Empowering the Integration of Scientific Journals and New Media through AIGC: Model Innovation and Practical Pathways

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Abstract: The rapid development of Artificial Intelligence-Generated Content (AIGC) technology is profoundly transforming the publishing ecosystem of scientific journals. Based on the Diffusion of Innovations theory, this paper systematically explores the application models and innovative pathways of AIGC technology in the integration process of scientific journals and new media. The study finds that AIGC not only reconstructs the content production workflow of scientific journals but also drives fundamental changes in communication models. By analyzing typical domestic and international cases, this paper proposes a three-stage practical framework of "technology adaptation–process reengineering–ecosystem reconstruction," providing actionable implementation plans for the digital transformation of scientific journals. The research also highlights that in advancing AIGC applications, special attention must be paid to ethical norms, quality control, and talent development as critical issues.

Keywords: AIGC; Scientific journals; Media convergence; Intelligent publishing; Digital transformation

1. Introduction

Currently, scientific journals are facing significant opportunities and challenges in digital transformation. According to the *Blue Book of China's Scientific Journals (2023)* released by the China Association for Science and Technology, the integration of new media in China›s scientific journals remains at an early stage, with less than 20% of journals achieving fully digitalized publishing processes[1]. Against this backdrop, the breakthrough progress in Artificial Intelligence-Generated Content (AIGC) technology provides new technical support and developmental pathways for the transformation and upgrading of scientific journals.

AIGC technology refers to the use of artificial intelligence algorithms to automatically generate text, images, audio, video, and other forms of content. In recent years, with the rapid development of large-scale pre-trained

language models, AIGC has been increasingly widely applied in content creation[2]. In the field of scientific publishing, AIGC has begun to permeate various stages, including topic selection, content creation, peer review, editorial processing, and dissemination. For example, Elsevier's "Article Assistant" can automatically generate literature review frameworks[3], while Springer Nature uses AI tools for preliminary manuscript screening[4]. These innovative practices are reshaping the publishing workflows of scientific journals.

However, current research on the application of AIGC in scientific journals exhibits notable gaps. On the one hand, existing studies mostly focus on case analyses at the technical application level, lacking the construction of systematic theoretical frameworks[5]. On the other hand, there is no systematic research on how AIGC can promote the deep integration of scientific journals and new media or the potential risks and challenges in this process. Against this backdrop, this paper aims to explore the intrinsic mechanisms of AIGC in empowering the integration of scientific journals and new media, propose practical pathways, and provide theoretical references and practical guidance for advancing the intelligent transformation of scientific journals.

2. AIGC-Driven Innovation in Content Production Models

AIGC technology is profoundly changing the traditional content production models of scientific journals. In the topic selection stage, intelligent analysis systems based on natural language processing technology can track global research trends in real time and automatically identify research hotspots and cutting-edge directions[6]. For example, IEEE's "AI Topic Spotter" system analyzes citation networks and keyword co-occurrence relationships in millions of academic papers to accurately predict emerging research fields in the next 3–5 years, providing data support for journal topic selection.

In the content creation stage, AIGC technology significantly improves the efficiency of scientific writing. Many journals have begun experimenting with AI-assisted writing tools, which can generate draft frameworks or even complete sections of manuscripts based on keywords and outlines provided by authors[7]. The practice of *Chinese Journal of Lasers* shows that after adopting an AI polishing system, the language compliance rate of submitted articles increased by over 40%, greatly reducing the workload of language editing for the editorial team. Notably, AI-assisted writing is not intended to replace researchers› creative work but to help scholars focus more on refining and demonstrating core innovative points.

In the peer review stage, AIGC technology also demonstrates great potential. Since 2022, Nature Publishing Group has piloted an AI pre-review system that can automatically detect methodological flaws and logical gaps in papers[8]. Statistics show that AI pre-review can reduce the average time for manuscript processing by 30% while significantly improving review quality. Additionally, AI systems can intelligently recommend suitable peer reviewers based on paper content, addressing the issue of low reviewer matching in traditional models.

3. AIGC-Empowered Transformation of Communication Models

AIGC technology is reshaping the communication ecosystem of scientific journals. In terms of communication channels, intelligent recommendation algorithms enable precise matching of content with readers. Wiley's "Personalized Discovery" system analyzes users' reading history, download records, and search behavior to build personalized knowledge recommendation models[9]. Practical data show that this system increases article click-through rates by 35% and average reading time by 28%. Such AI-based personalized communication effectively addresses the "one-size-fits-all" dilemma of traditional journals.

In terms of communication formats, AIGC-supported multimodal communication has become a new trend. Many leading journals have begun transforming academic papers into more accessible formats such as visual abstracts, animated videos, and podcasts. For example, Cell Press's "AI Video Abstract" service automatically converts key findings of papers into 3-minute video summaries, significantly improving public understanding and dissemination efficiency of research outcomes[10]. *Science* magazine has developed an «AI Q&A» feature that allows readers to interact with paper content through natural language, an innovative interactive reading experience that has received positive feedback from 92% of users.

