

AI-based Writing Tools: Empowering Students to Achieve Writing Success

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Abstract: Artificial Intelligence (AI)-based writing tools promise to greatly assist students in revising their writing in English. These tools are capable of analyzing grammar, spelling, punctuation, coherence, and style, offering valuable suggestions for improving writing skills. Nowadays, a variety of AI-based writing tools are available, each possessing unique features designed to enhance writing effectiveness. This paper aims to provide brief reviews of several representative AI-based writing tools. It is expected that these reviews will serve as a useful reference for students, teachers, and educators, enabling them to select and utilize AI-based writing tools that meet the needs of their specific writing goals.

1. Introduction

Nowadays, the importance of possessing strong writing skills cannot be overstated. In an increasingly competitive academic and professional environment, the ability to communicate effectively through written words has become more critical. However, teaching writing can be challenging for teachers. Firstly, writing is a complex skill that requires a blend of creativity, critical thinking, and linguistic knowledge [1] [2]. Secondly, writing is a highly personal and subjective skill, which means that teachers need to provide meaningful and tailored feedback to each student to help them improve. In larger class settings, this task can become even more challenging. With a diverse range of students, each having unique strengths and weaknesses, teachers often find it difficult to provide personalized feedback in a timely manner. Previous research suggests that writing proficiency is best enhanced through individualized feedback [3]. With the assistance of AI-based writing tools, students can obtain instant and tailored feedback to improve their writing skills [4]. This paper provides an overview of AI-based writing tools, discussing their current capabilities, challenges, and potential future prospects.

2. Typical AI-based Writing Tools

This section provides an overview of several typical AI-based writing tools, discussing their features and demonstrated effectiveness in enhancing students' writing abilities.

2.1. Grammarly

Grammarly is an innovative tool that meticulously examines linguistic errors, such as grammar, spelling, and punctuation, to ensure clarity, precision, and excellence in written English. This advanced software provides automated corrective feedback, guiding students in refining their language use and elevating the overall quality of their compositions. This integration of Grammarly into the learning process turns out to be particularly beneficial for students facing writing challenges, especially those learning English as a Foreign Language (EFL). A study conducted by Zhang et al. [5] highlights the widespread acceptance of Grammarly among EFL students. The research demonstrates that Grammarly serves as a valuable resource, supporting students in their English writing endeavors. The tool not only identifies linguistic errors but also suggests improvements, enabling students to refine their writing and enhance their language proficiency. Furthermore, research by Huang et al. [6] examines the impact of incorporating Grammarly into writing classes. The study reveals that the integration of Grammarly not only enhances the English writing skills of EFL students but also alleviates the teaching burden on educators. Teachers benefit from Grammarly's ability to identify and correct linguistic errors, freeing them from the task of manually reviewing and correcting student writing. This allows teachers to focus on more innovative and engaging teaching methods, enhancing the overall learning experience for students.

2.2. QuillBot

QuillBot has established itself as a leading tool in the realm of language technology, renowned for its exceptional paraphrasing capabilities. Beyond this, it also offers additional features such as summarization and grammar checking, making it a comprehensive solution for language learners. Paraphrasing, in particular, is an intricate skill that requires rephrasing content in one's own words while maintaining the original's intended meaning. This process is pivotal in honing writing abilities and is often a challenging aspect for EFL students. EFL students often struggle with paraphrasing due to the high-level thinking skills it demands [7]. Effective paraphrasing requires a deep understanding of the original content, the ability to analyze and synthesize information, as well as creative thinking to rephrase ideas in a new way. Recognizing the challenges faced by EFL students, Mohammad et al. [8] conducted a study to assess the effectiveness of QuillBot in assisting students with paraphrasing. The study employed a questionnaire and interviews to gather data. The findings validate the QuillBot's effectiveness in assisting students with paraphrasing, making it an indispensable resource for language learners seeking to improve their English writing abilities.

2.3. NoRedInk

NoRedInk is a tool that empowers teachers to provide tailored writing instruction to their students, fostering a personalized learning environment. This innovative platform offers a range of features, including customized writing assignments, practice exercises, and interactive quizzes, all designed to actively engage students in the writing process [9]. By addressing specific aspects of writing such as grammar, usage, mechanics, and style, NoRedInk supports students in refining their writing skills and achieving their full potential [10]. The platform's ability to provide detailed reports on student performance allows teachers to quickly identify both the strengths and areas needing improvement in student writing. This is an especially valuable resource when managing large classes, as it enables teachers to target interventions more efficiently. Moreover, research conducted by Summerhays [11] has demonstrated the positive impact of NoRedInk on student learning outcomes. Students who utilize the platform not only exhibit improved grammar skills but also develop a more positive attitude towards learning writing through technology. This positive

attitude is crucial in motivating students to engage actively with the writing process and achieve their academic goals.

2.4. ArgRewrite

ArgRewrite, developed by the research team at the University of Pittsburgh, specializes in the analysis of rewritten content. Its unique approach stands out from other available tools, as it focuses on providing feedback on the changes made by an author between different drafts, rather than offering suggestions on a single essay draft [12]. In contrast to automated revision tools, ArgRewrite encourages a more hands-on approach to essay refinement. It prompts students to engage actively with their writing, using the feedback provided to iteratively improve their essays. According to Litman et al. [13], ArgRewrite excels at accurately analyzing the types and locations of revisions students make across multiple essay drafts. This ability to track and analyze revisions fosters self-monitored revising practices, enabling students to take ownership of their writing process and make informed decisions about their writing choices. By providing a detailed understanding of their writing progress, ArgRewrite helps students develop a more nuanced understanding of their own writing strengths and areas for improvement.

