

Book Review

Review of ChatGPT in Scientific Research and Writing: A Beginners Guide

Jie Han, Wei Qiu, and Eric Lichtfouse, *ChatGPT in Scientific Research and Writing: A Beginners Guide* (Gewerbestrasse, Cham: Springer Nature, 2024)

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Abstract: As faculty struggle with heavy teaching loads and students with numerous assignments and projects, research writing often suffers. Hence, the increased adoption of large language model (LLM) based generative artificial intelligence (AI) tools like ChatGPT, Gemini, etc., to enhance research writing. However, the incorporation AI tools into academic research is not without controversy. Scholars remain split on the issue. There are issues around technical knowledge, reliability, and trust. In *ChatGPT in Scientific Research and Writing: A Beginners Guide*, the authors introduce researchers to best practices for incorporating ChatGPT's resources at various stages of research writing.

Keywords: *ChatGPT, AI, large language models (LLMs), research, prompt engineering, science communication*

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Across many higher education institutions, engaging in scientific research has become a challenging task. Some faculty struggle with heavy teaching loads and students with numerous assignments, giving little time for research. Some researchers now seek for tools to enhance their research writing, hence, their increased adoption of large language model (LLM) based generative artificial intelligence (AI) tools like ChatGPT, Copilot, Gemini, among several new others.

However, the incorporation AI tools into academic research is not without controversy. Researchers are split on the issue (Kwon, 2025). Scholars against, argue that using AI for academic research, diminishes critical thinking, leads to unreliable results, and questionable findings. On the extreme, some scholars view AI assisted research as outrightly bad and fraudulent (Sinclair, 2023).

Other scholars in support of AI believe that the technology can relieve pressure from research tasks, helping to save time and resources. However, some of these pro-AI scholars grapple with understanding the technology and how best to employ its resources in research.

In *ChatGPT in Scientific Research and Writing: A Beginners Guide*, the authors introduce researchers to best practices for incorporating ChatGPT's resources at various stages of research writing. The authors begin by discussing the development of ChatGPT-4, highlighting its improvements over earlier models. They argue that ChatGPT was instrumental in popularizing the use of generative AI for general-purpose text-based tasks. However, they note that some researchers do not consider ChatGPT a top choice among AI research writing tools.

Anti-ChatGPT scholars argue that the model is not the best tool for research as it is prone to citation errors. Additionally, they argue that ChatGPT frequently "hallucinates" or fabricates non-existent citations and bibliographic and reference data; a natural result of it being a predictive text model as opposed to a search engine (Isenburg, 2023). Some libraries have received requests to find articles fabricated by ChatGPT. The above arguments point to the need to verify citations provided by ChatGPT in library databases or e-journals.

In chapter two, the authors outline how ChatGPT can be used to extract key points and to find specific details in scientific papers. The authors stress that the efficiency of this action is dependent on using the right prompts. The authors illustrate this operation with two examples, demonstrating ChatGPT's capacity to save time spent on scanning and skimming through complex texts. However, they do not explain how the model can decipher meanings in texts written in highly nuanced language, for example in postmodern poetry.

In chapter three, the authors demonstrate how ChatGPT can interpret complex figures and correlate them to certain functions. By using features like hyperspectral images and data plots, the authors demonstrate how ChatGPT attempts to provide interpretations of complex figures. However, the results in the two examples shown in the chapter are stated as "mostly correct" (p. 10). Some scholars will be curious about the minor details left out in the interpretations of figures.

In chapter four, the authors demonstrate ChatGPT's capacity to evaluate research papers. They state that this function is particularly relevant in appraising papers submitted to journals for evaluation, including papers submitted for faculty appraisal, and other similar activities. They demonstrate how ChatGPT can be prompted to identify the strengths and weaknesses of a paper in relation to its title and whether it was written in line with a journal's current review policies and guidelines.

Spotting errors in statistic figures is the first area of focus in chapter five. Here, the authors demonstrate ChatGPT's technical capacity to sieve through complex formulas and figures to decipher errors. They authors provide two examples of this technical operation in Tables 13 and 14 (pgs. 26 – 26). The second area of focus is ChatGPT's capacity to spot misquotations from texts. The authors argue that by using the right prompts, ChatGPT can identify deeper and not so obvious errors that humans often miss.

Chapter seven focuses on how ChatGPT could help during the weeks or months of peer review. The authors note that many researchers are often discouraged at this stage by the nature and timing of reviewers' comments. They demonstrate how ChatGPT can be prompted to rebut reviewer's negative comments, answer complex questions, respond to difficult requests, and send reminders to journal editors and reviewers.

In chapter eight, the authors demonstrate ChatGPT's capacity to craft effective titles for articles. Through the right prompting, ChatGPT can analyze texts and create titles which are concise, informative, and impactful.

In chapter nine, the authors show how ChatGPT could help reduce the labor and stress of designing and conducting experimental studies. However, the authors note that while the application of AI in experimental studies requires complex robotic operations and automation, ChatGPT can provide roadmaps to ease the tasks of researchers. For example, ChatGPT can provide step by step instructions on how to conduct an experiment efficiently, using the right materials and methods.

