

RESEARCH WRITING IN THE AI GENERATION: RETHINKING PEDAGOGIES, PRACTICES, AND PERSPECTIVES¹

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Abstract: *The purpose of this keynote conceptual article is to discuss how technological innovation interacts with research practices. It focuses on the effects Artificial Intelligence (AI) has on research writing. The essay analyses various ways through which AI technologies could enhance efficiency via automation of mundane tasks, allowing academics to concentrate on creativity and analytics. It also discusses matters of academic integrity in the forefront of plagiarism. Promoting the implementation of regulations is necessary to harmonise the benefits of AI with the need to retain critical thinking skills. Pedagogical changes are needed to allow integrating AI practices into the academic curriculum by striking a balance between conventional pedagogical approaches that converse with the capabilities of AI. A pressing point from the study is the need to further enhance AI literacy and its proper usage so as to navigate the dynamic terrain of research. The conclusion stresses that thorough regulation and human oversight will still be required to make sure that the emergent use of AI inculcates improvements in academic work without its integrity being spoiled.*

Keywords: *AI integration, academic writing, pedagogical adjustments, ethical concerns, technological innovation*

INTRODUCTION

Artificial Intelligence (AI) and sophisticated digital tools have entirely changed research methodology, replacing labour-intensive manual data collecting and processing techniques. This evolution illuminates the confluence of technological innovation and educational practices, rendering AI-integrated research writing a focal point of scholarly attention (Nguyen, U. N. T., & Nguyen, L. V., 2021b; Rabbianty et al., 2023).

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Not only does AI enhance efficiency but it also opens new educational vistas by automating monotonous tasks, which liberates researchers, especially those who use English as a foreign language, to devote themselves to more creative and analytical endeavours. While AI tools like Wordvice AI and Consensus AI provide advanced research functionalities, other tools such as ChatGPT and Unriddle assist with drafting and editing. Large volumes of information may be processed with the use of these instruments, leading to more accurate academic results. However, AI's role in research writing raises concerns about ethics and plagiarism (The Institute for Ethical AI in Education, 2023). There is an ongoing debate about harmonising AI's benefits with preserving creative and critical thinking skills. Future developments in AI necessitate careful integration into educational practices, including redesigning assessment rubrics and establishing clear AI usage policies to maintain academic standards (Rabbianty et al., 2023).

THE EVOLUTION OF RESEARCH WRITING

The field of research writing, defined as is the structured presentation of original ideas and evidence to contribute to scholarly discourse, has experienced significant changes over the years, largely due to technological advancements that have had a significant impact on contemporary methodologies and practices (Beck et al., 2024). In the past, conducting academic research required a lot of labour and involved gathering and analysing large amounts of data by hand. This work was frequently done alone in a library. The emergence of digital tools and artificial intelligence technologies has brought about a substantial shift in this paradigm, as they improve the effectiveness, accessibility, and integration of research in educational settings.

Earlier in the academic writing process, traditional research approaches placed a strong emphasis on following strict steps to guarantee data accuracy and relevance. The choice of research methodology was crucial since it had an immediate effect on the type of data that was gathered and how it was analysed later. Planning and organising the work well was

essential. This included developing strong arguments, creating research questions and thesis statements, and keeping everything organised with outlines. This systematic methodology showed the researcher's breadth of expertise and analytical abilities in addition to guaranteeing focus.

Writing as a medium of learning is an essential component of writing across the curriculum (Wang & Wang, 2024). Writing encourages new ideas and a better understanding, which positions writing as a cognitive development process as opposed to just a means of delivering previously learnt material. This viewpoint emphasises the value of writing craft skills in a certain subject or study, including language education and applied linguistics, as it helps students integrate into a discourse community (AWAC, 2023). Writing, reasoning, and learning are therefore inextricably linked, with each supporting the others.

