coherence, and structure areas where AI tools could provide significant support. Recruitment strategies included distributing email invitations and posting advertisements on relevant forums.

Instruments

Three AI-powered writing tools were employed in this study: Grammarly, QuillBot, and Ginger Software. These tools were selected for their distinct features,

accessibility, and popularity among EFL learners, ensuring a comprehensive evaluation of their functionalities and impact on writing development.

Grammarly: Grammarly is an AI-powered writing assistant that offers a comprehensive suite of features, including automatic writing enhancement, error suggestion, and contextual formatting (Taguma M. et al., 2018). Available on multiple devices and platforms, Grammarly supports both free and premium versions. While the free version provides basic feedback, the premium version, employed in this study, offers advanced features such as plagiarism detection and in-depth language correction.

QuillBot: One of the most widely used free paraphrase programs is QuillBot. A product from QuillBot makes paraphrasing suggestions using artificial intelligence (AI) (Dale, 2020). It is an online tool for paraphrasing text to prevent plagiarism, condensing lengthy phrases, and enhancing grammar to make writing more accurate and polished (Williams & Davis, 2017). Students, authors, bloggers, instructors, and others have all been known to benefit from this application (Di Mauro-Jackson, 2020). This tool was selected to examine its effectiveness in enhancing sentence variety and reducing redundancy in EFL writing.

Ginger Software: One of the key features of Ginger Software is its ability to detect errors related to non-native English language usage. For example, the tool can identify errors related to word choice, verb tense, and sentence structure that are common in EFL writing. The tool can also provide suggestions for how to correct these errors, which can be especially helpful for EFL writers who may be less familiar with the nuances of English language usage. Although its free version was employed in this study, Ginger's capability to detect common EFL-related errors provided valuable insights into its utility compared to the other tools.

The selection of these tools was based on their ability to address key areas in EFL writing, such as grammar accuracy, clarity, and coherence. Their varying levels of functionality allowed for a comparative analysis, offering a holistic understanding of their respective strengths and limitations. Each tool's corrections and feedback were analyzed to determine their contribution to writing development and to identify patterns of error detection and correction.

Procedure

This study employed a descriptive qualitative research approach. This research paradigm is predominantly used to describe, comprehend, and interpret phenomena (Lichtman, 2023). To gather data, this research relied on document analysis and semi-structured interviews. These methods were selected to provide a comprehensive understanding of how AI tools impact EFL writing and students' perceptions of their utility.

Document Analysis

Given, (2016) posits that documents can serve as the primary source of data for both collection and analysis. The authors aimed to report the robustness of AI-powered tools, Grammarly, QuillBot, and Ginger, as automated corrective feedback and tested them for comparison purposes. The primary data source consisted of analytical exposition texts written by 30 undergraduate Indonesian EFL students. Each student produced a sample text as part of their academic writing coursework. The original texts were analyzed for common grammatical errors, including subject-verb agreement, noun-pronoun agreement, article usage, tense consistency, and punctuation. These texts were then processed through

Grammarly (premium version), QuillBot, and Ginger Software (free version). Corrections and feedback provided by each tool were documented and categorized to compare their effectiveness in error detection and correction. To ensure consistency, each text was analyzed in its entirety, with all suggestions recorded and assessed. Particular attention was paid to the tools' ability to provide meaningful feedback on grammar, coherence, and lexical choices. Patterns of error detection were identified, and differences in feedback between tools were noted.

Interviews

Semi-structured interviews were conducted to gain in-depth insights into students' perceptions of using AI-powered tools for writing feedback. Participants were asked a series of open-ended questions focusing on their experiences with Grammarly, QuillBot, and Ginger Software. The interview questions explored areas such as ease of use, perceived accuracy of feedback, impact on writing confidence and skills, and any challenges faced while using the tools. To ensure a thorough understanding, interviews were audio-recorded and transcribed verbatim. The interviews also allowed participants to elaborate on their preferences for specific tools, highlighting both strengths and limitations of AI feedback. Feedback from the interviews complemented the findings from document analysis, offering a holistic view of the tools' effectiveness.

Findings and Discussion

Result of Documentation

To assess the reliability of the AI software in EFL writing, the author contrasted its performance with authentic writing samples processed by Grammarly, QuillBot, and Ginger Software. The samples were 30 original analytical exposition texts derived from Indonesian undergraduate Indonesian EFL students. These sample sentences and paragraphs were characterized by common grammatical errors, including subject-verb agreement, noun-pronoun agreement, article usage, tense consistency, and punctuation.

These paragraphs were tested with three online AI grammar-checking tools. Each paragraph was input into the text box of each tool, and the suggested corrections were recorded.

