

Research on Research Integrity Issues of Artificial Intelligence in Academic Writing and Solutions

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Abstract

Abstract: [Objective] To systematically review the research integrity risks triggered by AI-assisted academic writing and propose countermeasures. [Method] Systematically summarize misconduct manifestations in AI writing and literature review, and design a prevention framework from three dimensions: ethics education, technical regulation, and institutional policy statements. [Results] Construct a comprehensive governance scheme covering “awareness-technology-rules”, which can reduce the probability of misconduct such as AI ghostwriting and data fabrication. [Limitations] The countermeasures still lack interdisciplinary empirical validation, and do not fully discuss the impact of generative AI iteration speed on regulatory timeliness. [Conclusion] Multi-stakeholder collaborative governance can maintain academic authenticity and public trust in the AI era.

Full Text

Research and Solutions to Research Integrity Issues Arising from AI in Academic Writing

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Abstract:

[Objective] To map research integrity risks triggered by AI-assisted academic

writing and propose countermeasures. **[Methods]** Systematically catalog dishonest behaviors in AI writing and reviewing, and design a prevention framework spanning ethics education, technical oversight, and institutional disclosure. **[Results]** A comprehensive “awareness-technology-rules” governance package was constructed that can reduce the incidence of AI ghost-writing, data fabrication, and other misconduct. **[Limitations]** The countermeasures lack cross-disciplinary empirical validation, and the impact of rapid generative-AI iteration on regulatory timeliness is not fully addressed. **[Conclusions]** Multi-stakeholder collaborative governance can safeguard academic truth and public trust in the AI era.

Keywords: artificial intelligence; academic writing; research integrity problems

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Academic writing constitutes a vital component of scientific research, characterized by structured expression of ideas, data-driven arguments, and rigorous logical reasoning. With the rapid advancement of artificial intelligence (AI) technology, AI applications in academia—particularly in academic writing—have proliferated [1]. Numerous studies have examined the effectiveness of AI writing tools in higher education. For instance, Miranty and Almusharraf et al. [2,3] investigated the impact of Grammarly, an AI-based grammar checker, on undergraduate writing skills, finding that graduate students using Grammarly demonstrated improved grammatical accuracy and writing quality compared to control groups. Similarly, Farrokhnia and Rospigliosi et al. [4,5] utilized the AI language model ChatGPT to assist graduate students in generating research proposals, revealing that its output proved valuable for providing initial ideas and conceptualizing topics. Through continuous dialogue with researchers, AI learns and optimizes its assistance, supporting scientific research and academic writing through three primary functions: (1) **Brainstorming**: leveraging big data processing capabilities to retrieve, recommend, and synthesize existing data, providing inspiration, materials, or information support to uncover more in-depth research content and ideas; (2) **Content generation and editing**: rapidly generating text, code, and images to assist with abstract writing, keyword extraction, language polishing, and machine translation; and (3) **Literature review**: facilitating comprehensive cross-disciplinary and multimodal knowledge association to help researchers better understand knowledge domains and quickly distill core content.

As a novel “medium,” AI-driven writing tools offer considerable convenience. However, large-scale user exploration has gradually revealed the technical boundaries of AI algorithms, raising concerns that the paradigm shift brought by AI may pose new challenges to research integrity within existing frameworks. The lack of transparency in AI’s implementation basis and usage process

results in generated content without clear attribution of data sources, which not only undermines scientific transparency but also triggers concerns about the authenticity and reliability of AI-generated content. Since AI is merely a statistical model incapable of generating original ideas or fully comprehending the meaning of prompts, it may produce plausible yet false information. For example, in a proof-of-concept study by Martin et al. [6], ChatGPT powered by the GPT-3 language model was used to generate a fraudulent article in neurosurgery. Experts in neurosurgery, psychiatry, and statistics subsequently reviewed the article for accuracy and coherence, comparing it with existing publications. The study found that while the fraudulent article resembled genuine scientific papers in word usage, sentence structure, and overall composition, it exhibited significant problems and errors, particularly in reference citation [7]. During “black box” evaluations of ChatGPT, researchers observed that even when fed fictional information, the language model would generate associated false content following the user’s line of reasoning. Furthermore, given ChatGPT’s ability to generate coherent and plausible text, educators have grown concerned about its potential negative impact on graduate students’ independent thinking and writing skills. Several universities have implemented countermeasures: New York University faculty have classified ChatGPT use as academic misconduct and explicitly prohibited it in course syllabi, while the University of Hong Kong has issued campus-wide emails emphasizing the strict prohibition of ChatGPT and similar AI writing assistants in all classroom tasks, assignments, and assessments. Nevertheless, if used appropriately, AI technologies like ChatGPT can significantly promote the development of graduate students’ critical thinking and innovative capabilities. This paper therefore aims to discuss various research integrity issues that may arise during AI-assisted academic writing and literature review, proposing a series of countermeasures to address potential challenges and foster a healthy academic environment.

