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Artificial Intelligence and Scholarly Inquiry in the Human Sciences: A Theoretical Perspective on Opportunities and Constraints and Ethical Considerations.

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Abstract :

This study examines the role of artificial intelligence in supporting scientific research in the field of the human sciences, with a particular focus on the opportunities it offers as well as the challenges associated with its use. Artificial intelligence has become an increasingly important tool for researchers, as it facilitates access to academic articles and scientific sources and assists in the analysis of large datasets with remarkable speed and efficiency. These capabilities can significantly improve the quality of research while reducing the time and effort required during the research process.

At the same time, the study highlights the ethical considerations that should guide the use of artificial intelligence in scientific research, particularly with regard to academic integrity, honesty, and the preservation of originality in scholarly work. However, the growing reliance on these technologies also raises several challenges, especially ethical concerns such as algorithmic bias and the lack of ethical awareness among some users. In this context, the study emphasizes the importance of adhering to key principles governing the use of artificial intelligence in research, including respect for human autonomy and the principle of preventing harm. Ensuring compliance with these principles is essential for promoting the responsible and ethical use of artificial intelligence in a manner that contributes to the advancement of knowledge in the human sciences.

Keywords: Artificial Intelligence ;Human Sciences Research;
Opportunities; Ethical Considerations

Introduction

with technology emerging as one of the most prominent domains due to the sheer volume of innovations and discoveries in software, tools, and search engines. These technological advancements have given rise to artificial intelligence (AI) as a modern concept and a fertile field for scientific research and exploration, attracting the interest of scholars across the humanities, social sciences, and natural sciences.

Artificial intelligence relies on computer science and algorithms to perform tasks that simulate human capabilities, such as writing, translation, text and image analysis, and processing large volumes of data with remarkable speed and efficiency, its use enables researchers to support scientific inquiry, which is defined as a systematic process aimed at developing existing knowledge, building new knowledge, and uncovering principles that explain human and social phenomena.

Research in the human sciences follows a methodological sequence, beginning with problem identification, reviewing existing literature, and culminating in the analysis and interpretation of results. In this context, AI tools such as ChatGPT, Google Gemini, as well as scholarly databases like Google Scholar and Semantic Scholar, have become effective means to enhance research quality, save time and effort, and reduce the costs associated with scientific investigation.

Despite the many advantages offered by AI, its excessive or irresponsible use in scientific research can pose ethical challenges, including issues of originality and academic integrity. Therefore, AI must be employed thoughtfully and cautiously to maximize its scholarly benefits. Accordingly, this article aims to explore the opportunities and challenges associated with the use of artificial intelligence in scientific research.

THE FIRST TOPIC: Scientific Inquiry in the Human Sciences

Research in the human sciences occupies a central place in understanding social phenomena and interpreting the various dimensions of human behavior within its cultural, social, and historical contexts. Through systematic and rigorous methods, scientific research contributes to the production of reliable knowledge that helps explain societal issues and propose appropriate solutions. In this regard, the present section seeks to provide a theoretical overview of scientific research in the human sciences by addressing its conceptual foundations and highlighting its significance in advancing knowledge. It also discusses the main objectives of scientific research and reviews its most prominent types, in order to offer a comprehensive understanding of the methodological framework that guides scholarly inquiry in this field.

First requirement: The Concept of Scientific Research

Scientific research is defined as 'an attempt to discover, explore, develop, verify, and validate knowledge through rigorous investigation and critical analysis, followed by a comprehensive and intelligent presentation of findings.'¹

Furthermore, it is defined as 'the investigation into the nature, components, and dimensions of things, assisting individuals or institutions in understanding the content of phenomena. This facilitates the resolution of social, economic, and political problems using logical scientific methods.'²

As an academic activity, scientific research encompasses defining or identifying problems, formulating hypotheses or proposing solutions, as well as collecting, reporting, and analyzing facts and data to reach specific conclusions.'³

Humanities and Social Research: is a field of study that aims to examine human behavior and to understand and interpret social and human phenomena within the contexts in which they occur, such as cultural, historical, and social settings. It encompasses a variety of disciplines, including psychology, educational sciences, sociology, history, anthropology, media and communication studies, among others. Research in this domain is conducted using systematic methodological approaches, which may be qualitative, quantitative, or based on mixed research designs.⁴

second requirement: The Significance of Scientific Research

-Scientific research aims to advance knowledge and deepen the human understanding of diverse phenomena. Furthermore, it serves as the foundation for developing technologies and practical solutions that contribute to improving the quality of life for individuals and communities .⁵

-Scientific research acts as a pillar of societal progress; the volume and quality of research output serve as a primary indicator of a nation's advancement across all sectors. The ultimate objective of such scholarly studies is to formulate effective, evidence-based solutions to the complex problems facing contemporary society. The significance of research is reflected in several key dimensions:

-Scientific discoveries and innovations contribute to the creation of new opportunities, particularly within the labor market, by fostering the establishment of diverse institutions and optimizing industrial and production processes. Furthermore, these advancements play a vital role in enhancing the quality of medical services provided to the community.