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| Original | Our consumption and productions habits have exceeded the threshold of the earth. everyday people are increasing. This make humans need a lot of food. However, more than one billion people throw their food without knowing many people who need hunger and malnourished. In the west African region nearly 40% of the food crisis soared, the increase was more than double the average. | |
| Grammarly | Our consumption and production habits have exceeded the threshold of the earth. Every day people are increasing. This makes humans need a lot of food. However, more than one billion people throw their food without knowing that many are hungry and malnourished. In the west African region , nearly 40% of the food crisis soared. The increase was more than double the average. | 10 detected errors; 2 suggestion |

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| Quillbot | Our consumption and production habits have exceeded the threshold of the earth. Everyday people are increasing. This makes humans need a lot of food. However, more than one billion people throw their food away without knowing how many people are hungry or malnourished. In the west African region, nearly 40% of the food crisis soared; the increase was more than double the average. | 10 detected errors |
| Ginger Softwere | Our consumption and productions habits have exceeded the threshold of the earth. Everyday , people are increasing. This makes humans need a lot of food. However, more than one billion people throw their food without knowing many people who need hunger and malnourished. In the West African region, nearly 40% of the food crisis soared, the increase was more than double the average. | 4 detected errors |

The original text has 374 characters and 60 words with 6 sentences. It has several grammatical errors. The verb tense is inconsistent. The first sentence is in the present tense, while the second sentence is in the past tense. Grammarly detected that the correct tense in the second sentence should be present tense to match the first sentence. However, QuillBot dicovered that in the second sentence, "everyday" should be changed to "every day" as it is an adverb and should be two separate words. In the third sentence, "make" should be changed to "makes" to match the singular subject "this." The word "this" is unclear who or what refers to. In the fourth sentence, "who need hunger and malnourished" should be changed to "who are hungry and malnourished." The phrase "who need hunger" does not make sense grammatically. In the fifth sentence, "the food crisis soared" is missing an article. It should be "the food crisis has soared". In addition, QuillBot suggests that the fifth sentence is incomplete as it does not specify what has increased more than double the average. Ginger had the lowest rate of error detection, it would not be surprising if its number of incorrect recommendations were low as well.

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| Original | Climate change is a significant change in climate, air temperature and rainfall, this is caused by the increase of the earth as s result of the increase in the concentration of greenhouse gases in the earth's atmosphere. Decreased water quality too high rainfall will result in a decrease in the quality of watersources. In addition, the increase in temperature also causes chlorine levels in cleanwater.Exploitation of soil by households and industry, especially deep groundwater. Then the due to the reduction in Green Open Space (RTH) which naturally becomes a filter as well as a reservoir for rainwater. Green house has effects interpreted as an increase in the earth's temperature. The increase in the earth's temperature is caused by the trapping of long wave (infrared) sunlight by greenhouse gases. | |
| Grammarly | Climate change is a significant change in climate, air temperature, and rainfall. This is | 17 detected |

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| | <p>caused by the increase of the earth as s result of the rise in the concentration of greenhouse gases in the earth's atmosphere. Decreased water quality too high rainfall will result in a decrease in the rate of water sources. In addition, the increase in temperature also causes chlorine levels in clean water. The exploitation of soil by households and industry, especially deep groundwater. Then due to the reduction in Green Open Space (RTH), it naturally becomes a filter and a reservoir for rainwater. The greenhouse effect has been interpreted as an increase in the earth's temperature. The increase in the earth's temperature is caused by the trapping of a long wave (infrared) of sunlight by greenhouse gases.</p> | errors; 2 suggestions |
| Quillbot | <p>Climate change is a significant change in climate, air temperature, and rainfall. This is caused by the warming of the earth as a result of an increase in the concentration of greenhouse gases in the earth's atmosphere. Decreased water quality: too much rainfall will result in a decrease in the quality of water sources. In addition, the increase in temperature also causes an increase in chlorine levels in clean water. Exploitation of soil by households and industry, especially deep groundwater. Then, due to the reduction in green open space (RTH), which naturally becomes a filter as well as a reservoir for rainwater, Greenhouse gas has effects interpreted as an increase in the earth's temperature. The increase in the earth's temperature is caused by the trapping of long-wavelength (infrared) sunlight by greenhouse gases.</p> | 20 detected errors |
| Ginger Software | <p>Climate change is a significant change in climate, air temperature and rainfall, this is caused by the increase of the earth as s result of the increase in the concentration of greenhouse gases in the earth's atmosphere. Decreased water quality too high rainfall will result in a decrease in the quality of water sources. In addition, the increase in temperature also causes chlorine levels in clean water. Exploitation of soil by households and industry, especially deep groundwater. Then the due to the reduction in Green Open Space (RTH) which naturally becomes a filter as well as a reservoir for rainwater. Green house has effects interpreted as an increase in the earth's temperature. The increase in the earth's temperature is caused by the trapping of long wave (infrared) sunlight by greenhouse gases.</p> | 2 detected errors |

The original text has 812 characters and 132 words with 8 sentences. Grammarly discovered in the first sentence, "increase of the earth" should be changed to "increase in the earth's temperature". In the second sentence, "Decreased water quality too high rainfall" should be changed to "Decreased water quality due to high rainfall," to clarify the cause-and-effect relationship. In the third sentence, "chlorine levels in cleanwater" should be changed to "chlorine levels in clean water." In the fourth sentence, "Green house has effects" should be changed to "The greenhouse effect has effects". In the fifth sentence, "the trapping of long wave (infrared) sunlight" should be changed to "the trapping of a long wave (infrared) of sunlight" to include the article "a".