2.1 Overview of AI Writing Tools

According to the 2022 *White Paper on Artificial Intelligence Generated Content (AIGC)* [8], AI applications in academic paper creation can be categorized into imitation-based creation and concept-based creation, depending on the creative approach. In imitation-based academic writing, AI first analyzes and studies the characteristic patterns of existing human papers, then uses generative models to create content following these patterns. In contrast, concept-based academic writing moves beyond mere observation and emulation of specific data, instead extracting abstract concepts from massive datasets and recomposing different textual elements based on input concept keywords to produce innovative academic outcomes. Currently popular AI writing tools include ChatGPT, Kimi, Doubao, and DeepSeek.

ChatGPT (Chat Generative Pretrained Transformer), developed by OpenAI, has maintained high popularity since its release on November 30, 2022 [9]. As

a deep learning-based natural language processing technology, ChatGPT includes multiple models such as GPT-4, GPT-4o, and GPT-4o mini, demonstrating strong text generation capabilities. Its appeal lies in providing grammar correction, paper optimization, and logic clarification services through text interaction, offering targeted improvement suggestions. Additionally, the tool can intelligently recommend relevant literature based on users' conversation history and current questions to assist with resource retrieval. Starting from April 2025, the GPT-4o model supports mixed input of text, voice, and images, providing instant responses to voice queries with a 50% faster response time. The model also features real-time web search, breaking through the time limitations of its knowledge base—users can manually enable the “real-time search” option to access the latest information from 2025. For file processing and code generation, it can directly read Word, PDF, and Excel files for content analysis while supporting code writing and debugging in programming languages such as Python and JavaScript, making it highly applicable for academic data processing. Consequently, many scholars utilize this technology for literature searching, outlining, and idea organization to improve writing efficiency and quality.

Compared with ChatGPT, AI writing tools like Kimi and Doubao are better suited for Chinese-language writing contexts. In content creation, these tools can deeply expand on academic topics, integrating the latest research findings and theories to output logically rigorous and well-argued paragraphs. They can also assist in writing different modules such as abstracts, introductions, and discussion sections while highlighting research focal points. Regarding formatting standards, they provide reference arrangement in various academic citation formats (e.g., APA, MLA, Chicago) and adjust paper formatting according to journal requirements. For assisted revision, they can perform grammar correction and semantic optimization to enhance expression accuracy and fluency, while also helping analyze data and interpret literature to facilitate efficient academic writing tasks. Additionally, DeepSeek, an intelligent interactive system independently developed by the Chinese AI enterprise DeepSeek, has rapidly attracted attention from academia and industry since its 2024 launch due to its specialized capabilities in vertical domains. The latest DeepSeek-R1 version features an academic enhancement suite supporting cross-language literature intelligent retrieval, research hotspot analysis, and structured paper generation. Its built-in code interpreter can directly process scientific datasets from SPSS, MATLAB, and other platforms to generate visual analysis reports. Notably, the system employs knowledge distillation technology to improve model inference efficiency by 60%, significantly reducing computational power consumption while maintaining output quality—a feature that has made it widely popular in university laboratories and industrial research institutes [10]. While these AI writing tools offer diverse specialized capabilities, maintaining academic integrity and ensuring generated content meets standards of originality and authenticity remains paramount.

