



The conscious use of artificial intelligence in scientific research: paths and challenges for a sustainable and interdisciplinary science

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How to cite this article: Conti, D. M.; Branchi, B. The conscious use of artificial intelligence in scientific research: paths and challenges for a sustainable and interdisciplinary science. *Sustentabilidade: Diálogos Interdisciplinares*, v. 6, e2517639, 2025. <https://doi.org/10.24220/2675-7885v6a2025e17639en>

The exponential advancement of Artificial Intelligence (AI) is sparking debate and reshaping academic practices across all fields. In recent years, AI-based tools have become allies in scientific research, offering support for complex data analysis, pattern identification, automated literature review, and even text writing. However, this growth brings with it an urgent need: consistent debate and reflection on the conscious, ethical, and responsible use of these technologies, especially when inserted in interdisciplinary contexts focused on sustainability.

Universities around the world have recognized the urgent need to establish clear protocols for the ethical and responsible use of Artificial Intelligence in scientific research. Prestigious institutions such as Stanford, Oxford, and MIT have published guidelines for the use of AI tools, emphasizing transparency in reporting methods, critical validation of results generated by algorithms, and the need to ensure human authorship at all stages of the scientific process.

In this context, a growing trend is the inclusion of AI policies in research ethics committees, requiring researchers to describe how they used these technologies, what data was used, and what measures were taken to mitigate algorithmic biases. Furthermore, initiatives aimed at training students and faculty are being strengthened through courses, workshops, and practical guides that encourage the conscious and sustainable application of these tools, especially in interdisciplinary contexts. Such movements demonstrate that the responsible use of AI is not merely a technical choice, but an institutional commitment to scientific integrity and the promotion of inclusive and sustainable science.

Interdisciplinarity, in turn, is one of the central pillars of scientific sustainability research. Solving socio-environmental challenges demands integration between natural, social, economic, and technological sciences, and it is precisely in this

context that AI can play a strategic role. Its ability to articulate large volumes of data from different sources and disciplines facilitates the identification of innovative solutions to complex problems, such as climate change, water resource management, or sustainable urban planning. Alignment between institutional guidelines on the conscious use of AI and the interdisciplinary principles of sustainability is therefore essential to ensure that technology expands the reach of science without sacrificing its critical, ethical, and inclusive essence.

However, AI's technical capabilities must be tied to clear principles of transparency, integrity, and accountability, with critical human analysis being essential, and in our view, irreplaceable. The use of algorithms and predictive models should not disregard social, cultural, and ethical contexts, as this risks perpetuating inequalities or historical biases present in the data fed to computer systems. In sustainability research, this is particularly sensitive, given that vulnerable populations are often the most affected by practices and policies based on analyses that fail to consider their sociological roots.

From this perspective, it is up to the scientific community to ensure that AI-enabled automation never replaces the critical, creative, and ethical perspective of researchers—as well as of evaluators and reviewers of academic projects or articles. The increasing ease of access to abstracts, syntheses, and even the formulation of hypotheses through these tools requires a careful and reflective approach that preserves intellectual originality, ensures methodological rigor, and upholds the ethical principles that underpin research practice.

The conscious use of AI also implies considering the environmental impacts of these technologies. Large language models and algorithms require significant computing power, often associated with high energy consumption and a carbon footprint. Therefore, reflecting on energy efficiency, technological choices, and environmental trade-offs becomes an integral part of a scientific practice committed to sustainability.

We invite all readers to delve deeper into the role of AI in science, especially in interdisciplinary research focused on sustainability. How can we ensure that these tools expand the reach of science without sacrificing its critical and ethical essence? How can we promote equity in access to and use of AI, avoiding new forms of digital exclusion? And, further, how can we integrate reflections on the life cycle of these technologies into the scope of academic research itself?

More than providing ready-made answers to these questions, we propose opening space for the collective construction of these paths. The conscious use of AI can, and should, be a tool to accelerate the search for sustainable solutions, always with responsibility, transparency, and interdisciplinary dialogue.