In the other hand, QuillBot detected that original texts contain several grammatical errors. The sentence "Climate change is a significant change in climate, air temperature and rainfall, this is caused by the increase of the earth" is incomplete and lacks proper punctuation. The phrase "as s result" contains a typographical error. The phrase "watersources" should be two separate words "water sources." The sentence "Then the due to the reduction in Green Open Space (RTH) which naturally becomes a filter as well as a reservoir for rainwater" is missing a comma after "Then" and has a redundant "the." The phrase "Green house" should be "Greenhouse," and the phrase "long wave" should be "long-wavelength." Meanwhile, Ginger Software is only able to find 2 errors in the text where it is also found by Grammarly and QuillBot.

In terms of lexical density, the QuillBot suggestion text is generally more dense than the Grammarly suggestion text. The QuillBot suggestion text uses more specific and meaningful words to convey information. For example, the second text uses "warming of the earth" instead of "increase of the earth," "trapping of long-wavelength (infrared) sunlight" instead of "trapping of long wave (infrared) sunlight," and "decrease in the quality of water sources" instead of "decrease in the rate of water sources." Overall, the QuillBot suggestion text uses fewer words that are not directly related to the topic of climate change, making it more information-dense and effective in conveying information.

In discourse analysis, there are some differences in how they are structured and the information they provide. The Grammarly suggestion text appears more disjointed and less coherent than the QuillBot suggestion text. It has limited use of causal connectives. Words such as "because", "therefore", or "consequently" are largely absent. In contrast, the QuillBot suggestion text is more organized and logically flows. It is more cohesive and easier to follow. The text provided by Quillbot has better causal relationships. For example, QuillBot employs phrases like "as a result of" to establish causality, thereby enhancing logical coherence. It presents information in a clear and logical order, with clear connections between different ideas. It makes it more effective in conveying its message to readers. Regarding cohesion devices, both texts use connective words and phrases to link ideas and create a cohesive flow of information. Both texts are coherent and cohesive in presenting information about climate change, with slight differences in the complexity of language.

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| Original | Education is one of the important part that must be prioritized in building a developed country, education has many goals, one of which is to educate the nation's life. When the covid-19 |
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| | pandemic caused learning to experience many obstacles, one of which was not being able to do face to-face learning, this made it difficult for student to learn, the online system also still made some people unable to take part in learning because there was no cost to buy tools for online use, this problem still exists today. | |
| Grammarly | Education is one of the critical parts that must be prioritized in building a developed country. Education has many goals, one of which is to educate the nation's life. When the covid-19 pandemic caused learning to experience many obstacles, one of which was not being able to do face-to-face learning, which made it difficult for the student to learn. The online system also still made some people unable to take part in education because there was no cost to buy tools for online use. This problem still exists today. | 7 detected errors; 2 suggestions |
| Quillbot | Education is one of the important parts that must be prioritized in building a developed country. Education has many goals, one of which is to educate the nation's people . When the COVID-19 pandemic caused learning to experience many obstacles, one of which was not being able to do face-to-face learning, this made it difficult for students to learn. The online system also made some people unable to take part in learning because there was no cost to buy tools for online use; this problem still exists today. | 11 detected errors |
| Ginger Software | Education is one of the important parts that must be prioritized in building a developed country, education has many goals, one of which is to educate the nation's life. When the covid-19 pandemic caused learning to experience many obstacles, one of which was not being able to do face to-face learning, this made it difficult for students to learn, the online system also still made some people unable to take part in learning because there was no cost to buy tools for online use, this problem still exists today. | 2 detected errors |

The Grammarly suggestion text contains 519 characters, 89 words, and 5 sentences, making it longer and more complex than the original text. In contrast, the original text consists of 513 characters, 89 words, and only 2 sentences. These statistics demonstrate that the suggestion text provides more information and utilizes a more sophisticated writing style, likely aiming to convey the information more clearly and concisely. There are several grammatical errors discovered by Grammarly. The first sentence lacks a comma between "part" and "that", which can cause confusion for the reader. Grammarly suggests changing "important" to "crucial". There is also a missing verb after "nation's life" in the second sentence. In the third sentence, "student" should be pluralized to "students". "The online system also still made" is grammatically incorrect and should be replaced with

"The online system also made it difficult." The last sentence is also a run-on sentence, which can make it challenging to read. Overall, the suggested text appears to be an improvement upon the original text in terms of coherence and readability.

QuillBot corrected the grammatical errors of the original text. It changed "important part" to "important parts," "nation's life" to "nation's people," and "student" to "students." It also added a semicolon before "this problem still exists today" to separate it into two sentences. However, surprisingly Ginger only focuses on plural and singular correction. On the other hand, Ginger is another grammar correction tool that focuses mainly on identifying and correcting plural and singular noun errors. While QuillBot provides more comprehensive corrections, Ginger is a tool that is more specialized in identifying and correcting basic grammatical errors. It is important to note that neither of these tools is perfect, and it is always important to review and edit your text manually to ensure that it accurately conveys your intended message.