-Moreover, scientific research enables a better understanding and management of natural phenomena, facilitating disaster mitigation and preparedness against events such as earthquakes and floods.

-Finally, research contributes to achieving food security through the development of agricultural technologies, while simultaneously strengthening social and environmental stability.

Third requirement: Typology of Scientific Research

Scholars in these domains have identified various types of scientific research. One of the most prominent classifications is that presented by Fodil

Deliou in his book on research methodology in human and social sciences, in which he categorized scientific research based on a set of indicators⁶:

1.The Criterion of the Research Field or Specialized Domain:

A. Intellectual Sciences (Humanities and Social Sciences)

This domain encompasses fields that focus on the study of human experience, cultural constructs, and societal dynamics. It includes:

Philosophy, Literature, Social Sciences:

B. Applied and Formal Sciences

This domain involves the practical application of scientific knowledge and the study of abstract systems. It includes:

- Formal Sciences: Mathematics, Algebra, and Geometry.
- Natural and Material Sciences: Physics and Chemistry, Life Sciences (Biology)

2. The Time Dimension Criterion (Temporal Scope)

Research can be classified based on the duration of data collection and study:

-Cross-sectional Research (Horizontales): Studies that observe phenomena at a specific, single point in time or over a short period.

-Longitudinal Research (Verticales/Transversales): Studies that track the same phenomena or subjects over an extended period to identify changes, trends, or developments over time.

3. The Criterion of Research Setting and Data Sources

This classification distinguishes research based on where the data is retrieved and the nature of the investigative environment:

Documentary Research: Conducted by analyzing secondary sources such as books, journals, newspapers, archives, and official records.

Field Research: Conducted in the natural environment where the phenomenon occurs, utilizing primary data collection tools such as observation, interviews, and questionnaires.

Laboratory Research: Conducted within controlled environments (laboratories or specialized research centers).

Mixed-Methods Research (Dual): Combines both documentary and field research approaches to provide a comprehensive analysis.

4. The Chronological Criterion

This indicator classifies research based on its focus regarding historical time:

-Historical Research: Aims to analyze past experiences, events, or phenomena, interpreting them through a retrospective lens.

-Descriptive Research: Focuses on analyzing and diagnosing current realities. It includes exploratory research, surveys (social mapping), and case studies, specifically designed to answer "what," "how," and "how much" questions.

Fourth requirement: Ethical Guidelines in Scientific Research

When a researcher embarks on a study to achieve specific objectives, they are ethically obligated to adhere to a set of professional standards that govern scholarly conduct. These principles are typically formalized in a comprehensive code of ethics. Within academic institutions, ethics committees serve as the primary oversight bodies, tasked with reviewing proposals and rejecting any research that fails to respect these foundational ethical mandates.⁷

1. Virtues of the Researcher: The researcher must demonstrate:

-Honesty and Integrity: Upholding the highest standards of truthfulness in reporting and conduct.

-Rectitude and Probity: Maintaining professional uprightness in every scholarly interaction.

-Respect for Participants: Ensuring the protection of research subjects by preventing exploitation, respecting their privacy, and guaranteeing the confidentiality of their identities and affiliations.

-Mutual Trust: Fostering a relationship between the researcher and the participants built on the explicit guarantee of protecting their rights and ensuring that the research contributes to their well-being or provides a clear social benefit.

2. Ethics of the Scientific Process The credibility of scientific output relies on:

-Data Accuracy: Strictly prohibiting the dissemination of false data or the fabrication/manipulation of research results.

-Diligence in Evaluation: Committing to a thorough reading and comprehension of research materials before undertaking any assessment or peer review.

-Critical and Impartial Critique: Providing objective, fair-minded evaluations of scholarly work, which is a fundamental prerequisite for the continuous advancement and self-correction of scientific knowledge.