2.2 AI's Enhancement of Writing Efficiency

AI demonstrates remarkable performance in saving writing time. Traditional writing processes often require extensive time for material collection, conceptualization, drafting, and repeated revision. AI technology streamlines these steps, making them more efficient. For instance, Semantic Scholar (<https://www.semanticscholar.org/>), an AI-driven literature search tool, utilizes AI algorithms to quickly provide researchers with relevant academic papers and citations, substantially shortening material collection time. This efficient retrieval capability allows researchers to devote more time to analysis and writing. Second, AI offers significant advantages in improving grammatical accuracy and language quality. For many authors, particularly non-native English speakers, correct grammar and vocabulary usage presents a major challenge. AI grammar checking and language optimization tools such as Grammarly (<https://www.grammarly.com/>) and ProWritingAid (<https://prowritingaid.com/>) automatically detect and correct grammatical errors, spelling mistakes, and stylistic issues. These tools also provide detailed explanations and suggestions to help authors understand the nature of errors and improve their language proficiency. In academic writing, AI also provides powerful auxiliary functions. Turnitin's Feedback Studio (<https://www.turnitin.com/products/feedback-studio>) employs AI technology not only to detect plagiarism but also to provide targeted writing feedback, helping graduate students and researchers improve paper originality and quality. Additionally, the writing assistance tool Scrivener (<https://www.literatureandlatte.com/scrivener/overview>) helps authors better manage large documents and complex writing projects through AI-optimized organization and planning functions.

However, AI tools may also have limitations in handling complex logical relationships and in-depth professional knowledge. Therefore, authors must carefully review and edit AI-generated content to ensure information accuracy and reliability. Overall, AI's enhancement of writing efficiency is evident—it saves time, improves grammatical accuracy, provides targeted writing feedback, and has become an indispensable tool in modern writing. As AI technology continues to develop, we can anticipate that AI will play an even more important role in future writing domains, bringing authors greater convenience and possibilities.

2.3 Attitudes of Domestic and International Academic Institutions Toward Generative AI Like ChatGPT in Academic Writing

The application of text-generating language models like ChatGPT in academic writing has sparked widespread societal concern about its impact on academic ethics. Many renowned international academic institutions have introduced relevant regulations restricting the use of generative AI like ChatGPT. For example, *Science* magazine has stated that text, data, and figures directly generated by ChatGPT and similar tools cannot be used directly in academic papers, and authors must disclose the extent of AI tool involvement in their writing [11].

Domestic academia has also paid close attention to the impact of AI tools like ChatGPT on academic ethics. Several Chinese journals, including *China Cancer* [12] and *Shanghai Nursing* [13], have issued regulations on using ChatGPT or other generative AI technologies in paper writing and review processes. Additionally, Luan Yufan et al. [14], based on ChatGPT's operational logic and from the perspective of objectivity in academic ethics issues, analyzed the academic ethics crisis brought by generative AI, including risks of academic fraud, authorship disputes, and blurred objectivity in talent evaluation. You Junzhe [15] proposed that the powerful "human-like expression" capability of generative AI like ChatGPT transforms research methodologies, impacting existing research evaluation rules and thereby creating risks of researcher misconduct and fraud in scientific activities. Wang Youmei et al. [16] traced ChatGPT's development and characteristics, analyzing from game theory perspective the ethical risks in its research application, including data privacy leakage and misuse, the "black box" problem of machine algorithms, and loss of balance in academic fairness. Evidently, the involvement of generative AI like ChatGPT in academic writing presents multi-dimensional impacts on academic ethics, making it imperative to resolve the academic ethics crisis in the digital intelligence era. From domestic discussions, evaluations of ChatGPT's role in academic writing are mixed. On the positive side, the tool can significantly enhance research efficiency, help researchers expand intellectual boundaries, and serve as a capable assistant in background literature retrieval, citation recommendations, and paper content creation and revision. However, excessive reliance on such software may foster intellectual dependency, potentially weakening innovative capabilities and disrupting academic norms. Researchers should therefore adopt a cautious attitude, rationally weighing pros and cons based on their own academic competence and professional knowledge.

2.4 AI's Challenge to Research Integrity

We designed experiments to test the authenticity and accuracy of ChatGPT as a writing tool. In Experiment 1, ChatGPT was prompted to write an article on "how matrix stiffness affects the immunomodulatory capacity of mesenchymal stem cells." We also issued a separate command to provide references for the generated article and conduct a critical analysis of those references. The format of ChatGPT's output is shown in Figure 1

A.

Following our instructions, ChatGPT produced an article that appeared correct. However, we could not access all the references obtained through ChatGPT via internet resources (Figure 1B), suggesting that ChatGPT had incorrectly listed these references in the article.

Figure 1. Using ChatGPT to generate a research paper (A) and ChatGPT providing references for the test paper (B).