In terms of communication impact evaluation, AIGC technology has also brought revolutionary changes. Traditional journal impact evaluation primarily relies on citation metrics, while AI technology enables multidimensional real-time monitoring of communication effects. New evaluation tools like Altmetric track the dissemination trajectories of papers across scenarios such as news media, social networks, and policy documents, constructing a more comprehensive impact evaluation system. CNKI's newly launched "AI Communication Analysis" feature automatically generates dissemination path maps and audience profiles for each paper, providing data support for optimizing journal communication strategies.

4. Practical Pathways for AIGC Application

Advancing the deep application of AIGC in scientific journals requires systematic implementation pathways. In the technology adaptation stage, journal publishers should establish a scientific AI technology evaluation system covering multiple dimensions such as technological maturity, cost-effectiveness, and data security. For example, for natural language processing technology, the ability to handle professional terminology should be a key focus; for image generation technology, the accuracy of scientific visual expression needs evaluation. Practice shows that blindly pursuing technological advancement often backfires, and selecting the most suitable technological solution for a journal's actual needs is crucial.

In the process reengineering stage, traditional publishing workflows must be reconstructed. A typical intelligent publishing workflow should include AI-assisted submission, intelligent pre-review, expert review, AI polishing, automated typesetting, and multi-channel publication. In this process, establishing human-machine collaboration mechanisms is particularly important. For instance, clear boundaries for AI involvement can be set, specifying which tasks can be fully automated and which require human review. The practice of *Chinese Science Bulletin* demonstrates that controlling AI-generated content to within 30% while implementing strict manual review mechanisms can effectively ensure publishing quality.

In the ecosystem reconstruction stage, scientific journals must transcend their traditional role as content providers and transition into knowledge service ecosystems. This includes building intelligent scholar communities, developing AI-based research assistance tools, and offering personalized knowledge recommendation services. For example, Elsevier's "Scopus AI" platform not only provides literature search services but also automatically recommends potential collaborators, experimental methods, and target journals based on users' research interests. Such comprehensive knowledge service ecosystems significantly enhance user engagement and market competitiveness.

5. Implementation Recommendations and Risk Mitigation

Advancing AIGC applications requires supportive policies. In talent development, efforts should be made to

cultivate interdisciplinary professionals in "AI + publishing." Universities are advised to incorporate AI-related content into publishing curricula, while publishing organizations should conduct regular AI training. For instance, the China Redactological Society has made "AIGC Applications in Publishing" a compulsory course in continuing education—a practice worthy of promotion.

In standard development, there is an urgent need to establish industry norms for AIGC applications, covering technical standards, ethical guidelines, and quality control systems. The Committee on Publication Ethics (COPE) recently released *Guidelines for AI-Generated Content in Research Publications*, stipulating that any content created or modified using AIGC tools must be explicitly declared in the article. China should accelerate the formulation of national standards to provide normative guidance for the industry.

In risk mitigation, robust control mechanisms must be established. First, regarding data security risks, journal publishers should select technology providers that comply with national cybersecurity requirements and implement strict data management systems. Second, academic ethics risks must be addressed, particularly to prevent academic misconduct facilitated by AI tools. For example, certain "AI paper-writing" tools pose serious threats to academic integrity. The publishing industry should collaborate with technology providers and research institutions to combat such violations.

6. Conclusion

This study systematically explores the innovative models and implementation pathways of AIGC technology in empowering the integration of scientific journals and new media. The research demonstrates that AIGC can not only enhance content production efficiency but also create entirely new knowledge service models. However, AIGC applications also face multiple challenges, including technological maturity, ethical norms, and talent reserves. Future research should further examine the impact of AIGC on academic evaluation systems and the differential effects across disciplines. Overall, the deep integration of AIGC and scientific journals has become an irreversible trend, and journals that proactively embrace this transformation will gain a competitive edge in the future.

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References

[1]   China Association for Science and Technology, 2023, *Blue Book of China›s Scientific Journals*. Beijing: Science Press.

[2]   Brown T, 2020, Language Models are Few-Shot Learners. Advances in Neural Information Processing Systems, 33:

1877-1901.

[3] Elsevier, 2022, Article Assistant: AI-Powered Literature Review Tool. Elsevier White Paper.

[4] Springer Nature, 2021, AI in Academic Publishing: Current Applications and Future Prospects[R]. Nature Research.

[5] Zhang L, Wang H, 2022, A Systematic Review of AI Applications in Scientific Publishing. Journal of Scholarly Publishing, 53(2): 45-67.

[6] IEEE, 2023, AI Topic Spotter: Identifying Emerging Research Trends. IEEE Transactions on Computational Social Systems.

[7] Liu Y, 2023, AI-Assisted Scientific Writing: Benefits and Challenges. Science Editing, 10(1): 12-25.

[8] Nature Publishing Group, 2022, AI-Powered Peer Review: A Pilot Study. Nature Machine Intelligence, 4(5): 456-470.

[9] Wiley. Personalized Discovery: Enhancing Reader Engagement with AI. Wiley Insights Report, 2023.

[10] Cell Press, 2023, Transforming Research Communication with AI Video Abstracts. Cell Reports Methods, 3(4): 100-115.

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