The use of AI in academic writing represents a major shift from traditional methods. ChatGPT and other AI technologies have revolutionised research and writing processes by automating tedious operations that were previously completed by hand. These resources support content drafting, editing, formatting, and assessment. Researchers can now concentrate more on the creative and analytical elements of their work as a result (Nytho, 2024). Large datasets can be processed quickly and accurately because of AI's powerful data analysis capabilities. This makes insights that could otherwise go unnoticed easier to find. The accuracy and depth of analysis are improved as well as the pace and precision of AI research. This facilitates the acquisition of high-quality research and increases accessibility to academic materials (Nguyen, U. N. T., & Nguyen, L. V., 2021a; Nytho, 2024; Yi, 2023).

DEBATED STUDIES ON AI-ENHANCED RESEARCH WRITING

The integration of AI, particularly chatbots such as ChatGPT, SciSpace, etc, into academic and scientific research has recently garnered significant attention, which reveals both transformative potential and complicated challenges. A wide-ranging analysis of recent studies highlights the

multifaceted impact of AI tools, offering valuable insights into their benefits, limitations, and ethical considerations. These insights will lay the groundwork for discussions in the following section.

The narrative review by Giglio and Costa (2023) dwells on how AI could be a solution to improve scientific writing, especially by non-native English-speaking researchers. AI can assist in the search for pertinent scientific papers, generate summaries, or even help in the redaction of different sections of the manuscript, including the abstract, introduction, methods, results, and discussion. AI-powered software can make corrections in grammatical noise and can also facilitate different enhancements in the style of writing, which if offered to other non-native users of English Language, would be a relief. AI-powered solutions, including Elicit and ResearchRabbit, can facilitate the search for academic web results over internet space. The reference can then finally be assembled using SciSpace, Copilot, etc. These include correcting grammatical and spelling mistakes by artificial intelligence software programs like Grammarly and PaperPal. In addition, ChatGPT is able to reframe sentences and paragraphs, rephrase the document, provide apt word suggestions, and even replace phrases. The authors conclude that AI can be an applicable tool to enhance the clarity, style, and coherence of scientific writing, helping non-native English-speaking researchers to communicate their research more effectively.

Further critical approaches to the integration of AI in academic research are provided by Wang and Wang one year later, in 2024, going beyond the application of chatbots to tools like Elicit, SciSpace, and GPT-4, with more developed parameters. According to the results of their research (Wang & Wang, 2024), it is possible to see how AI can indeed streamline at much efficacy all these processes, from literature reviews in the identification of research gaps to data analyses and visualisation. They streamline complex activities and bring in new insights through the use of these advanced algorithms, thus enhancing productivity and the depth of research. On the other hand, the authors also consider the question of AI ethics and the biases built into the systems, and urge

for the integration of AI in responsible ways. They argue that higher education institutions must play a pivotal role in fostering responsible use of AI, developing policies that address the challenges arising in this process and providing researchers with skills and critical thought appropriate for their negotiation in an AI-assisted research landscape.

The Research Rebels (2024) likewise explores how AI is affecting literature reviews, emphasising how quickly AI systems can analyse massive amounts of data, spot important themes, and extract pertinent information. Because of this efficiency, productivity is greatly increased and researchers are able to devote more time to critical analysis and synthesis. However, the paper also emphasises the necessity of ethical standards to guarantee that AI technologies are applied sensibly and yield objective results. The study emphasises how crucial it is to create guidelines to control how AI is incorporated into research procedures so that the advantages of the technology are exploited without jeopardising academic integrity. Meanwhile, a critical assessment of AI tools such as ChatGPT in the context of scientific writing is given by Buriak et al. (2023). They recognise that AI has the ability to revolutionise problems like writer's block and help non-native English speakers. The study does, however, also highlight the dangers of relying too much on AI, such as the possibility of mistakes and the production of shallow language. The authors urge caution and emphasise the necessity of striking a balance between the use of AI and human discretion and critical thinking. In order to retain the calibre and integrity of research outcomes, scientific writing must remain creative and innovative.