Scientific Transparency

Just as the researcher is required to be honest with participants, they must also practice transparency with professional peers in the same field. This includes allowing them to review research data and engaging in the exchange of critical

feedback, which serves as an objective guarantee for the rigor and validity of the research.⁸

Academic Integrity

Academic integrity is the cornerstone of scholarly research, ensuring the credibility and validity of knowledge. It is maintained through:

-Rigorous Citation: Properly attributing information to its original sources using standardized documentation styles (such as APA, MLA, or Chicago), or by utilizing advanced reference management tools like *Zotero* and *EndNote*.

-Prohibition of Plagiarism: Strictly avoiding the misappropriation of others' ideas, research findings, or structural frameworks. Whether in whole or in part, presenting another researcher's work as one's own is a fundamental breach of ethics.

-Scientific Sampling: Selecting research samples based on established statistical and scientific sampling techniques, thereby avoiding personal preferences or subjective selection biases.

Fifth requirement: Challenges of Scientific Research in Human and Social Sciences

The foremost challenge in these fields is the question of "scientificity," which arises from the difficulty of subjecting social and human phenomena to rigorous scientific methods. In this regard, two opposing schools of thought have emerged: one group argues that this is possible by utilizing the scientific method applied in natural sciences, which enables a better understanding and the development of frameworks for explanation and prediction.

Conversely, the second group maintains that this is impossible, as human phenomena are characterized by a level of complexity and unique specificity that render them resistant to the standard methodologies of natural sciences. Pitirim Sorokin expressed this skepticism, noting: "I cannot grasp how we can operationally define and scientifically study phenomena such as the state, the nation, love, or hatred..."

1. The Problem of Scientificity

Historically, human and social sciences were the last fields to be subjected to scientific study, having previously been domains of metaphysical inquiry. The scientific claim among sociologists was established as a result of their influence by the results achieved in the natural sciences. Since the scientific method based on experimentation had achieved clear progress for the latter, it was believed that the same method could be used to achieve progress in the humanities. This resulted in a crisis within this field; after discussions regarding a "societal crisis," the discourse shifted to an "existential crisis of the human sciences".⁹

- Weak Funding and Institutional Support:

- Very limited research budgets in universities.
- Scarcity of funded projects in human sciences compared to technical sciences.
- Absence of specialized research centers with sufficient resources.

Difficulty in accessing data:

- Absence of national open databases for researchers.

-Sensitivity of some topics (migration, crime, unemployment, etc.) makes obtaining information related to the phenomenon difficult.

2. Methodological Problems:

- Related to inadequate training, especially in designing tools, selecting samples, and using statistical software (SPSS).
- Over-reliance on descriptive methods without employing experimental or mixed methods.

3. Problems Regarding Modern References and Sources:

- University libraries lack recent books and periodicals.
- Weak subscriptions to international databases (Scopus, Web of Science).

4. Bureaucracy:

- Slow administrative procedures related to obtaining field research permits.

5. Scientific Publishing Problems:

- Relates to the scarcity of high-quality peer-reviewed journals and the long duration of the review process, which may reach a year or more.

6. Absence of a Collective Research Work Culture:

- Work is often individual rather than within multidisciplinary research teams.

THE SECOND TOPIC: Artificial Intelligence (AI)

This section addresses the concept of artificial intelligence and its main characteristics, as well as its most important tools. It also highlights the advantages it offers and the challenges associated with its application in research within the human sciences, in addition to the ethical conditions and considerations governing its use.

First requirement: Concept of Artificial Intelligence (AI)

While there is no single, all-encompassing definition of Artificial Intelligence, several perspectives highlight its various dimensions. The concept is composed of two terms: "Intelligence" and "Artificial." The former refers to the use of unlimited mental capabilities for thinking and performing in any given field.¹⁰ while the latter is generated through the use of advanced programs and techniques that simulate human skills and abilities.

By combining these terms, we arrive at "Artificial Intelligence," which is defined as the intelligence created by humans within a computer or machine. It is also characterized as a branch of computer science focused on the representation, design, and programming of computer models used across numerous fields.