In terms of discourse analysis, both texts are discussing the importance of education in building a developed country, with a focus on the challenges posed by the COVID-19 pandemic. However, the second text is more coherent and cohesive as it maintains a consistent focus on education throughout and uses transition words such as "when" and "also" to connect ideas.

In terms of cohesion and coherence, the second text is also more coherent as it maintains a consistent focus on education throughout and uses transition words such as "when" and "also" to connect ideas. Additionally, it uses parallel structure in the sentence "Education is one of the important parts that must be prioritized in building a developed country. Education has many goals, one of which is to educate the nation's people." This parallel structure helps to emphasize the importance of education and create a cohesive structure.

In terms of lexical density, the second text is more lexically dense as it uses more specific vocabulary and avoids repetition. For example, it uses "students" instead of "student," "learning" instead of "education," and "tools for online use" instead of "tools for online." This use of specific vocabulary contributes to the text's clarity and precision.

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| Original | Water is one of the most important human needs and is needed by all aspects of society, both for bathing, drinking, cooking, etc. However, in real life there are many sections of society that have not been able to meet their basic needs. One of them is the basic human need for water, humans who lack are willing to take dirty water due to the limited availability of clean water. It is necessary for each individual to be aware of the importance of managing water or sanitation resources and also providing adequate services for everyone. Especially for people who need clean water in barren lands or deserts like in Africa. This must be followed up immediately because it greatly affects human survival. | |
| Grammarly | Water is one of the essential human needs and is needed by all aspects of society for bathing, | 3 detected |

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| | drinking, cooking, etc. However, in real life , many sections of society need help to meet their basic needs. One of them is the basic human need for water. Humans who lack are willing to take dirty water due to the limited availability of clean water. Each individual must know the importance of managing water or sanitation resources and providing adequate services for everyone, especially for people who need clean water in barren lands or deserts like in Africa. This must be followed up immediately because it dramatically affects human survival. | errors; 12 suggestions |
| Quillbot | Water is one of the most important human needs and is needed by all aspects of society, both for bathing, drinking, cooking, etc. However, in real life , there are many sections of society that have not been able to meet their basic needs. One of them is the basic human need for water; humans who lack it are willing to take dirty water due to the limited availability of clean water. It is necessary for each individual to be aware of the importance of managing water or sanitation resources and also providing adequate services for everyone. Especially for people who need clean water in barren lands or deserts like in Africa. This must be followed up immediately because it greatly affects human survival. | 3 detected errors |
| Ginger Software | Water is one of the most important human needs and is needed by all aspects of society, both for bathing, drinking, cooking, etc. However, in real life there are many sections of society that have not been able to meet their basic needs. One of them is the basic human need for water, humans who lack are willing to take dirty water due to the limited availability of clean water. It is necessary for each individual to be aware of the importance of managing water or sanitation resources and also providing adequate services for everyone. Especially for people who need clean water in barren lands or deserts like in Africa. This must be followed up immediately because it greatly affects human survival. | no detected errors |

In this text, Grammarly gives 12 suggestions. Grammarly seems the first sentences may be unclear and hard to follow. So Grammarly considers rephrasing. There are 646 characters, 108 words, and 6 sentences. The first text has several grammatical errors. "However, in real life there are many sections of society that have not been able to meet their basic needs" has an unnecessary "that" after "society." "Humans who lack are willing to take dirty water" should have "lack water" instead of "lack" alone. "It is necessary for each individual to be aware of the importance of managing water or sanitation resources and also providing adequate services for everyone" has an unnecessary "also" after "sanitation

resources." Lastly, "Especially for people who need clean water in barren lands or deserts like in Africa" is a fragment sentence. The text suggested by Grammarly is cohesive and coherent as it flows logically from one sentence to another. It also has a high lexical density as it uses precise and specific vocabulary to convey meaning.

When comparing the two texts between Grammarly and QuillBot, there do not seem to be any significant grammatical errors in either one. However, there are some minor differences between them. For instance, QuillBot uses a semicolon to separate two related clauses, whereas Grammarly uses a period and a conjunction. Both texts have a similar structure and convey the same message, as seen in discourse analysis. Additionally, the coherence and cohesion of both texts are well-organized and easy to follow. They both use transitional phrases to connect ideas and paragraphs smoothly. Both texts have a range of vocabulary to convey their message effectively, with QuillBot utilizing slightly more complex words and phrases. Overall, while both texts are well-written and convey their message effectively, QuillBot has a slightly more complex structure and uses more advanced vocabulary.

As shown in the table, Ginger again outperformed the other two grammar checkers. It missed the fewest errors, making it the least effective software. Given Ginger's low error detection rate, it is not surprising that it also had a low rate of incorrect suggestions. This likely explains why the free version of Ginger did not identify the fragment error, resulting in no feedback. However, it should be noted that the results are based on limited sample size, and further testing with a larger sample may yield different results. Additionally, it is important to consider the specific context and purpose of the writing when selecting a grammar checker. Some checkers may be better suited for certain types of writing or for non-native English speakers. Therefore, it is recommended to use multiple grammar checkers and human editing to ensure the highest level of accuracy and effectiveness in writing.

