

Research Article

Towards Utilizing Artificial Intelligence in Scientific Writing

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Abstract: The integration of Artificial Intelligence (AI) tools in scientific writing processes has emerged as a topic of increasing interest and exploration. This article encapsulates the multifaceted dimensions associated with the utilization of AI in scientific writing endeavors. The contemporary landscape underscores the potential of AI systems, such as ChatGPT, in facilitating various stages of scientific writing, including literature review, draft generation, language refinement, and formatting. While AI-powered tools offer unparalleled efficiency and efficacy in streamlining writing tasks, ethical considerations regarding plagiarism detection, bias mitigation, and the preservation of academic integrity necessitate careful deliberation and regulatory frameworks. Furthermore, the synergistic collaboration between human expertise and AI assistance is advocated to optimize the quality and authenticity of scientific publications. This article provides a foundational overview of the evolving role of AI in scientific writing, inviting further research and discourse to harness its transformative potential while upholding scholarly standards and ethical principles.

Keywords: Artificial Intelligence, ChatGPT, Chatbots, OpenAI, Scientific writing

1. Introduction

A chatbot constitutes an electronic system, often manifesting as a software application, designed to replicate human-like conversational exchanges through the identification and interpretation of predefined keywords or phrases. This technological entity possesses the capability to seamlessly integrate into a variety of digital platforms, ranging from conventional websites to contemporary mobile applications and ubiquitous messaging platforms. Leveraging sophisticated algorithms and natural language processing techniques, chatbots aim to facilitate interactive experiences and streamline communication processes across diverse user interfaces [1].

The Chatbot Generative Pre-trained Transformer (ChatGPT), an AI innovation developed by OpenAI, represents a sophisticated instance of Artificial Intelligence software engineered to emulate human-like conversational interactions. Operating on intricate algorithms intricately programmed to decipher natural language inputs, ChatGPT provides responsive outputs, drawing from a repertoire of pre-existing responses or generating novel ones through AI-driven mechanisms [2]. Its functionality is continually enhanced through the integration of reinforcement learning methodologies, advanced natural language processing techniques, and iterative machine learning algorithms, all aimed at refining its capacity to comprehend and effectively address user inquiries.

Concretely, users can engage ChatGPT in conversational exchanges spanning a broad spectrum of requests, including soliciting succinct textual compositions on designated topics, sourcing information pertinent to specific interests, crafting tailored emails or messages characterized by prescribed tones

and content for designated recipients, revising textual structures or altering linguistic formulations, and troubleshooting various issues through interactive dialogue [3].

In the realm of scientific discourse, the integration of this chatbot holds considerable potential. Notably, ChatGPT presents a viable avenue for automated functions integral to scientific writing endeavors, including the generation of preliminary drafts, synthesis of article summaries, and facilitation of language translation tasks. Such capabilities offer tangible benefits within academic spheres, streamlining writing processes and enhancing efficiency. Nevertheless, the application of this tool in scientific writing introduces ethical considerations necessitating prudent regulation and oversight [4].

The exploration of Artificial Intelligence (AI) applications in scientific writing represents a significant advancement in scholarly endeavors. This contribution delves into the burgeoning intersection between AI technology and scientific writing practices, shedding light on its potential to revolutionize various facets of the writing process. Specifically, it elucidates the role of AI systems, such as ChatGPT, in augmenting literature reviews, drafting scientific manuscripts, refining language, and enhancing overall writing efficiency. Moreover, this contribution addresses the ethical considerations inherent in AI-driven scientific writing, emphasizing the importance of upholding academic integrity and mitigating biases. By delineating the synergistic relationship between human expertise and AI assistance, this contribution advocates for a balanced approach to leveraging AI tools in scientific writing, thereby fostering a collaborative environment conducive to innovation and scholarly excellence. Through this exploration, new avenues for research and discourse are unveiled, paving the way for the judicious integration of AI technology in scientific writing practices while safeguarding the integrity of academic scholarship.

Section 2 elucidates the role of ChatGPT in Scientific Writing, delineating its functionalities and applications within scholarly endeavors. **Section 3** undertakes a comparative analysis between Chatbots and human beings in the context of scientific writing, exploring their respective strengths, limitations, and contributions to the academic landscape. **In Section 4**, Journal Publishing is scrutinized, encompassing discussions on the levels of assistance provided by AI tools, language enhancement capabilities, the peer review process, and considerations surrounding non-published works. Ethical considerations pertaining to the utilization of AI in scientific writing are examined in **Section 5**, highlighting the ethical dilemmas, implications, and regulatory frameworks essential for ensuring integrity and accountability in scholarly discourse. Finally, **Section 6** encapsulates the article's findings and insights, drawing conclusions on the implications of AI integration in scientific writing.

