RESPONSIBLE USE OF GENERATIVE AI IN SCIENTIFIC RESEARCH

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As a master's student engaged in academic research, understanding the proper application, limitations, and ethical norms of generative AI in scientific research is critical to upholding academic integrity, improving research efficiency, and ensuring the rigor of research outcomes. This article systematically elaborates on the practical value of AI in research, potential risks, normative application guidelines, and acceptable/unacceptable usage boundaries for doctoral research, combining the perspective of postgraduate research practice [1, 2, 4].

The Practical Value of Generative AI in Scientific Research. Generative AI serves as a powerful auxiliary tool in the entire scientific research process, significantly solving pain points such as time-consuming manual operations and information barriers, and bringing multi-dimensional improvements to graduate students' research work:

1. Efficient Search and Analysis of Scientific Publications. Manual literature reviews often take weeks or even months, while AI search engines (e.g., Consensus AI, Semantic Scholar) crawl massive academic databases to quickly identify relevant literature, generate core finding summaries, and help me analyze publication trends, pinpoint research gaps, and formulate scientific research questions at the early stage of the research project [3]. This not only saves a lot of time for sorting out literature but also ensures the comprehen siveness of the literature review.

2. Enhanced Understanding of Academic Texts. AI tools (e.g., Explain Paper, SciSpace) can simplify complex professional terminology, explain obscure scientific concepts, and concisely retell the content of lengthy papers. Tools supporting PDF interactive communication even allow me to ask questions about paper details or generate presentation outlines based on papers. In addition, multi-language support removes language barriers, enabling me to efficiently read and understand high-quality foreign literature that is not in my native language.

3. Automated Data Collection and Analysis. AI can automatically process large amounts of open-source data or database information to complete data collection, and more importantly, it can identify hidden patterns, trends and correlations in the data, reduce the risk of human error in large-scale data processing, and quickly output accurate analytical conclusions. For graduate students without extensive statistical analysis experience, tools like Julius AI also simplify data visualization and interpretation, laying a solid foundation for subsequent research discussions.

4. Improved Quality of Academic Writing. AI models (e.g., Quillbot, Wordvice.ai) provide stylistic optimization suggestions, automatic citation generation, and editing and proofreading services, effectively making up for deficiencies in grammar expression and text structure organization. Paraphrasing tools help me

polish the expression of research ideas, making the academic writing style more concise and professional and avoiding rigid "clerical-style" wording. Common tools like Grammarly also become a daily helper for checking the basic norms of writing.

5. Real-time Academic Integrity Inspection. AI plagiarism checkers can scan the completed text, compare it with massive academic databases, identify potential content borrowing, and even detect whether the text is generated by AI. This helps me proactively check the originality of the research manuscript in the writing process, and strictly abide by academic integrity norms before submission.

Potential Disadvantages and Risks of AI in Scientific Research. While AI brings convenience to research, it also has inherent limitations and potential risks that graduate students must remain vigilant about in practice:

1. Risks of Violating Academic Integrity Principles. AI generates content based on existing data and models, and improper use (e.g., directly copying AI-generated text as one's own research results) will lead to a lack of scientific value of the research and even be identified as plagiarism [5]. At the same time, AI cannot replace the independent thinking and research of researchers, and over-reliance on AI will also weaken the core research capabilities of graduate students.

2. Probability of False Detection Results. AI text detection tools (e.g., the once-used Turnitin detector) have algorithm limitations, and may misidentify human-written text as AI-generated, leading to false results. This reminds me that AI detection results cannot be regarded as the only criterion, and manual review and verification are still needed for controversial content.

3. Superficiality of Information Analysis. AI can process a large amount of information, but its analysis is often superficial, especially when it relies on outdated or non-authoritative sources. For in-depth scientific research, it is necessary to combine up-to-date data from reliable sources (e.g., core journal papers, official statistical databases) for manual in-depth analysis, and AI can only serve as an auxiliary means.