Furthermore, it is defined as the method of guiding a computer to perform tasks that humans execute, often with greater efficiency. It also refers to the process of simulating human cognitive abilities; it is a subset of computer science concerned with designing intelligent systems that exhibit characteristics associated with human behaviors.¹¹

The Concept of Artificial Intelligence in Scientific Research

It is the use of information technology, software, automation, and algorithms to perform tasks and predict with a high degree of accuracy, critical thinking, and analytical reasoning based on available instructions and data.¹²

It can also be defined as the utilization of super-intelligent information technology in conducting scientific research—whether related to books, dissertations, theses, or articles. This contributes to searching for sources, documentation, data analysis, tool design, and the discussion of results, among other applications.

second requirement: Characteristics of Artificial Intelligence

Artificial intelligence is characterized by a set of key features, including:

-Problem-Solving under Uncertainty: AI contributes to solving presented problems even in the absence of complete information.

-Learning and Understanding from Experience: The ability to learn from previous experiences and utilize old expertise in new situations.

-Rapid Response and Adaptability: Swift response to new circumstances and handling difficult, complex, and ambiguous cases. Furthermore, it operates at a consistent, non-fluctuating advisory scientific level.

-Symbolic Data Processing: It processes non-numerical symbolic data through logical analysis and comparison, simulating human thought and style.¹³

-Functional Autonomy: AI is characterized by independence in performing tasks without direct human supervision, and this autonomy evolves continuously over time.

-Unpredictability: Difficulty in predicting its actions due to the autonomous nature of many decisions and choices based on surrounding data.

-Intangible Nature: Being a set of algorithms and software belonging to the invisible virtual world.¹⁴

-High Learning Capacity: Superior ability to learn, gain experience, and make decisions.

-Reasoning and Adaptability: Proficiency in reasoning, deduction, and adaptation to the surrounding environment.

-Accelerated Performance and Production: Increasing the pace of production through the ability to select the best available options and respond to variables with high flexibility and speed.¹⁵

Third requirement: Types of Artificial Intelligence

Scientists have classified Artificial Intelligence into three primary categories

1- Weak or Artificial Narrow Intelligence (ANI)

This is the simplest type compared to other forms and is widely available, It performs a single, pre-programmed task that simulates the human mind. Examples of this type include:

-Translation Programs

-Facial Recognition

-Recommendation Systems: Like those used by YouTube and Netflix.

2- Strong or Artificial General Intelligence (AGI)

This type of artificial intelligence is highly advanced, reaching a stage where it matches human intellect and functions. These systems operate by learning from data and the experiences they accumulate, enabling them to make autonomous decisions independent of human intervention. It remains in the research and development phase and has not yet been fully realized.

3- Artificial Super Intelligence (ASI)

A level that surpasses human intelligence in every aspect: creativity, decision-making, and problem-solving. To date, it remains a theoretical concept, while scientists discuss its ethical and strategic risks.

Fourth requirement: Generative AI Tools

Artificial intelligence provides a range of tools that assist researchers in preparing their studies, including:

1- Multimodal Generative AI Tools: Text, Image, Audio, and Video Production

-Text Generation:

- ✓ **ChatGPT** (by OpenAI)
- ✓ **Google Gemini**
- ✓ **Claude** (by Anthropic)
- ✓ **Perplexity AI**
- ✓ **Microsoft Copilot**

-Image Generation and Design:

- ✓ **Midjourney**
- ✓ **DALL-E**
- ✓ **Stable Diffusion**
- ✓ **Adobe Firefly**

-Video Generation:

- ✓ **Runway ML**
- ✓ **Pika Labs**
- ✓ **Synthesia**

2- AI Tools for Analysis and Scientific Research

These tools assist researchers in literature gathering, summarization, analysis, and idea generation:

-**Scite.ai**: (Citation Analysis) – Specifically for analyzing the context of citations.

-**Elicit**: (Assistance in Systematic Reviews) – Helps in finding and synthesizing research papers.

-**Kahubi**: (Generating Research Questions and Literature Analysis).

-**Research Rabbit**: (Exploring Scientific Networks) – Often referred to as "Spotify for Research" due to its ability to map connected studies.

-**Semantic Scholar**: (Data Extraction from Studies) – An AI-powered search engine for academic publications.

-**Connected Papers**: (Analyzing Relationships between Research) – Visualizes the links and similarities between academic papers

Fifth requirement: Challenges and Opportunities Created by the

Artificial intelligence offers numerous opportunities for researchers that assist them in conducting their studies, the most important of which include:

1. Opportunities Created by the Application of Artificial Intelligence in Scientific Research

-Opening New Horizons: Artificial Intelligence (AI) has contributed to opening new vistas in scientific research by providing innovative methodologies and enhancing data analysis capabilities.