**Figure 2

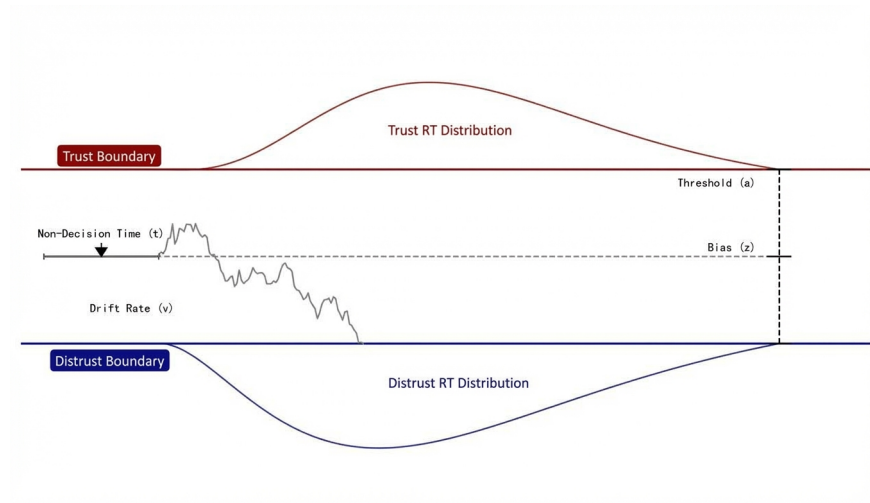


Figure 1: Figure 1

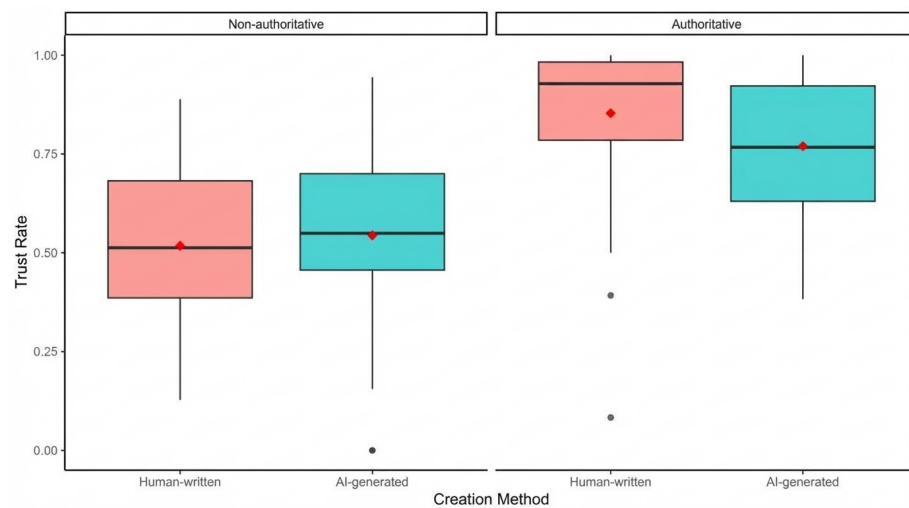


Figure 2: Figure 2

.** Search results for Reference 1' s title in PubMed (A), Google search engine (B), and the provided journal' s official website (C).

Furthermore, we conducted a rigorous review of the references provided by ChatGPT for the test paper. Reference 1—Wang, Y., et al. (2020). *Matrix stiffness regulates the immunomodulatory properties of mesenchymal stem cells via MCP-1 secretion*. *Stem Cell Research & Therapy*, 11(1), 236—could not be found when searching its title directly in PubMed or Google (Figure 2A-B). We further searched within the provided journal (*Stem Cell Research & Therapy*), an international peer-reviewed journal focused on stem cell therapy translational research published by BioMed Central since 2010. Searching the journal' s official website for this article' s title yielded no relevant records (Figure 2C), indicating that Reference 1 cited by ChatGPT does not exist.