4. Inaccuracy in Academic Text Translation. Although AI can complete the preliminary translation of scientific papers, academic translation requires professional disciplinary knowledge, and AI translation is prone to errors in professional terminology and logical expression. Imperfect translation may lead to the rejection of papers in peer review, so important academic translations still need to be completed by professional translators to meet the requirements of authoritative databases such as Scopus and Web of Science.

Core Recommendations for the Responsible Use of Generative AI by Researchers. As a graduate student, abiding by the ethical norms of AI use and implementing the following recommendations in research practice is the basic requirement to ensure the validity and integrity of research:

1, Bear Ultimate Responsibility for Scientific Research Outcomes, I am fully accountable for the content generated with the help of AI, and maintain a critical attitude towards AI output, clearly recognizing its limitations such as bias, hallucinations and inaccuracies. AI can never be the author or co-author of research

results, as authorship is accompanied by subjective initiative and responsibility that only humans have. In addition, I will never use AI-fabricated materials (e.g., falsified data, fake citations) in the research process.

2. Implement Transparent AI Use Norms. I will detail the generative AI tools used in the research process (including name, version, usage time, and specific application scenarios) in the research paper or research report. In line with open science principles, if necessary, I will make the input prompts and AI output content public. At the same time, considering the randomness of AI output (the same prompt may produce different results), I will ensure the reproducibility and robustness of research results, and disclose the limitations of the used AI tools and corresponding mitigation measures in the research.

3. Pay Close Attention to Privacy and Intellectual Property Protection. When uploading sensitive information (e.g., unpublished research drafts, original experimental data, research prompts) to AI systems, I will first confirm the tool's privacy policy to avoid the data being used for AI model training without permission. I will not upload the personal data of third parties to online AI tools without the consent of the data subject, and strictly comply with EU data protection regulations and national relevant laws and regulations. In addition, I will understand the technical and ethical implications of the tool, including the operator, operation server location, and data usage rules, and prioritize closed or privacy-guaranteed AI platforms for sensitive research content.

4. Abide by Relevant National and International Legislation. In the process of using AI output, I will strictly check for plagiarism of text, code, images and other content, respect the authorship of others, and cite the relevant research results properly. If the AI output contains personal data, I will handle it in accordance with the law and follow the EU data protection rules.

5. Continuously Learn and Master the Proper Use of AI Tools. Generative AI tools are updated and evolved rapidly, and I will actively participate in relevant training courses, keep abreast of the latest best practices of AI in scientific research, and share useful experience with classmates and supervisors. Continuous learning helps me maximize the advantages of AI and avoid research risks caused by unskilled use.

6. Avoid Using AI in Sensitive Research Activities. I will refrain from using generative AI in activities that may affect other researchers or institutions (e.g., research evaluation, peer review), so as to avoid unfair treatment caused by AI's limitations such as hallucinations and bias. At the same time, this can also protect the unpublished original research results of other researchers from being exposed or included in AI models without permission.

Regulated Boundaries of Generative AI Use in Doctoral Research. Combined with the research norms for doctoral students, generative AI use is divided into unacknowledged permitted use, use subject to supervisor agreement, and unacceptable use, and I will strictly abide by these boundaries in my postgraduate research and future doctoral research:

1. Permitted Use (No Acknowledgment Required)

- Use of proofreading tools (e.g., basic grammar and spelling checks by Grammarly) to optimize writing norms;
- AI-assisted personal study (e.g., using AI to explore and understand complex disciplinary concepts), but this does not include primary research work. My core research capabilities such as information analysis, synthesis and critical evaluation must be completed independently, and AI can only be used to assist in the development of these capabilities;
- Use of specific AI assistive software to ensure inclusive research (e.g., using voice recognition AI for research with physical disabilities).

2. Use Subject to Prior Discussion and Agreement with Supervisor. Common AI applications that require supervisor approval include: AI-accelerated literature review, brainstorming and clarifying research questions and intervention plans, data management and analysis, image/text generation, AI-assisted coding and data visualization. For any AI-generated materials included in the research results to be assessed, I will fully acknowledge the role of AI in the paper and clearly mark the relevant content.