Abbas et al. (2024), Dolan (2024) and Palmer (2024) offered empirical insights into ChatGPT's usage among university students. Their research employs robust methodologies, including surveys and temporally delayed designs, to explore how ChatGPT influences academic behaviour and performance in research writing. Abbas et al. (2024) developed and validated an eight-item scale to measure ChatGPT usage, while Dolan (2024) and Palmer (2024) expanded on this by examining the effects of academic workload, time pressure,

reward sensitivity, and quality sensitivity on AI use. The findings reveal that increased academic workload and time pressure correlate with higher ChatGPT usage, whereas sensitivity to rewards correlates with lower usage. Additionally, ChatGPT usage is associated with increased procrastination, memory loss, and decreased academic performance. The studies indicate that academic workload and time pressure have indirect effects on student outcomes through ChatGPT usage, highlighting the need for further research into how AI tools impact academic behaviour and success in research writing.

Table 1: Benefits and threats of AI in research writing
(Selected from meta-analysis)

Benefits	Threats
Breaking mental blocks when writing	Compromising academic performance
Making analogies between disparate concepts and ideas	Damaging memory retention
Improving titles, abstracts, and conclusions of manuscripts	Developing tendencies for procrastination
Identifying overlooked references	Inventing references or spurious correlations
Providing guidance on writing structure	Overlooking works with fewer citations arising from intrinsic biases
Levelling the playing field by facilitating composition for non-native English speakers	Perpetuating existing biases
Helping a writer be more thorough when covering a topic	Producing inconsistent or inaccurate outputs
Identifying hidden research gaps	Replacing critical thinking and thorough literature reviews

To sum up, these studies collectively provide a nuanced view of AI’s role in academic and scientific research. While AI tools like ChatGPT offer substantial benefits in terms of productivity and efficiency, they

also introduce challenges related to ethics, accuracy, and human judgement. The integration of AI into research practices requires careful management to ensure that technological advancements enhance scholarly work without undermining its integrity. The need for comprehensive policies, responsible usage, and ongoing critical evaluation is essential to navigate the evolving landscape of AI in research effectively.

DISCUSSION

As previously analysed, the use of AI in academic research and writing presents key challenges and ethical considerations that educators, policymakers, and researchers must consider. As AI tools become more prevalent, their ability to generate content based on patterns in training data can lead to issues of plagiarism and the preservation of authorship. The concern is that AI-generated content might inadvertently mimic or replicate existing literature, thus posing risks to the originality and attribution of ideas within academic work (Young, 2023).

Pedagogies for AI-enhanced Research Writing

Profound implications for teaching methodologies and the overall pedagogical landscape have been brought about by the integration of generative AI in educational settings. The evolving role of AI presents both opportunities and challenges that educators must navigate thoughtfully to enhance learning experiences while maintaining academic rigour and ethical standards.

First, research calls for balancing tradition and technology. Utilising a qualitative methodology, recent research (Maphoto et al., 2024) explores various approaches and applications of generative AI to enhance teaching and learning experiences. The study employs a triangulation of research instruments to comprehensively understand the potential influence between generative AI and academic writing. The researchers emphasize the importance of balancing technological integration with human oversight to uphold scholarly rigour and ethical standards. This

perspective suggests an urgent need for pedagogical strategies tailored to address the complexity of generative AI integration within academic curricula.

The second suggestion is teaching responsible generative AI use in research programmes, like PhD, Masters', etc. The ethical use of generative AI is a crucial component of its integration into education. Educators are encouraged to adopt transparent practices in the classroom, allowing students to explore AI technologies under guided supervision. This approach helps students develop ethical grounding and a practical understanding of academic integrity related to AI (Schmidli et al., 2023).