2.5. ChatGPT

ChatGPT, created by OpenAI, represents a significant advancement in the field of large language models, surpassing the limitations of conventional grammar checkers. Its prowess extends beyond mere linguistic correctness to embrace text generation, showcasing an extraordinary capability to mimic human-like responses. This innovative tool is a spark that ignites creativity among students, stimulating their imaginations and introducing novel perspectives that might have remained hidden during their writing process. According to Salvagno et al. [14], ChatGPT's integration into classrooms has been met with enthusiasm. The tool not only encourages students to think outside the box but also helps them develop their writing skills in areas such as organization, coherence, grammar, and vocabulary. ChatGPT's ability to provide real-time feedback and suggestions allows students to identify and correct errors in their writing, refining their craft as they progress. Furthermore, research conducted by Song and Song [15] reveals that classes utilizing ChatGPT exhibit enhanced progress and performance in writing motivation and skills. Students who have access to ChatGPT support demonstrate improved writing abilities, outperforming those without the tool. The integration of ChatGPT into educational settings represents a shift in the way writing instruction is taught. As ChatGPT continues to evolve and improve, it will undoubtedly play an increasingly important role in fostering creativity, enhancing writing skills, and igniting a passion for writing among students.

In conclusion, Grammarly, QuillBot, NoRedInk, ArgRewrite, and ChatGPT all provide crucial support in enhancing students' writing abilities. Each of these tools stands out with its unique highlights, making them invaluable resources for students seeking to improve their writing skills. Students can determine the most appropriate tool that aligns with their needs based on their writing objectives, personal preferences, and any policy considerations.

3. Similarities and Differences in AI-based Writing Tools

After conducting a rigorous analysis of the aforementioned AI-based writing tools, it becomes evident that they exhibit several notable similarities. Firstly, these tools utilize Natural Language Processing (NLP), a technology that involves training machines to analyze and understand human language, such as English, to perform specific tasks like improving writing [16]. Secondly, these

AI-based writing tools offer prompt feedback on written texts, effectively eliminating the need for students to wait for responses from instructors. This instantaneous feedback can aid students in grasping fundamental writing principles and provide guidance on enhancing their writing skills. Thirdly, Grammarly, QuillBot, NoRedInk, and ChatGPT follow a freemium model, where they provide a basic free version with limited features and offer paid plans for access to more advanced features. This flexible pricing strategy caters to the needs of users with varying budgets, ensuring that everyone, regardless of their financial constraints, can access the tools. However, it is noteworthy that ArgRewrite appears to be unavailable to the general public, possibly due to its targeting of the specific campus user group.

Despite sharing these similarities, each AI-based writing tool distinguishes itself from the rest through unique attributes. Firstly, the primary focus of each tool serves as a significant differentiating factor. These tools are equipped with diverse features tailored to facilitate effective text writing, ranging from grammar correction to content optimization. Secondly, the user interfaces of these tools exhibit differences. Grammarly and QuillBot offer similar interfaces, presenting an intuitive design with a toolbar that suggests improvements in writing. NoRedInk stands out with its clean and organized layout, which makes it easy for students and teachers to track progress and identify areas for improvement. ArgRewrite, on the other hand, is designed with an interface that offers multiple views of revision changes [17]. Meanwhile, ChatGPT introduces a conversational user interface that features a chatbox. This interface enables students to engage in a natural conversation with the AI, posing questions and receiving responsive feedback. This interactive approach makes the writing process more engaging and personalized. These distinctions not only underscore the individuality of each tool, but also reflect that AI-based writing tools meet the different users' needs.

4. Challenges and Solutions

AI-based writing tools, despite offering a significant number of advantages, are confronted with challenges in terms of technology accessibility. This accessibility encompasses the availability of necessary hardware, software, and a reliable internet connection, all of which are prerequisites for effective utilization of these tools [18]. In today's world, the widening digital divide poses a significant obstacle for students in economically disadvantaged regions [19], limiting their access to AI-based writing tools. This digital divide not only hinders their ability to complete writing tasks efficiently but also excludes them from the benefits of modern technology. Besides, ethical considerations such as privacy, copyright, and potential biases in AI algorithms are critical issues that must be addressed [20].

Stakeholders in the education sector should collaborate to empower students through the use of AI-based writing tools. Governments, in particular, play a pivotal role and should prioritize infrastructure development, ensuring that students in all regions have access to the necessary hardware, software, and reliable internet connections. Additionally, governments must enact relevant laws and regulations to strengthen the supervision of AI-based writing tools. On the part of AI companies, they must adhere strictly to ethical guidelines in the design and use of these tools. This involves ensuring that the algorithms are unbiased, transparent, and accountable, while safeguarding user privacy and copyright. Furthermore, educators can empower students to make ethical choices when using these AI-based writing tools by instilling a sense of responsibility and accountability [21].

5. Summary

This paper examines the influence of AI-based writing tools on the quality of student writing.

Tools like Grammarly, QuillBot, NoRedInk, ArgRewrite, and ChatGPT have proven their effectiveness in improving writing skills. Although AI-based writing tools have great potential to benefit students, deploying these tools at scale as well as the regulation of AI are challenges. As policymakers recognize the revolutionary impact of AI in writing education, they actively advocate for the widespread adoption of AI-based writing tools and ensuring that the tools are utilized ethically. In the future, there are expectations for students to engage in a more inclusive and equitable landscape for AI-supported writing.

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