Result of Interview

In this research, Interviews were conducted to explore in-depth information about students' perceptions of feedback from AI power in writing. The researcher interviewed a few participants about their experience using Grammarly, QuillBot, and Ginger. The interviews aimed to gain insight into how students perceived the feedback provided by these AI-powered writing tools. Participants were asked a series of questions about their experiences with each tool, including their thoughts on the effectiveness of the feedback and the ease of use of the software. The interviews also explored the participants' attitudes towards AI in general and whether they preferred receiving feedback from a human or a machine.

The interviews conducted provided valuable insights into students' perceptions of feedback from AI-powered writing tools, highlighting both strengths and weaknesses of these tools. Nonetheless, further research is needed to investigate how feedback from these tools can be improved to better **support students' writing development**. The open-ended interviews revealed that students found the implementation of artificial intelligence in text writing to be beneficial. With AI, they could independently evaluate their writing, instantaneously examining their grammatical structures, mechanics, and spelling, as well as the

organization and content of their writing. As a result, this activity significantly challenged and motivated them. The following is an excerpt from the interview.

"As a writer who values clear and concise communication, I have found that utilizing both Grammarly and Quillbot has been highly beneficial for me. Grammarly is my go-to tool for checking grammar, spelling, and punctuation errors in my writing. On the other hand, I use Quillbot more frequently for paraphrasing text to make it more concise and engaging. Both software tools have helped me improve my writing skills, ensuring that my writing is grammatically correct, easy to understand, and accurate. By using these tools, I am able to produce high-quality work efficiently. Overall, utilizing both Grammarly and Quillbot has helped me become a better writer, allowing me to communicate my ideas effectively and efficiently. In terms of Ginger, I did not use it for writing"

Moreover, the open-ended interviews conducted with EFL writing students revealed that they exhibited **increased motivation and enthusiasm** towards writing as a result of the EFL teaching and learning process, which in turn resulted in significant improvements in their EFL writing skills. This positive outcome was attributed to the integration of corrective feedback tools such as Grammarly, QuillBot, and Ginger in the EFL writing classes. To provide a glimpse of the interview findings, the following excerpt is presented. The following is an excerpt from the interview.

"Ever since I discovered the existence of these applications, my confidence in academic writing has significantly increased. Whenever I receive an assignment, I always make it a point to run my writing through this application to gauge my grammar and punctuation accuracy. This application is beneficial in providing valuable feedback. As a result, my motivation to complete any writing assignment has grown stronger. In addition, I am also very enthusiastic about writing texts, especially working in groups. I just enjoy the peer review process"

The interview findings aligned with the perceived **strengths and weaknesses** of using AI-powered tools in writing as experienced by the students. Through these interviews, the researcher was able to develop a more profound comprehension of how students view the effectiveness of these learning systems in supporting their academic pursuits. The following is an excerpt from the interview.

"Having used the free version of Grammarly previously, I decided to try out the premium version for my current writing assignment. While the feedback provided by the free version was helpful, I found that it wasn't sufficient in assisting me to write a text. In my opinion, the most significant advantage of Grammarly Premium is its ability to provide suggestions on conciseness and clarity, which are not available in the free version. As a result, my writing has become more fluid and easier to comprehend since utilizing Grammarly Premium"

During the interviews, another student mentioned that **QuillBot offers more than just grammar** checking. This student pointed out that the paraphrasing function is particularly useful for writers who want to restructure their sentences without the risk of plagiarism. In essence, QuillBot's versatility is what sets it apart from other grammar-checking tools. Below are some excerpts from the student interviews that highlight the significance of QuillBot's various functions in academic writing.

"I find QuillBot to be an impressive AI tool that offers a variety of features, such as paraphrasing, summarizing, and grammar checking. Even with a free account, I have access to these features, which I find particularly useful. In comparison, Grammarly only provides grammar checking, which is a significant limitation. During my English studies, I found myself using QuillBot more frequently than Grammarly due to its versatility. While I have heard about Ginger software, I find QuillBot's

user interface to be more accessible and appealing. Overall, QuillBot's range of functionalities and user-friendly interface makes it an excellent option for those seeking an efficient and effective AI-powered writing tool"

According to the results of in-depth interviews, it was found that respondents had become **dependent on the use of AI-powered** tools for corrective feedback. Despite the availability of more detailed suggestions from tools like Grammarly, Quillbot, and Ginger Software, respondents often did not explore them, instead relying on the suggested revisions provided by the applications. The respondents believed that the revisions provided by the tools were appropriate and correct. The following is an excerpt from the interview.

"With a way of working fast, Grammarly and Quillbot make me addicted. I am not compelled to study the errors in my text. Grammarly provides proper revisions for all errors. I just had to click on the wrong word, which was automatically replaced with a more appropriate one"

Furthermore, the interviews also revealed that relying heavily on AI-powered corrective feedback can have **an adverse impact on the learners' ability to write independently**. This dependence on technology may hinder their development of critical writing skills, as they may not be challenged to think critically about their writing or to engage in a more active editing process.