Enhancing AI literacy should also be included. AI literacy emerges as a cornerstone of contemporary learning. It involves understanding and interacting effectively with AI technology, encompassing technical knowledge and awareness of ethical and societal implications. AI literacy goes beyond traditional learning paradigms, equipping students with skills to navigate and harness AI in various aspects of life and work. This represents a fundamental shift in education, making AI literacy as crucial as reading, writing, and arithmetic (Stanford University, 2023). A well-rounded AI literacy program should cover several key components, such as:

- Introduction to AI concepts: Basic definitions and understanding of AI, its history, and evolution. This should cover different types of AI, such as narrow AI, general AI, and superintelligent AI.
- Understanding machine learning and technical foundations: An overview of machine learning, including different types of machine learning (supervised, unsupervised, reinforcement learning) and basic algorithms. This component can also be enriched through programming introductions (Walter, 2024).

Fostering critical thinking cannot be avoided in this AI generation. The integration of AI in education offers unique opportunities to cultivate critical thinking. AI systems, with their vast databases and analytical

capabilities, can present students with complex problems requiring higher-order thinking skills such as analysis, synthesis, and evaluation. By encouraging students to question, analyse, and think deeply about the information presented by AI, educators can promote a deeper understanding and critical engagement with AI-driven environments (Maphoto et al., 2024).

The field of AI literacy in research writing is still in its infancy and is having difficulty gaining traction. AI literacy is becoming more and more influential, which makes educators and policymakers are planning to incorporate it into curricula and instructional practices. The difficulty, though, is in promoting a deeper comprehension of AI's wider effects, which include social, psychological, and economic ones, in addition to technical expertise (Maphoto et al., 2024). In order to ensure that students have the knowledge and abilities to ethically navigate an AI-driven society, educators must design ways that strike a balance between technological breakthroughs and ethical issues as AI continues to alter education.

Practices in the AI-driven Research Landscape

Significant practical implications for both students and educators have been caused by the integration of AI tools into research writing. One approach to leveraging these tools is to supply them with detailed information about the course, the task, and the desired learning outcomes. This allows the AI to generate suggestions for criteria and descriptions, which can be further refined by educators. Such AI tools can be particularly useful for bulk editing and can export rubrics into various file formats for ease of use (Heaps, 2024). Moreover, frequent opportunities should be provided for students to corroborate the accuracy of AI-generated content. These tools, based on large language models, excel in producing coherent and natural-sounding text but may fall short in reliability and accuracy, especially when providing interpretations. Therefore, it is crucial for second/foreign language instructors to guide students in fact-checking and questioning AI

outputs to avoid reproducing any inherent biases present in the training data (Tseng & Warschauer, 2023).

In the realm of academic research, platforms like Scite.ai offer innovative solutions by analysing citation patterns and providing contextual information about how studies have been cited by other researchers. This feature aids scholars in better understanding the impact and reliability of published papers, thereby enhancing the credibility of their work (Yi, 2023). Similarly, AI tools like Research Rabbit can offer multiple benefits, such as keeping researchers updated with the latest developments, identifying research gaps, and improving efficiency by suggesting relevant studies based on recent publications (Fickenworth, 2024).

Finally, ethical considerations remain a priority when integrating AI into educational and research practices. As pointed out by several educators, while AI can significantly enhance language learning and research productivity, it is essential to ensure that these technologies serve as supplements rather than replacements for human effort (Maphoto et al., 2024). Embracing AI responsibly involves striking a balance between leveraging its capabilities and maintaining the ethical integrity of the educational process (UNESCO, 2024).

Perspectives on AI's Role in Research Writing

AI has entered educational practices, changing the way that research in academia is done and also considered. For example, the use of technological tools during this COVID-19 era has increased tremendously because remote teaching and learning have become a necessity so there is an astronomical surge in using more AI applications in higher education context from 2020. While wide-scale adoption occurred quickly, it often repeated old teaching practices and was less about discovering new AI-assisted pedagogies (see Crompton & Burke, 2023).

Regarding the use of AI in higher education, the high prevalence and rising tendency for the topic of application has appeared also related to AI increasing role (ahead along with publications' number), revealed by nearly two/three folds between 2021-2022 over the other years' values. Several researchers highlight the dearth in understanding collective affordances provided by AI and have stated that additional systematic reviews assessing how AI can transform education as a whole are necessary (Crompton & Burke, 2023). This will provide us with new patterns and insights related to AI in education and research for our part of this ongoing study.