Similarly, Reference 3—Kim, J., et al. (2017). *Matrix stiffness modulates macrophage immunomodulation*. *International Journal of Cell Biology*, 2017, 1-10—was shown by ChatGPT as published in *International Journal of Cell Biology*, a Hindawi-published international journal focusing on cell biology that was not indexed in the Chinese Academy of Sciences JCR rankings in December 2022 or 2023. PubMed and Google searches for this article also found no such publication (Figure 3

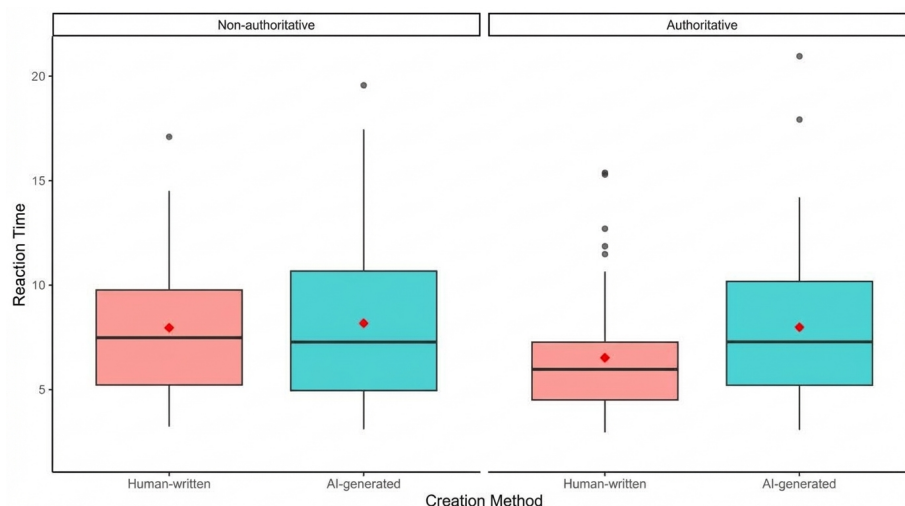


Figure 3: Figure 3

A-B). We additionally conducted thorough searches on the journal' s homepage and the purported volume where the article was allegedly published. As shown in Figure 3C, no such record was found, again demonstrating that ChatGPT creates references that are entirely fabricated and completely erroneous. This shows that AI programs like ChatGPT cannot replace the human brain. Overall, since ChatGPT-generated references cannot be matched in academic resources,

this suggests these references do not derive from real scholarly works but are instead constructed by the program, lacking academic citation accuracy and reliability.

Figure 3. Search results for Reference 3' s title in PubMed (A), Google search engine (B), and the provided journal' s official website (C).

Next, we saved the content generated by ChatGPT in the previous experiment as a Word file and uploaded it to GPTZero, which claims to detect AI-generated text. However, the results indicated that GPTZero assessed the probabilities of the text being written by human, AI, or a mixture as 86%, 13%, and 1%, respectively (Figure 4 [FIGURE:4]A-B). Therefore, while the program claims accuracy, this is not the case. Additionally, we conducted plagiarism detection on the ChatGPT-generated content. The Turnitin detection report stated that "approximately 21% of the document' s text is similar to text from other sources, and 100% was detected as AI-generated content" (Figure 5 [FIGURE:5]A-B). Based on these experiments, we conclude that inappropriate use of ChatGPT and similar AI in scientific writing will lead to misinformation dissemination. Possible reasons for this practice include: researchers using AI tools to quickly complete writing tasks due to tight deadlines; researchers relying on AI tools to compensate for insufficient research resources or literature; researchers sacrificing quality for publication quantity due to various pressures; and some researchers not fully recognizing the ethical and legal consequences of improper AI tool usage. These factors may prevent researchers from accurately distinguishing between original text and AI-generated text and references.

Figure 4. GPTZero' s probability assessment of the test paper being written by human, AI, or a mixture (A-B).

Figure 5. Turnitin plagiarism detection report for the test paper.

Research Integrity Issues and Solutions in AI-Assisted Academic Writing

Research Integrity Issues in AI-Assisted Academic Writing

Based on the above experiments, we can see that generative language models like ChatGPT can rapidly produce seemingly fluent and logical text in current academic writing processes. While enhancing research efficiency, this also creates new avenues for research integrity issues in academic writing. First, AI-generated content lacks originality—it relies on learning from and imitating vast amounts of existing data, essentially constituting splicing and recombining of existing information. Therefore, researchers relying on AI for paper writing may inadvertently produce content highly similar to existing literature, which is often considered plagiarism. Second, when generating text, AI tools often cite academic resources or information sources, but their citation methods may be inaccurate or non-standard. AI cannot understand academic citation standards and norms, and its generated citations may be fabricated or erroneous.

Additionally, AI-generated text lacks deep understanding of academic literature and may take certain information fragments out of context, leading to misinterpretation or distortion of originally accurate theories or viewpoints. Therefore, in Table 1, we categorize the research integrity issues arising from AI tools in academic writing based on the nature and impact of the problems into: fabricated citations, erroneous citations, out-of-context quotations, inappropriate citations, patchwork generation, and citing unreliable sources. These issues not only damage the rigor of academic research but also threaten trust within the academic community.