"I have found that using only a free account has provided me with sufficient feedback. Not only can I correct writing errors with this application, but it also displays the score of my articles, allowing me to determine the quality of my writing. However, I have encountered some difficulty in understanding the suggestions provided by the AI-powered system in certain aspects of my writing"

During the research, it was found that some respondents disagreed with the notion that Grammarly, Quillbot, and Ginger had 100% grammatical accuracy, while the majority of students agreed with this statement. Upon conducting interviews, it was revealed that some respondents claimed that Grammarly did not have a 100% grammatical accuracy rate. Although they acknowledged the tool's high degree of accuracy, they pointed out that it could still provide incorrect advice. The following excerpt from one of the interviews further explains this viewpoint.

"I usually don't follow all the suggestions given by Grammarly, Quillbot, or Ginger. While these AI-powered tools can be helpful, I sometimes find that their suggestions don't make sense. For instance, when I want to write a sentence in the past tense, they may suggest changing it to the present tense. Therefore, I only follow the suggestions that I believe are correct, rather than blindly accepting all of them"

The comparison of grammar-checking tools yielded some interesting results. QuillBot, Grammarly, and Ginger were evaluated, and it was found that QuillBot outperformed the other two tools regarding grammar checking. Specifically, QuillBot offered more suggestions for corrections compared to Grammarly and Ginger. While Ginger's free version detected a few errors in the same paragraph, only one of its suggestions was correct, with the other three needing to be corrected. Despite being the most reliable grammar feedback program according to paragraph-level tests, QuillBot must be completely accurate.

In addition, Grammarly emerged as the effective tool overall for addressing fundamental writing issues like grammar, spelling, and sentence clarity. Its combination of accuracy and user-friendliness made it the preferred choice for improving general writing quality. However, QuillBot stood out as a complementary tool, excelling in paraphrasing and enhancing textual coherence, making it ideal for more advanced revisions. Ginger Software, while functional,

was deemed less impactful due to its narrower scope and limited feedback capabilities.

Despite the fact that the comparison of grammar-checking tools revealed that QuillBot is the most reliable program, there are still some limitations to address. For example, the evaluation was based on tests at the paragraph level, and it is unclear whether the same outcomes would be obtained at the sentence or word level. Moreover, although QuillBot was discovered to suggest more corrections than Grammarly and Ginger, it is possible that some of the corrections are not applicable in certain contexts. This emphasizes the need for additional research into the precision and effectiveness of AI-Powered in various contexts and for various writing styles. Additionally, it may be beneficial to investigate other grammar-checking tools to determine if there are other applications that provide a more thorough and accurate solution. Overall, the results of this comparison are encouraging and suggest that QuillBot could be a useful tool for writers seeking to improve their writing accuracy.

Discussion

The study aimed to evaluate the performance of artificial intelligence software in enhancing EFL writing skills among Indonesian undergraduate students. Specifically, it sought to analyze the tools' error detection rates, the quality of their feedback, and their impact on student perceptions and writing development. The results show that all three software detected errors in the original text. In terms of specific errors, Grammarly detected errors in verb tense and subject-verb agreement, while QuillBot detected errors in punctuation and word choice. Ginger Software, on the other hand, detected fewer errors, but it also missed some errors detected by the other two software. The study also found that different software offered different types of suggestions for corrections. For example, Grammarly identified subject-verb agreement issues, such as suggesting "This makes humans need a lot of food" instead of "This make humans need a lot of food." Its focus on clarity and conciseness was evident in recommendations like "increase in the earth's temperature" rather than "increase of the earth." This reflects Grammarly's prioritization of correctness and fluency in standard academic English. In the other hand, QuillBot relies on advanced natural language processing which enable it to excel in paraphrasing and lexical improvements. For instance, it restructured "throw their food without knowing many people who need hunger and malnourished" to "throw their food away without knowing how many people are hungry or malnourished," offering a clearer and more polished alternative. These differences in suggestions could be attributed to the differences in algorithms and language models used by the software.

The study suggests that artificial intelligence software can be a useful tool for detecting and correcting grammatical errors in EFL writing. The researcher discovered that students' use of AI-powered apps, such as Grammarly, depends on several factors, including their attitudes towards usage, ease of use, and usability. It was found that the majority of students prefer Grammarly due to its simplicity and ease of use. This finding was consistent with previous research by (Karyuatry & Rizqan, 2018), which demonstrated that using Grammarly as a teaching tool had significant benefits, including increased student engagement and reduced criticism of their compositions. In addition, (O'Neill & Russell, 2019) states respondents

understood the significance of receiving grammatical feedback on their assignments, perceived they had received sufficient assistance from Grammarly, and found the suggestions useful and simple to comprehend. However, it is also important to note that different software may have different levels of accuracy and may offer different suggestions for corrections. As such, it is recommended to use multiple software or to manually review the suggestions made by a single software to ensure the accuracy of the corrections.