2. ChatGPT in Scientific Writing

In recent years, the advent of artificial intelligence (AI) has revolutionized numerous facets of human interaction and productivity. Among the forefront of AI innovations stands ChatGPT, a cutting-edge conversational AI model developed by OpenAI. ChatGPT harnesses the power of deep learning algorithms to simulate human-like conversations, providing responses that are coherent, contextually relevant, and often indistinguishable from those generated by human interlocutors. While ChatGPT finds widespread applications across various domains, its integration into scientific writing represents a particularly compelling avenue [5]. In this introduction, we explore the potential of ChatGPT as a transformative tool in the realm of scientific writing, examining its capabilities, implications, and ethical considerations. By delving into the intersection of AI technology and scholarly communication, this exploration seeks to elucidate the opportunities and challenges presented by the utilization of ChatGPT in scientific writing endeavors [6].

ChatGPT has demonstrated its efficacy in assisting engineering researchers and scientists in various aspects of scholarly writing. It facilitates the composition of articles and abstracts, aids in literature review endeavors, summarizing data and information pertinent to research inquiries. Furthermore, it provides valuable insights and suggestions for enhancing the structural organization, referencing, and titling of academic manuscripts. Additionally, ChatGPT offers assistance in language refinement, ensuring the readability and coherence of written text. Remarkably, it even has the capability to

autonomously generate comprehensive drafts of scholarly papers, showcasing its versatility and utility in academic writing processes [7].

ChatGPT has recently been tasked with generating regular discharge summaries, yet the specific quality of the content remains unassessed. Our understanding indicates that, a structured evaluation to ascertain the output's quality has not yet been conducted. More intricate writing processes, such as systematic reviews and meta-analyses, necessitate human intervention, with ChatGPT primarily serving a supportive role in editing. Looking forward, AI holds potential for automatically generating figures, tables, and other visual elements for manuscripts, facilitating data summarization. While vital for manuscript clarity and comprehension, these elements often require considerable time investment to create [8].

Throughout the manuscript development phase, ChatGPT serves as a valuable resource in generating preliminary drafts of scientific papers and providing suggestions for titles. Moreover, by furnishing foundational information, ChatGPT aids in crafting the methodology section of the study, elucidating the rationale behind sample size determination, and delineating data analysis methodologies. Drawing from personal experience, upon manuscript completion, ChatGPT significantly streamlines the editing process by facilitating tasks such as formatting adjustments, language refinement, clarification of complex sentences, and even synthesis of a suitable abstract. Although the outcomes may not invariably meet expectations, leveraging ChatGPT undeniably yields time-saving benefits during the editing phase [9].

3. Chatbots vs. human beings

As an artificial intelligence (AI) system, ChatGPT possesses a notable advantage in swiftly comprehending information at depth and establishing connections between evidence to draw conclusions. This capability surpasses that of humans, who are constrained by limitations in their capacity to extensively review literature and discern connections between seemingly disparate pieces of information. Moreover, discerning whether a paper is authored by a chatbot or a human presents a challenging task [10]. Chatbots employ sophisticated techniques, such as natural language processing (NLP) and machine learning, to generate text that closely resembles human writing. Detecting the authorship requires meticulous scrutiny and critical reading to arrive at a conclusion. Nonetheless, several characteristics may indicate that a paper was generated by a chatbot, including the absence of nuanced expression, distinctive style, or originality. Such traits could potentially facilitate identification by AI-based detectors or discerning human reviewers [11]. Intriguingly, similar writing patterns may also manifest in texts authored in a non-native language, resembling AI-generated output. By focusing on these distinctive features, AI plagiarism detection tools could potentially distinguish between texts authored by these two categories, offering insight into their efficacy in authorship attribution. However, text generated by chatbots may lack the nuanced phrasing and lexical selection characteristic of human authors, which are often employed to convey specific meanings or tones. Additionally, it might exhibit vagueness and inconsistencies that typically do not arise in human-written papers [12].

4. Journal Publishing

Numerous academic journals have implemented protocols addressing the integration of artificial intelligence (AI) in the composition and publication of scientific papers. It is crucial to acknowledge that the concerns raised by this integration mirror those surrounding the utilization of human assistance in paper writing [13-16].

A. *Level of assistance*

Various degrees of human and AI involvement exist in scientific paper writing. At the fundamental level lies spell checking, which can be automated or performed by humans. Manuscripts submitted for publication typically undergo spell checking, whether conducted by the authors themselves, a third party, or software. In such cases, formal acknowledgment in the manuscript is unnecessary. Similarly, grammar checking does not warrant acknowledgment. However, at the editing stage, acknowledgment may be warranted. Historically, when only human editing was feasible, publishers often required

acknowledgment of such assistance in the manuscript. There exist various levels of editing, with copy editing representing the most basic tier. Copy editing encompasses tasks such as rectifying spelling and grammar errors, ensuring uniformity in style and formatting, and verifying factual accuracy. Additionally, efforts are made to enhance readability and clarity of the text. The ultimate goal of copy editing is to produce a refined, error-free manuscript that is accessible and comprehensible to readers.

