THE ROLE OF PEER REVIEW IN THE ERA OF ARTIFICIAL INTELLIGENCE

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Peer review remains the foundation of scholarly publishing, safeguarding scientific rigor, ethical standards, and academic credibility. Traditionally, it has functioned as a quality assurance mechanism, relying on expert judgment to evaluate originality, methodology, interpretation, and relevance.[1] Due to the rapid emergence of artificial intelligence (AI) in research and manuscript preparation, the peer review process now faces new opportunities and unprecedented challenges. In this evolving academic environment, peer review is not rendered obsolete by AI; rather, its role becomes more vital, adaptive, and ethically significant.[2]

Artificial intelligence has increasingly been integrated into multiple stages of the research process. AI-powered tools assist in literature searches, data management, statistical analysis, image processing, and language editing.[3] For the researchers in low- and middle-income countries, including Nepal, AI has the potential to reduce barriers related to language proficiency and access to academic resources, enabling wider participation in global scientific discourse. In medical education and clinical research, AI can facilitate rapid evidence synthesis, improve data interpretation, and enhance manuscript readability.[4]

Despite these advantages, AI also introduces substantial risks to the integrity of scientific publishing. AI-generated text may contain factual inaccuracies, fabricated references, or misleading interpretations that appear superficially convincing. [5] The opaque nature of many AI systems makes it difficult to trace accountability, raising concerns about authorship responsibility and intellectual ownership.[6] Moreover, excessive reliance on AI tools may dilute critical thinking and compromise scientific originality. These concerns underscore the growing importance of a vigilant and ethically grounded peer review system.[7]

In the era of AI, the responsibilities of peer reviewers extend beyond traditional methodological assessment. Reviewers must critically evaluate the authenticity and coherence of submitted work, ensuring that research findings are supported by verifiable data and appropriate references.[8] AI-generated manuscripts may demonstrate linguistic fluency while lacking contextual depth, clinical insight, or logical consistency, limitations that can only be detected through human expertise. Peer reviewers, therefore, play a crucial role in distinguishing genuine scholarly contribution from automated content generation.[1]

Ethical oversight has become a defining function of peer review in this new landscape. Artificial intelligence lacks moral judgment and cannot evaluate the social, clinical, or public health implications of research findings.4 In medical and community-based research, where conclusions may influence patient care, health policy, and population-level interventions, ethical scrutiny is essential. Peer reviewers serve as custodians of ethical integrity by identifying potential harms, conflicts of interest, inappropriate data use, and misleading conclusions that AI systems may fail to recognize.[9]

Transparency regarding the use of AI is another emerging responsibility in scholarly publishing. Journals increasingly require authors to disclose whether AI tools were used in data analysis, image generation, or manuscript preparation.[10] Peer reviewers play a key role in assessing whether such use is appropriate, adequately disclosed, and compliant with journal policies. Rather than discouraging responsible AI use, peer review should ensure that AI serves as an assistive tool and not a substitute for scientific reasoning or author accountability.[6]

To remain effective, peer review systems themselves must evolve alongside technological advances. Editorial boards and academic institutions should establish clear guidelines on acceptable AI use, provide training for reviewers to recognize AI-related red flags, and emphasize evaluation of scientific content over stylistic polish.[10] The integration of AI-based tools for plagiarism detection, image manipulation screening, and statistical verification may support reviewers, but final judgment must remain firmly rooted in human expertise.[4]

Importantly, peer review also has an educational role. Constructive reviewer feedback helps authors refine their arguments, improve methodological clarity, and strengthen ethical compliance.[1] In an AI-influenced academic environment, this mentorship function becomes even more relevant, reinforcing the values of critical thinking, transparency, and responsible scholarship among early-career researchers and medical students.

In conclusion, artificial intelligence is reshaping the landscape of scientific publishing, but it does not replace the need for peer review. On the contrary, it amplifies its importance. Peer review remains the essential human

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safeguard that ensures science is credible, ethical, and socially responsible. As AI continues to evolve, strengthening and adapting the peer review process will be crucial in preserving the integrity of medical research and advancing trustworthy scientific knowledge.

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