In terms of grammatical errors, it is apparent that all three software were able to detect several mistakes, including verb tense inconsistency, unclear references, missing articles, typos, and other errors. However, there were also discrepancies in their suggestions. For example, Grammarly suggested changing "increase of the earth" to "increase in the earth's temperature" while QuillBot suggested changing it to "warming of the earth." Meanwhile, Ginger software detected fewer errors and provided fewer suggestions. Regarding lexical density, the QuillBot suggestion text appeared to be more information-dense compared to the Grammarly suggestion text. The QuillBot text used more specific and meaningful words to convey information, resulting in fewer words that are not directly related to the topic of climate change. In terms of discourse analysis, the QuillBot suggestion text appeared to be more organized and logically flowed compared to the Grammarly suggestion text, which appeared disjointed and less coherent. Both texts used cohesive devices to link ideas, but the QuillBot text appeared to be more cohesive and easier to follow. Lastly, in terms of length and complexity, the suggestion texts were longer and more complex than the original texts, indicating a more sophisticated writing style that aimed to convey information more clearly and concisely. However, there were still grammatical errors and other issues that needed to be addressed.

The interviews conducted with EFL writing students shed light on their perception of using AI-powered corrective feedback tools in their writing. The majority of the respondents acknowledged that the implementation of artificial intelligence in text writing was highly beneficial for their writing development. Students reported that using these tools allowed them to examine their grammatical structures, mechanics, and spelling, as well as the organization and content of their writing. This feedback from the tools challenged and motivated them, which led to significant improvements in their writing skills.

In addition, the integration of corrective feedback tools such as Grammarly, QuillBot, and Ginger in EFL writing classes resulted in increased motivation and enthusiasm towards writing, resulting in significant improvements in the EFL writing skills of the students. While the free version of Grammarly was found to be helpful, the premium version was more efficient in assisting students in writing their texts. In comparison, QuillBot's versatility in providing paraphrasing, summarizing, and grammar checking features made it an excellent option for students seeking an efficient and effective AI-powered writing tool.

However, some students became dependent on the use of AI-powered tools for corrective feedback. Despite the availability of more detailed suggestions from these tools, some respondents often did not explore them, instead relying on the suggested revisions provided by the applications. This over-reliance on technology may hinder their development of critical writing skills, as they may not be challenged to think critically about their writing or to engage in a more active

editing process. Thus, it is essential to strike a balance between using AI-powered tools and developing critical writing skills. Further research is needed to investigate how feedback from these tools can be improved to better support students' writing development.

After conducting interviews with some of the respondents, it was observed that most of the research subjects shared the same perspective that applications like Grammarly, QuillBot, and Ginger helped identify and correct grammatical errors in their articles. However, some respondents had conflicting opinions; they felt that these applications could only correct words and did not address sentence-level issues such as the misuse of clauses and conjunctions. Respondents also expressed that while Grammarly and QuillBot were user-friendly as they highlighted errors, the feedback provided was difficult to comprehend without a good understanding of grammar.

Overall, the study suggests that while AI-powered writing tools can be helpful, they should not be used as a substitute for independent writing skills and critical thinking. While tools like Grammarly and Quillbot can be useful in helping you write more efficiently, it is important to remember that they are not infallible. Relying solely on these tools to catch errors can result in a lack of attention to detail and the potential for mistakes to slip through.

Additionally, while automated tools like these can be helpful for basic grammar and spelling errors, they may not be able to provide nuanced feedback on issues like tone, clarity, or organization. These are skills that require practice and attention to develop. Therefore, while tools like Grammarly and Quillbot can be useful supplements to the writing process, they should not be used as a replacement for careful editing and revision. It's still important to take the time to review and revise your work, even if you use these tools to help speed up the process.

Previous research in this context (e.g., Shang, 2022; Tambunan et al., 2022) reported that students often struggle to apply the correct grammatical structures when relying solely on Automated Corrective Feedback (ACF). This difficulty arises largely from an incomplete understanding of the target language structures. Therefore, peer interactions for in-depth clarification become essential. Although findings indicate that learners consider peer discussions for resolving misunderstandings and specific issues in their writing, a combined approach of ACF and peer support could enhance learning outcomes. In this model, students would be notified of their mistakes by ACF while composing their text, allowing for immediate corrections. However, if doubts remain about ACF's feedback or a complete grasp of the language structure is still lacking, students could seek guidance from more proficient peers after completing their writing.

However, Ranalli, (2021) stated that it is important to consider the possibility of accidental activation, particularly when interpreting data related to view modes. Users may unintentionally expand content by merely clicking within highlighted sections, which could result in artificially inflated frequencies for the expanded mode. (Lee et al., 2023) have shown that AI-driven systems support learners in developing autonomy, aligning with their personal learning goals. However, much of the existing Automated Writing Evaluation (AWE) technology primarily emphasizes content response rather than addressing the essay's overall quality and contextual relevance. In another study, (Han, 2017) explores the complex interplay between students' beliefs and their engagement with Written

Corrective Feedback (WCF). The findings reveal that the relationship between learners' engagement with WCF and their beliefs is moderated by interactions and tensions among beliefs related to the individual, the task, and specific strategies.