-Transformative Impact of Generative AI: The rapid rise of Generative AI (GenAI) has introduced transformative tools capable of creating realistic text, images, and even entire datasets.¹⁶

-Enhancing Productivity and Quality: Enabling researchers to improve their productivity and the quality of their written work. This is particularly evident in how AI provides access to scientific discourse and lowers barriers related to language proficiency.

-Improving Efficiency through Functional Tools: AI-driven research tools offer a range of functions to improve efficiency, such as assisting in document creation and organization, facilitating discussions, and extracting valuable insights from Big Data.

-Natural Language Processing (NLP) Capabilities: AI technologies have enabled computers to understand and analyze human language to perform the following tasks:

- Categorizing academic texts by subject or category.
- Analyzing academic texts and extracting key information.
- Understanding scientific texts in different languages and providing accurate analyses.¹⁷

In a study by **Salhi Samir et al.** regarding the role of AI in developing scientific research skills among faculty members at the **University of Laghouat**, researchers concluded that¹⁸:

-Most respondents confirmed benefiting from AI techniques in automating and improving the literature review and analysis process.

-AI tools, such as **ChatGPT**, assist in generating new ideas or answering research questions, with an approval rate of **94.10%**.

-91.20% confirmed that AI tools like **Google Scholar** or **Semantic Scholar** helped them search for articles and scientific sources.

-AI actively contributes to the overall advancement of scientific research.

-Faculty members utilize AI software for reference management and source organization, which enhances competencies in this field.

Furthermore, a prospective study on the attitudes of **Algerian researchers** toward using AI techniques in scientific research confirmed that **88%** of the study sample believes these technologies save time and effort, allowing researchers to perform multiple tasks.¹⁹

2. Challenges Facing Scientific Research in the Humanities in the Light of Artificial Intelligence Usage

Given that the impact of Artificial Intelligence (AI) on research paradigms may be profoundly disruptive, as noted in the 2024 European Commission report, the

integration of these technologies into research practices necessitates a rigorous examination of ethics and scientific integrity. This imperative is underscored by estimates indicating that approximately 1% of abstracts submitted to the arXiv preprint repository in 2023 exhibited evidence of Generative AI utilization (Gray, 2024). This figure reflects the rapid proliferation of such tools within academic circles and represents a significant cause for concern, particularly in view of their surging adoption by the scientific community and the escalating capabilities of Generative AI—which has now evolved to include models capable of conducting research with minimal human intervention.

The ethical implications of utilizing Generative AI in scientific research are multifaceted and complex. The challenges associated with its integration into research methodology include difficulties concerning:

- The reproducibility of study results, attributable to the variance in outputs across different iterations;
- The lack of transparency regarding the utilization of these tools.

Preliminary ethical considerations concerning the application of these technologies have been documented within specific disciplines, such as psychology, health research, and software engineering. Furthermore, several conceptual studies have addressed the ethical challenges inherent in the use of Generative AI within research practice; notably, Resnik and Hosseini (2024) have categorized these ethical challenges as follows:

- ❖ **Bias:** These tools may produce unfair or inaccurate outputs because they rely on training data that may be inherently biased.
- ❖ **Errors (Hallucinations):** They can present incorrect information without the ability to easily detect the error.
- ❖ **Lack of Moral Agency:** These tools lack ethical consciousness; therefore, they may produce outputs that do not adhere to scientific values and standards.
- ❖ **Lack of Explainability (Black Box):** These tools act as a "Black Box" because the way they generate outputs is complex and opaque, making it difficult to explain or justify the results.

To overcome these challenges, **Kurz and Weber-Wulff (2023)** propose three fundamental principles for the use of Artificial Intelligence: usage must be permissible, transparent, and authors must assume full responsibility for the generated outputs.²⁰

Testing the capabilities of general AI tools in supporting idea generation—such as **ChatGPT**—alongside specialized research tools like **Kahubi**, has revealed significant limitations. For instance, when **Kahubi** was asked to define research questions regarding the climate impacts on a specific country, it categorized these impacts into ten areas (e.g., agricultural vulnerability, water resources, etc.) and provided a set of potential research questions. However, many of these questions have already been extensively covered in scientific literature, reflecting a limitation in innovating truly novel research directions. Furthermore, the literature summaries provided by **Kahubi** were nearly identical in sentence structure to the

original sources, raising concerns about researchers potentially committing plagiarism if they rely on these summaries.²¹