Another outstanding perspective is about balancing ethical considerations and technological advancements. AI presents innovative opportunities to enrich educational experiences, but it also raises important ethical considerations. The decision-making process regarding AI's role in education requires a balanced approach that prioritizes ethical considerations, safety, and inclusivity (UNESCO, 2024). The challenge lies in finding the right balance between leveraging AI's potential and ensuring that education remains a human-centred endeavour.

Assessment practices also need to be impacted. The integration of AI in education and research calls for serious reconceptualization of traditional assessment practices. For example, conventional rubrics are often oriented toward the final product rather than the process of learning; thus, they overlook developmental strides taken by students, exercised critical thinking skills, etc. Following from this, to help redress these limitations, there is a pressing need to adapt and redesign assessment rubrics to better reflect the personalized learning experiences that AI has the potential to facilitate. This paradigmatic shift in the acknowledgment of uniqueness and creativity in student work is an important way toward deeper learning and professional success (Conway, 2024). The traditional dissertation model, of a length of about 200 pages or more and taking 3-4 years to complete, has already been seriously questioned in today's academic discourses. Debates are on as to whether such a long-drawn dissertation is at all relevant

any more in the changing scenario when research has undergone sea changes and advanced tools like AI are now at the disposal of one and all. Another aspect of the PhD dissertation for which time is a question is the duration, which does not take into account the efficiencies that modern technologies introduced into the research project, accelerating work. This shift is such a big one; it raises urgent questions as to what exactly, in certain chapters or sections of the dissertation, should be reconsidered or even restructured to reflect the demands of the current academic and technological landscape

CONCLUSION

Since most of the newest developments in generative AI tools relate to text creation, code production, and image generation, the nature of dissertation writing has changed. Now one of the biggest challenges to dissertation committees is how to understand what content was created by the doctoral candidate and what had been created by AI, according to Uzun (2023). This challenge is further confounded by AI's ability to wilfully work in the human or academic writing style, making this very hard to detect. The detecting tools available today may miss the detection of content created with the new AI technologies, especially considering their continually innovative path ahead. As a result, since AI tools further keep upgrading their potential, with time the efficacy of the detection mechanisms will always get eroded, thus remaining an issue for academic integrity.

From traditional research forms to including AI in content development, it marks a sea change in academic research practices. In this way, the role of AI and machine learning in knowledge production and dissemination will likely continue changing, thereby impacting the development of alternate research program outcomes and research (theses, dissertations, etc.) models in times to come. One of the emerging transformative practices of this shift is that AI as a search tool becomes popular among research students. Fast identification of relevant sources and analysis of a huge volume of data within a short time makes AI

greatly advantageous. It is important to understand that AI itself is a by-product of the data it gets trained on; hence, the information it produces can be misleading if not properly used, ethically developed, and used transparently. The concerns are now cropping up that an over-reliance on AI could actually diminish research students' writing skills, critical thinking, and evaluation, which may undermine the academic rigor traditionally associated with research.

In a nutshell, what do we expect from a research student anyway? The requirements for a research student cover a number of key aspects. Although AI technologies can detect writing flaws and provide insightful input on grammar, style, and structure (Diggs, 2023), their main function is to improve the final piece of work that is submitted. A research student must, however, also be a competent and confident academic writer who embraces his/her own voice to emphasise the importance of form in addition to content. Students should see writing as an ongoing cycle of refinement and revision since it is an iterative process. Furthermore, it is expected that the student would be creative, innovative, and generate new knowledge in order to push the boundaries of scholarly discourse and make a significant contribution to their subject.

Artificial intelligence disclosure

During the preparation of this paper, the author used ChatGPT to generate initial drafts of the abstract, the section titles and conclusion sections. Subsequently, the author reviewed and edited the content as necessary and assume full responsibility for the final publication.

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