Caruso et al., (2019) research examined the role of online tools for corrective feedback (CF) in second language acquisition. Findings suggest that these tools not only enhanced students' appreciation for the feedback process but also improved their awareness of language learning strategies. This greater literacy may empower students to make more informed decisions about their learning progress. Specifically, the dialogic feedback model, supported by an interactive coversheet, encouraged students to engage more actively, fostering self-reflection on their learning. This engagement, in turn, may deepen students' understanding of their subject and the learning process. Although studies on the effectiveness of Automated Writing Evaluation (AWE) yield varied results (Link et al., 2022) there is a growing consensus among researchers that AWE systems can significantly improve student writing quality when applied within an appropriate context (Palermo & Wilson, 2020).

The use of AI-powered apps, such as Grammarly, during the writing process, is a common practice among students. However, it is essential to remember that the role of the teacher or peer review cannot be ignored. Student-specific factors, such as proficiency level, beliefs, and attitudes regarding the efficacy and reliability of Automated Writing Evaluation (AWE), along with the point in the writing and editing process at which AWE is implemented, are essential considerations. These factors should be evaluated in conjunction with teacher-related variables to optimize AWE's impact on learning outcomes (Godwin-Jones, 2021). (Grimes & Warschauer, 2010) further support this idea and suggest that the use of AI-powered tools should be combined with teacher feedback and guidance to improve students' writing abilities. Prvinchandar & Ayub, (2013) also recommend that English teachers encourage the appropriate use of software to enhance students' writing skills. Studies have shown that relying solely on AI-powered writing tools is not sufficient and that peer review and teacher feedback are crucial components for writing improvement. According to the results of interviews conducted by (Caruso et al., 2019), AI-powered writing tools may not detect the coherence and cohesiveness levels desired by the author, indicating that relying solely on AI-powered writing may not produce the desired results. Therefore, it is essential to use a combination of AI-powered tools and teacher or peer feedback to achieve optimal writing outcomes.

Conclusion

This study aimed to evaluate the effectiveness of AI-powered tools, Grammarly, QuillBot, and Ginger Software in supporting EFL writing development among Indonesian undergraduate students. The study revealed that the use of corrective feedback tools such as Grammarly, QuillBot, and Ginger significantly improved students' writing abilities by providing immediate and constructive feedback. Specifically, it sought to analyze the tools' error detection rates, the quality of their feedback, and their impact on student perceptions and writing development. Grammarly excelled in grammar and punctuation accuracy, QuillBot stood out for paraphrasing and lexical enhancement, and Ginger Software was most effective for basic error detection, though less impactful overall. Students

reported increased motivation and engagement when using AI tools, attributing this to the immediate and detailed feedback they provided. For example, Grammarly's scoring feature encouraged students to aim for higher accuracy and clarity, while QuillBot's paraphrasing capabilities inspired creativity in rephrasing ideas. This feedback not only helped students identify and rectify grammatical errors but also fostered a greater sense of confidence in their writing capabilities. For instance, Grammarly helped students correct subject-verb agreement errors, such as changing "This make humans need a lot of food" to "This makes humans need a lot of food." QuillBot improved sentence coherence and variety, rephrasing sentences like "throw their food without knowing many people who need hunger and malnourished" to "throw their food away without knowing how many people are hungry or malnourished." These examples demonstrate how AI tools enabled students to produce clearer, more polished texts. As one participant noted, the use of these applications increased their enthusiasm for writing assignments and the peer review process, highlighting the positive impact of technology on student engagement.

Moreover, the comparative analysis of AI tools demonstrated varying levels of effectiveness in error detection and suggestion quality. Grammarly addresses grammar, punctuation, and clarity, making it highly effective for foundational corrections. However, it occasionally failed to provide contextual feedback for more complex, higher-order issues. In contrast, QuillBot stands out for its strengths in paraphrasing, enhancing coherence, and introducing lexical variety, making it ideal for advanced revisions, though it is less adept at handling detailed grammar checks. Meanwhile, Ginger Software proves useful for basic corrections, but it lacks the comprehensive capabilities and depth needed to tackle more intricate writing challenges. Together, these tools offer varying levels of utility depending on the specific writing needs. While all three tools were able to identify common grammatical errors, discrepancies in their suggestions indicated that students should consider multiple sources of feedback to ensure accuracy and coherence in their writing. Combining AI feedback with teacher-led guidance and peer reviews provides a holistic approach, balancing automation with human expertise.

In conclusion, the findings underscore the importance of incorporating AI tools in EFL writing instruction as they not only enhance grammatical accuracy but also promote student motivation and engagement. However, it is essential for educators to guide students in utilizing these tools effectively, encouraging them to critically evaluate the feedback provided. Teachers should guide students in using these tools strategically, emphasizing their role as supplements rather than replacements for human feedback. By doing so, students can develop their writing skills more holistically, preparing them for real-world communication challenges. The study advocates for further research into the long-term effects of AI feedback tools on writing proficiency and student attitudes towards writing in EFL contexts.

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