Table 1. Categories of research integrity issues arising from AI tools in academic writing

Issue Type	Description	Manifestation
Fabricated Citations	Citing sources that do not exist or are completely fabricated, misleading readers	False references or forged journal data
Erroneous Citations	Citing incorrect literature or information and failing to attribute properly	Incorrectly citing a paper and providing inaccurate research results
Out-of-Context Quotations	When quoting fragments from literature, removing them from context to mislead readers	Quoting partial paragraphs from literature, altering original meaning
Inappropriate Citations	Citing sources with weak relevance or inappropriate sources lacking academic value	Citing non-academic literature or failing to provide proper background
Patchwork Generation	Piecing together multiple literatures without properly integrating ideas or extracting original viewpoints	Splicing content from multiple papers without original analysis
Citing Unreliable Sources	Citing information sources that are not credible or are themselves questionable, affecting paper quality	Citing low-quality journals or articles without peer review

Furthermore, current research integrity supervision mechanisms have significant

shortcomings. On one hand, existing academic detection tools struggle to identify the originality of AI-generated content—many plagiarism detection systems primarily rely on comparison with existing literature databases and lack effective means to identify AI-generated content. On the other hand, academic journals and institutions lack effective review mechanisms for AI-generated text during the examination process, failing to adequately identify potential academic misconduct. These deficiencies create regulatory blind spots in academia under AI technology application and exacerbate academic risks. In addressing these issues, the academic community needs to strengthen norm-setting for AI tool usage, establish more comprehensive research integrity supervision mechanisms, and intensify review of AI-generated content to prevent potential academic misconduct.

3.2 Strengthening Researchers' Ethical Awareness of AI Tool Usage

While the popularization of AI-assisted writing tools has played an important role in improving work efficiency and optimizing research outcomes, strengthening researchers' ethical awareness of AI tool usage is particularly crucial. First, researchers should enhance their ethical awareness through systematic training and courses. For example, AI-generated content may inadvertently infringe on others' copyrights, or generated citation information may be inaccurate, potentially leading to plagiarism and academic misconduct. Training courses should emphasize these potential issues and teach how to identify and avoid these ethical pitfalls. By strengthening ethical awareness, researchers can be more cautious when using AI tools and avoid improper behavior. Second, researchers should actively comply with ethical norms when using AI-assisted writing. For instance, when using AI to generate content or automatic citations, researchers should clearly indicate AI usage and accurately note which parts were assisted by AI tools. Meanwhile, researchers should maintain critical thinking toward AI-generated content, not blindly relying on results provided by AI tools, but instead combining their own academic judgment for proofreading and revision to ensure generated content meets academic standards. In the education process, case analysis, discussion, and practice should help researchers understand the applicable scope and limitations of AI technology, guiding them to remain vigilant when using these tools to avoid quality degradation in academic work due to over-reliance on AI tools. Finally, research institutions should provide clearer ethical guidance and policy support. Research ethics committees and academic journal editorial departments should formulate relevant policies and guidelines in response to AI technology's rapid development, clearly specifying norms for AI tool usage in research writing. Institutions should also regularly organize ethics lectures and discussion sessions, inviting experts to share ethical issues and solutions in AI tool usage, enhancing researchers' sense of moral responsibility. Through comprehensive ethics education and training, researchers will be better equipped to understand and address challenges posed by AI technology, thereby improving their academic ethical standards.