Chapter ten illustrates ChatGPT's capacity to design simple and complex questionnaire for survey research. The authors argue that ChatGPT has functions that can suggest further refinements to the scope of a questionnaire to better understand the target population. However, the authors do address the dangers of biased and leading questions that often result from using AI in creating questionnaire (Kwon, 2025).

In chapter eleven, the focus is on proposal writing. The authors show that ChatGPT can perform extensive searches in response to user's inquiries by providing answers revolving around these inquiries, supplementing gaps in existing literature, and generating creative ideas for research proposals. They demonstrate how ChatGPT can assist in the proposal writing process, from brainstorming for topics, through writing mock proposals, and producing a final proposal in accordance to set compliance guidelines.

In chapter twelve, the authors highlight the importance of science communication. Communication itself is a science. It interacts with matter and can be studied empirically through various scientific lenses (Ephraim, 2023). Science communication aims to promote public understanding of scientific knowledge. The authors demonstrate ChatGPT's capacity to re-write dense jargon-packed research papers into popular magazine-style short messages for posting on social media. Social media serve as powerful channels for reaching a wide variety of audiences, including providing spaces for public discourse of topical issues and disseminating scientific knowledge (Ephraim, 2018). In the chapter, the authors show how ChatGPT can adapt certain styles of writing for specific groups of readers. They describe ChatGPT as a "versatile editor to help scientists reach different target groups of audiences" (p. 84).

Chapter thirteen focuses on the downsides of the model. The authors note two major technical problems with using ChatGPT for research to include randomness of answers and hallucination. They define hallucination as the propensity of large language models to provide false or inaccurate facts and data, or attribute information to wrong or non-existent sources in an unpredictable fashion.

In chapter fourteen, the authors outline strategies for overcoming these problems including writing effective prompts, testing different models, proactive engagement with AI, among several other strategies. The authors conclude the chapter with a cautionary note warning that uploading unpublished data or manuscripts into large language models, could cause them to enter the public domain.

In the concluding chapter, the authors restate the advantages of generative AI models over humans in research. They argue that AI models can generate moderate to substantial levels of intelligent inputs throughout the process, from research conceptualization, literature review, and study design to scientific writing, research evaluation, and science communication.

Although an insightful and inspiring read, the book has a few shortcomings. First is the authors' technologically privileged writing perspective that assumes equal access to and knowledge of AI. The authors begin by going straight into discussing the advancements of ChatGPT models. Since the book is described as a beginner's guide, it would have been great if the authors included an introductory chapter on AI, discussing its definitions, evolution, and applications, including a section on large language models. Some readers might not be familiar with these complex terms. The authors' writing perspective could be viewed as negating the global digital divide. While Silicon Valley and other countries in the global north are advancing and competing in the sphere of AI, some countries in the global south are grappling with how to equip schools and universities with functional desktop computers in environments with severe power and Internet shortages. Many

researchers and writers in the global south are in perilous and disadvantaged situations, grappling with incorporating AI into their work (Apeageyi, 2025).

The second shortcoming of the book is its lack of a theoretical framework or an epistemological perspective to back its arguments. The authors proceed chapter by chapter, demonstrating the use of ChatGPT, making the book feel more like an instructional manual on using ChatCPT. In future editions, the authors should consider providing a theoretical framework(s) or knowledge perspective to connect their assertions and arguments to existing knowledge on the application of AI in research.

While the authors focused on the technical dangers of incorporating ChatGPT into research, they did not address the social challenges. A major social challenge of using ChatGPT is the linguistic competence of users. As the authors point, “clear, unambiguous, and well-defined requests have a higher chance of getting high-quality answers” (p.93). Currently, ChatGPT supports a little over 95 languages. This is indicative of a preference for native speakers of a language, majorly English, due to the model’s original training. Other social challenges include cultural homogenization, prejudice, sycophancy, diminishing critical thinking, and the erosion of human agency that rise with increased AI usage.

While the authors provide an appendix with supporting information, they do not include a glossary of terms. A glossary is considered quite essential to guide beginners in locating and understanding complex AI terminologies used throughout the book.

Despite a few shortcomings, the book serves as a concise guide for researchers and writers with no coding or prompt engineering experience. However, a little background knowledge and interaction with large language models like ChatGPT and Copilot is required to fully benefit from the book. The chapters provide guidelines on how to incorporate these intelligent systems at each stage of research writing.

The book contributes to growing literature on the application of AI into scientific research. It is positioned in support of the notion that AI offers valuable insights and possibilities in research writing. The book will benefit college faculty and students engaged in both quantitative and qualitative research. Journal editors, peer reviewers, and other independent researchers and writers will also benefit from its insights.

As the authors highlighted, ChatGPT can provide meaningful assistance to researchers, from research conceptualization to study design, data analysis and evaluation, to science communication. As a large language model, ChatGPT is continually being improved to make the research writing process more interesting and efficient.

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Conflicts of Interest:

The author declares no conflict of interest.

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