3. Unacceptable Use (Leading to Research Misconduct). AI-generated content must never replace the independent research and learning of doctoral candidates, nor misrepresent their understanding of disciplinary knowledge, concepts and research techniques. The main unacceptable usage scenarios that I must strictly avoid are:

- Fabrication: Creating non-existent research results, data, literature citations through AI and presenting them as real content (e.g., citing AI-generated fake research papers);
- Falsification: Inappropriately manipulating research results, processes and data through AI, and presenting AI-generated content without verifying its validity and authenticity;
- Plagiarism: Presenting AI-paraphrased academic content or AI-generated text/code as one's own research results without acknowledging AI-assisted authorship;
- Misrepresentation: Suppressing relevant research results, making false claims about authorship, or using AI-assisted advanced editing tools (e.g., Grammarly Premium) in doctoral theses that are not permitted by the regulations.

My Practical Experience with AI Literature Review Tools. There are a variety of AI literature review tools available for researchers, and I have tried some of them in my postgraduate research practice, and summarized their advantages and limitations as follows:

- Consensus AI: Advantages – quickly search massive databases, filter high-quality research papers, and generate conclusion summaries for specific research questions; Limitations – the coverage of some niche disciplinary literatures is insufficient, and the depth of analysis is limited;
- SciSpace: Advantages – with advanced semantic search capabilities, it can accurately match relevant literature and help understand complex academic content;

Limitations – the free version has restrictions on the number of literature views and analysis times;

- Research Rabbit: Advantages – build a personalized research library, automatically recommend relevant papers based on existing literature, and realize visual display of literature connections; Limitations – the recommendation algorithm is more inclined to mainstream research directions, and it is difficult to find innovative and frontier niche literature;
- Scholarcy: Advantages – summarize complex long papers, extract core points and citations, and build a searchable research library; Limitations – the summary of highly theoretical papers is easy to lose key logical links.

In practice, I always use a combination of multiple AI tools and manual review, using AI to complete the preliminary sorting and screening of literature, and then conducting in-depth reading and critical analysis of core literature manually, which balances research efficiency and research rigor.

Conclusion: For master's and postgraduate students, generative AI is a "double-edged sword" in scientific research. It can significantly improve research efficiency, break through information and technical barriers, and become a powerful research assistant; however, its inherent limitations and potential ethical risks require us to maintain a rational and critical attitude. In the research process, I will always take the responsible use of AI as the basic principle, abide by the relevant norms and boundaries, take human independent research as the core, and use AI as an auxiliary tool on the premise of obtaining supervisor approval (when necessary). At the same time, I will keep learning the latest use methods of AI tools, continuously improve my ability to use AI for scientific research, and ensure that the research results are rigorous, authentic and in line with academic integrity norms. Only in this way can we maximize the value of AI in scientific research and lay a solid foundation for the completion of postgraduate research tasks and future academic development.

Literature:

1. Application of Artificial Intelligence in Education, (specialty 011 – Educational, pedagogical sciences), 2 semester https://pns.hneu.edu.ua/course/view.php?id=12738
2. Complex training session, (specialty 011 – Educational, pedagogical sciences), 2 semester https://pns.hneu.edu.ua/course/view.php?id=10770
3. Kang, Q., Ryblova, A. N. Extracurricular individualization of research activities of foreign master's students: tutor support through library information resources. *Science for Education Today*. 2020. № 2. P.7–21.
4. Kolomiiets A., Kolomiiets D., Kushnir O. Vplyv shchuchnoho intelektu na filosofiiu osvity ta pedahohichnoi nauky **[The Impact of Artificial Intelligence on the Philosophy of Education and Pedagogical Science].** Naukovi zapysky VDPU imeni Mykhaila Kotsiubynskoho. Seriia: Pedahohika i psykholohiia. – V. 84. – 2025. – S. 7–13. – Rezhym dostupu: https://www.researchgate.net/publication/399102381

5. Sladkykh I. Pedagogy of Higher Education: Ethical Aspects of Artificial Intelligence Usage by foreign Master's Students. Naukovi zapysky VDPU imeni Mykhaila Kotsiubynskoho. Seriia: Pedahohika i psykholohiia. – Vyp. 85. – 2026. – S. 127–137.