3.3 Enhancing Supervision Capabilities Through Technical Means

In today's academic environment, continuous technological development provides important support for enhancing supervision capabilities, particularly AI-based plagiarism detection and literature citation accuracy verification systems. These technologies can not only improve supervision efficiency but also provide stronger safeguards for maintaining academic integrity. Plagiarism detection tools play a crucial role in academic writing and publishing. Turnitin, one of the most commonly used plagiarism detection tools, identifies text similarity by comparing submitted papers against its vast database and generates detailed similarity reports. This tool's working principle relies on text-matching technology that can precisely identify plagiarized portions, whether directly copied text or modified content. Turnitin can detect not only traditional plagiarism but also identify differences from traditional human writing by analyzing text structure, content repetitiveness, and emotional variations, helping distinguish AI-generated content from human-created text. It can also evaluate content innovation and background understanding through semantic analysis to further determine AI generation. Beyond plagiarism detection, another important issue is completely erroneous citations such as AI-generated fake references. To prevent this problem, specialized algorithms need to be developed and applied to detect these false citations. Specific technical approaches may include: (1) **Citation consistency checking**: developed algorithms should interface with academic databases (such as Google Scholar, PubMed, etc.) to automatically verify the authenticity of cited literature, ensuring cited works exist in databases and match actual content; (2) **Literature content analysis**: developed algorithms should analyze cited literature content to ensure the topic and content of cited works match the paper's actual discussion, preventing AI from arbitrarily splicing unrelated literature during content generation; and (3) **Contextual understanding**: developed algorithms need enhanced contextual understanding capability to avoid out-of-context citation issues. For instance, certain literature may be cited to support a viewpoint when the original meaning does not entirely align with the citer's argument. Enhanced contextual awareness can better ensure cited literature accurately reflects its original intent. Additionally, establishing automated review mechanisms is crucial for ensuring citation accuracy. Through regular checks and verification of AI-generated content authenticity, potential erroneous or false citations can be identified promptly, ensuring academic work quality.

3.4 Establishing Transparent Usage Declaration Mechanisms and Promoting Academic Rule Updates

Research by Zheng Wenwen et al. from the Institute of Scientific and Technical Information of China [17] shows that while publishers and institutions have formulated usage policies for AI-generated content targeting authors, editors, and reviewers, requirements for authors in academic publishing are relatively specific and comprehensive, though not yet unified, while requirements for editors

and reviewers are fewer, with some publishers and institutions not proposing specific regulations. To address these challenges, the academic community urgently needs to establish transparent usage declaration mechanisms and promote relevant rule updates to ensure AI technology compliance in research. First, establishing transparent usage declaration mechanisms is fundamental to ensuring research integrity. To avoid over-reliance on AI, plagiarism, or improper citation, academic institutions can require researchers to explicitly declare AI tools used and their specific purposes in papers. For example, researchers can state in the methods section or acknowledgments: “This study used OpenAI’s ChatGPT tool to assist in generating preliminary paper drafts” and “During data analysis, AI data analysis tool X was used.” Such declaration mechanisms not only enhance paper transparency but also enable peer reviewers and readers to more clearly understand the technical means authors relied on during research, thereby avoiding academic misconduct from improper AI tool usage. Additionally, publishing institutions can implement measures to ensure AI usage compliance. For instance, journals can require submitted papers to follow strict norms regarding citations and generated content, establishing specialized review mechanisms to examine whether AI tool usage complies with academic ethics requirements. If papers fail to properly label AI-generated portions, publishing institutions can require authors to make corrections or even reject the paper. This not only promotes research integrity but also prevents AI technology abuse in academia. Finally, schools and educational institutions should also play active roles in this process. Schools can incorporate AI ethics and AI tool usage norms into curricula to help graduate students understand correct AI usage in research. Educational institutions should also issue relevant statements clarifying their stance on AI tool usage and explicitly specify labeling requirements for AI-generated content in academic norms to ensure students follow these principles in future academic work.

AI undoubtedly plays a positive role in improving academic writing efficiency and quality, but its usage involves numerous gray areas that lead to research misconduct and ethical violations, hindering development in academic publishing and disrupting orderly research activities. Therefore, we must cautiously address its potential negative impacts while promoting AI technology’s broad application in academic writing. This paper summarizes research integrity issues arising from AI in academic writing and proposes several recommendations. First, the academic community should strengthen supervision of AI tool application in academic writing, formulating clear ethical and behavioral norms. Second, scholars should maintain high academic ethical awareness when using AI, ensuring content originality and proper citation. Meanwhile, academic publishing platforms and journals should enhance AI detection technology development to promptly identify potential misconduct. However, this study has certain limitations, mainly regarding limited data coverage and insufficient sample size. Future research can explore more advanced AI content detection methods and strengthen development of automated review technology for AI-generated content to ensure authenticity and credibility of academic achievements. Ad-

ditionally, further exploration of how to balance AI technology and academic ethics can ensure coordinated development between technological progress and research integrity.

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Hou Xiangyi: Designed experiments and drafted manuscript;

Danzeng Lamu, Sun Yidi: Collected and analyzed data;

Wang Yishu: Revised final manuscript version.

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