One of the most critical challenges is maintaining **Academic Integrity**. AI tools pose a significant threat to academic integrity in the areas of conducting and writing research projects if not used properly, correctly, and responsibly. These threats manifest in several aspects: AI tools produce texts and research that appear original, making it easier for researchers to rely on them without adhering to the standards of scientific honesty. This result in the submission of non-original research work, which undermines the credibility of the research, especially given that using AI tools makes identifying the original sources of information a difficult task.²²

3- Ethical Conditions for the Use of Artificial Intelligence:

The High-Level Expert Group on Artificial Intelligence (HLEG) of the European Commission has identified four ethical principles for the use of artificial intelligence:

- Respect for human autonomy;
- Prevention of harm;
- Fairness;
- Explicability.
- The same group also proposed a set of requirements that should be adopted in order to develop trustworthy artificial intelligence applications. These include:
 - Human agency and oversight;
 - Technical robustness and safety;
 - Privacy and data governance;
 - Transparency and accountability;
 - Societal and environmental well-being;
 - Diversity, non-discrimination, and fairness.²³

The ethical principles of artificial intelligence proposed by the High-Level Expert Group on Artificial Intelligence (HLEG)

provide a fundamental framework for the use of these technologies in scientific research within the human and social sciences. Respect for human autonomy ensures that research decisions remain in the hands of the researcher, while the principle of preventing harm seeks to protect participants and society from potential negative effects. Fairness promotes equity in research outcomes and prevents cultural or social bias, whereas explicability provides a clear understanding of how results are generated, thereby supporting transparency and scientific review.

The requirements for developing trustworthy artificial intelligence intersect with these principles. Human agency and oversight ensure that researchers maintain supervision over the research process, while technical robustness and safety help guarantee the accuracy and reliability of results. Respect for privacy and data governance protects sensitive participant information. In addition, transparency

and accountability enhance the credibility of research, societal and environmental well-being encourages consideration of broader impacts, and diversity, non-discrimination, and fairness ensure the inclusiveness of research outcomes.

In this way, combining ethical principles with practical requirements creates a solid framework for responsible research that preserves scientific integrity while safeguarding participants and society. The following table illustrates this idea:

Table (01): Application of Ethical AI Principles in Research within the Human and Social Sciences

Ethical Principle	Related Requirements	Application in Scientific Research (Human and Social Sciences)
Respect for human autonomy	Human agency and oversight	Ensuring that research decisions and the interpretation of results remain under the researcher's control, while AI serves only as a supportive tool.
Prevention of harm	Technical robustness and safety – Privacy and data governance	Protecting participants and their sensitive data, and ensuring the reliability of the systems used to avoid misleading results or negative impacts.
Fairness	Diversity, non-discrimination, and fairness	Preventing cultural or social bias in data analysis and ensuring that research findings are inclusive of different social groups.
Explicability	Transparency and accountability	Enabling researchers to understand how AI systems operate and how results are generated, thereby supporting transparency, review, and reproducibility.

Source: Prepared by the researchers.

Conclusion:

In conclusion, artificial intelligence has become a central element in advancing scientific research and reshaping research practices in the human sciences. This study first highlighted the concept, significance, and types of scientific research, as well as the key challenges faced by researchers, including methodological issues, academic integrity, and publication-related difficulties.

The discussion then focused on the characteristics, levels, and tools of artificial intelligence, showing how it adds value to research through data analysis, pattern recognition, and support in writing, translation, and review processes. Evidence suggests that an increasing number of researchers rely on these tools to enhance the quality of their outputs and accelerate knowledge production.

However, the study also emphasized the challenges associated with AI use, particularly ethical concerns such as academic honesty, potential plagiarism, over-reliance on machines instead of human skills, and issues related to data accuracy and verification. This demonstrates that artificial intelligence is a double-edged tool:

it offers significant opportunities when used responsibly, yet can become a hindrance if applied without methodological and ethical safeguards.

The future of scientific research in the age of AI depends on researchers' ability to balance leveraging AI's capabilities while maintaining the essence of the research process, which relies on critical thinking, analysis, and creativity. This requires:

- ❖ Raising awareness of ethical and responsible AI use;
- ❖ Developing researchers' skills in effectively using AI tools to ensure research quality and credibility;
- ❖ Adhering to ethical and methodological standards to employ AI as a supportive tool rather than a substitute for human reasoning.

By doing so, artificial intelligence can serve as an effective partner in scientific research, enriching human knowledge while preserving integrity and academic rigor.

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