B. English enhancement

The predominant language of scientific discourse is English, posing a potential disadvantage for individuals lacking proficiency in this language. Some academic journals now advocate for the utilization of AI systems to refine manuscripts during the initial stages of submission, preceding formal submission. The associated cost is currently estimated to be approximately US \$10, with instantaneous processing capabilities resulting in a Microsoft Word document annotated with track changes. Following the review of suggested alterations—an essential step to ensure accuracy and preserve intended meaning—the author can readily accept all modifications within Word and proceed with the submission process. In contrast, human proofreading services may incur costs exceeding \$200 and entail a week-long waiting period for the authors to receive the enhanced manuscript. While AI-driven editing may supplant the need for human proofreaders, authors should be informed of this alternative as a matter of ethical obligation. AI editing serves as a valuable tool to mitigate linguistic disparities among authors lacking English proficiency or adequate financial resources.

C. Reviewing

The potential integration of AI for the review of scholarly submissions presents an intriguing prospect, particularly in addressing challenges associated with the traditional peer review process. Instances arise where submissions languish without prompt reviewer engagement, attributed to various factors such as the perceived complexity of the topic, lack of interest, preconceived notions of the manuscript's novelty, reviewer availability constraints, or deficiencies in linguistic refinement. Even when reviewers agree to assess a submission, there is no guarantee of timely completion, and instances of non-compliance are not penalized beyond potential removal from the reviewer pool by the editor. Moreover, unforeseen circumstances may impede reviewer participation, such as personal illness or family emergencies. In such circumstances, authors anticipate expeditious feedback on their submissions. Under these exigencies, AI-powered reviews offer the potential for near-instantaneous evaluation, provided they offer accurate and constructive feedback, including recommendations regarding the manuscript's fate. Nonetheless, editors should exercise caution against overreliance on AI-driven reviewing mechanisms, should they be implemented. Peer review remains a cornerstone of scholarly discourse, affording human reviewers the opportunity to engage deeply with cutting-edge research, offer insightful feedback and potential solutions to authors, enhance their own knowledge base, and glean novel insights applicable to their research endeavors. Thus, while AI may complement traditional review processes, it should not supplant the indispensable role of human reviewers in advancing academic discourse and scholarship.

D. Non-published works

Artificial Intelligence (AI) holds promise in aiding the creation of documents intended for purposes other than formal publication. For instance, in grant writing, which necessitates proficiency across diverse domains that authors may not possess, such as model design and statistical analysis, AI stands to expedite the process and alleviate the necessity of engaging external experts, thereby conserving their time. Similarly, AI may prove beneficial in conducting preliminary research on a topic before crafting a presentation or attending a meeting.

5. Ethical Considerations

Ethical considerations may pose constraints on the utilization of chatbots for scientific writing endeavors. The process of synthesizing knowledge from various sources and authoring new or review articles entails human scholars integrating acquired insights with their own original ideas. It is inherent in scholarly discourse for researchers to reference and draw upon the findings, assertions, and written

works of others, thereby necessitating proper attribution to the original authors to avoid plagiarism. While AI systems such as ChatGPT can inadvertently engage in plagiarism by reproducing content without appropriate citation, they can also be programmed to circumvent this issue by paraphrasing content in a manner akin to human writers. However, employing software to merely rephrase sentences or passages to diminish plagiarism rates, without adding substantive original content, may be deemed ethically dubious in the realm of scientific research. If plagiarism is defined as the act of reproducing another's work without proper attribution, irrespective of the methodology employed and devoid of any added insights, it constitutes a breach of academic integrity. Consequently, journal editors are advised to employ AI-driven plagiarism detection tools to enhance the identification of potentially plagiarized content more effectively.

Moreover, the absence of an expert and discerning human intellect underpinning scientific endeavors, integral to the scientific method, may engender the peril of perpetuating or exacerbating prevailing biases and inaccuracies inherent in the data. Such an outcome could yield unfair results and impede the progression of scientific knowledge. Irrespective of the integration of AI technologies, it is our contention that the involvement of a subject matter expert in guiding scientific pursuits and scholarly writing remains an indispensable cornerstone to ensure the integrity and excellence of scholarly output. Furthermore, the remarkable advancement of AI tools has the potential to precipitate a notable upsurge in publication volumes among certain researchers, albeit not necessarily accompanied by a corresponding enhancement in their expertise within the respective field.

6. Conclusion

ChatGPT represents an artificial intelligence (AI) software with the potential to aid in the composition process of a scientific manuscript. It can contribute to literature review tasks, facilitate the identification of research inquiries, offer an overview of the current landscape within a field, and provide assistance with various editorial tasks such as formatting and language refinement. Additionally, its utility extends to clinical practice, where it can serve as a time-saving resource. As the adoption of chatbot tools is expected to become increasingly prevalent in the foreseeable future, it is imperative to establish international academic standards to govern their utilization in scientific writing. Such regulations should include provisions for identifying and penalizing instances of unethical usage. It is important to recognize that chatbots are merely tools; while they can support human researchers, they should not be viewed as substitutes for the expertise, discernment, and individuality inherent in human researchers.

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References

- [1] S. Altmäe, A. Sola-Leyva, and A. Salumets, "Artificial intelligence in scientific writing: a friend or a foe?," *Reprod. Biomed. Online*, vol. 47, no. 1, pp. 3–9, 2023. [[Google Scholar](#)]
- [2] J. A. Teixeira da Silva, "Is institutional review board approval required for studies involving ChatGPT?," *Am. J. Obstet. Gynecol. MFM*, vol. 5, no. 8, p. 101005, 2023. [[Google Scholar](#)]
- [3] A. Kleebayoon and V. Wiwanitkit, "ChatGPT for guidance during unexpected labour: Comment," *Eur. J. Obstet. Gynecol. Reprod. Biol.*, vol. 285, p. 219, 2023. [[Google Scholar](#)]
- [4] A. S. Bahammam, K. Trabelsi, S. R. Pandi-Perumal, and H. Jahrami, "Adapting to the impact of artificial intelligence in scientific writing: Balancing benefits and drawbacks while developing policies and regulations," *Journal of Nature and Science of Medicine*, vol. 6, no. 3, p. 152, 2023. [[Google Scholar](#)]
- [5] N. J. Kim and M. K. Kim, "Teacher's perceptions of using an artificial intelligence-based educational tool for scientific writing," *Front. Educ.*, vol. 7, 2022. [[Google Scholar](#)]
- [6] M. Inam *et al.*, "A review of top cardiology and cardiovascular medicine journal guidelines regarding the use of generative artificial intelligence tools in scientific writing," *Curr. Probl. Cardiol.*, vol. 49, no. 3, p. 102387, 2024. [[Google Scholar](#)]
- [7] R. Buchkremer *et al.*, "The application of artificial intelligence technologies as a substitute for reading and to support and enhance the authoring of scientific review articles," *IEEE Access*, vol. 7, pp. 65263–65276, 2019. [[Google Scholar](#)]
- [8] A. A. Khalifa and M. A. Ibrahim, "Artificial intelligence (AI) and ChatGPT involvement in scientific and medical writing, a new concern for researchers. A scoping review," *Arab Gulf Journal of Scientific Research*, 2024. [[Google Scholar](#)]
- [9] A. Tang, K.-K. Li, K. O. Kwok, L. Cao, S. Luong, and W. Tam, "The importance of transparency: Declaring the use of generative artificial intelligence (AI) in academic writing," *J. Nurs. Scholarsh.*, 2023. [[Google Scholar](#)]
- [10] A. R. Malik *et al.*, "Exploring artificial intelligence in academic essay: Higher education student's perspective," *Int. J. Educ. Res. Open*, vol. 5, no. 100296, p. 100296, 2023. [[Google Scholar](#)]
- [11] J. Homolak, "Exploring the adoption of ChatGPT in academic publishing: insights and lessons for scientific writing," *Croat. Med. J.*, vol. 64, no. 3, pp. 205–207, 2023. [[Google Scholar](#)]
- [12] O. D. Awosanya *et al.*, "The utility of AI in writing a scientific review article on the impacts of COVID-19 on musculoskeletal health," *Curr. Osteoporos. Rep.*, 2024. [[Google Scholar](#)]
- [13] Y. K. Duymaz and A. M. Tekin, "Harnessing artificial intelligence in academic writing: Potential, ethics, and responsible use," *Eur. J. Ther.*, 2023. [[Google Scholar](#)]
- [14] K. Kousha and M. Thelwall, "Artificial intelligence to support publishing and peer review: A summary and review," *Learn. Publ.*, vol. 37, no. 1, pp. 4–12, 2024. [[Google Scholar](#)]
- [15] M. Cascella *et al.*, "Writing the paper 'Unveiling artificial intelligence: an insight into ethics and applications in anesthesia' implementing the large language model ChatGPT: a qualitative study," *J. Med. Artif. Intell.*, vol. 6, no. 0, pp. 9–9, 2023. [[Google Scholar](#)]
- [16] A. Hassankhani, M. Amoukhteh, and A. Gholamrezanezhad, "Transparency in artificial intelligence-enhanced scholarly writing: Acknowledgment, detection, and the path forward," *J. Am. Coll. Radiol.*, 2024. [[Google Scholar](#)]



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