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AI and the Future of Scientific Research in Universities

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Abstract

This article examines the role of artificial intelligence in enhancing scientific research within universities. It highlights the main applications of AI throughout the research process and explores its contribution to improving research quality and accelerating knowledge production. The study also discusses the ethical, legal, and organizational challenges associated with the use of AI and outlines its future prospects in academia. The findings indicate that artificial intelligence is a promising tool for supporting scientific research; however, its effective use requires strong academic integrity and appropriate regulatory frameworks to ensure responsible implementation.

Keywords: Artificial Intelligence; Scientific Research; Academic Integrity; Digital Transformation.

Introduction

The world is currently witnessing rapid developments in artificial intelligence (AI), which has become one of the most influential technologies across various fields, particularly higher education and scientific research. Recent AI applications have facilitated access to information, data analysis, reference management, and academic writing, making AI an important tool for improving research efficiency and the quality of research outputs.

At the same time, the use of artificial intelligence in scientific research raises a number of ethical and legal challenges, particularly with regard to academic integrity, information reliability, data protection, and intellectual property rights. It has therefore become necessary to examine the dimensions of this technology and assess both its opportunities and risks within the university environment.

The research problem addressed by this article is formulated as follows:

To what extent does artificial intelligence contribute to the development of scientific research within universities, and what are the main challenges associated with its use?

The following questions arise from this central problem:

- What is meant by artificial intelligence, and what is its relationship with scientific research?
- What are its main applications at the different stages of scientific research?
- How does it contribute to improving the quality of research output?
- What are the main ethical and legal challenges associated with its use?
- What are the future prospects for employing AI in universities?

This study aims to:

- Define artificial intelligence and clarify its relationship with scientific research.
- Highlight its role in developing the research process and improving research outputs.
- Identify the main challenges associated with its use in the academic field.
- Explore future prospects for the use of artificial intelligence in scientific research.

1. Conceptual Framework of Artificial Intelligence and Scientific Research

Understanding the conceptual framework of artificial intelligence and scientific research provides an essential starting point for examining the relationship between them. This requires first defining artificial intelligence and tracing its development,

then highlighting the characteristics of scientific research in the modern digital environment, and finally identifying the forms of interaction and integration between this advanced technology and the different stages of the research process.

1.1. The Nature and Development of Artificial Intelligence

Over recent decades, the world has experienced rapid developments in information and communication technologies, among which artificial intelligence has emerged as one of the most important scientific outcomes of the digital revolution. AI has assumed a central position across economic, social, and scientific sectors because of its advanced capabilities in processing and analyzing data and supporting decision-making in ways that emulate certain human cognitive abilities.

Artificial intelligence refers to a set of systems and software capable of simulating certain functions of human intelligence, such as learning, inference, problem solving, prediction, and decision-making. The concept has evolved from relatively simple computational models into complex systems based on machine learning, neural networks, and deep learning. This evolution has enabled AI systems to process massive volumes of data and extract knowledge and indicators from them with a high degree of accuracy and efficiency.

The scientific origins of artificial intelligence date back to the mid-twentieth century. However, the field's major expansion has been closely associated with the modern digital revolution, advances in computing power, and the exponential growth of available data. These developments have moved AI from a largely theoretical framework toward practical applications in education, healthcare, economics, and scientific research.

The emergence of generative AI has further expanded the scope of its use within universities. These applications can assist with information retrieval, data analysis, scientific summarization, and academic writing, which has made them the subject of growing interest among both researchers and universities.

1.2. Scientific Research in the Digital University Environment

Scientific research is one of the fundamental pillars of the modern university, serving as the principal means of producing knowledge, developing it, and applying it for the benefit of society. Scientific research may be defined as a systematic intellectual activity based on methodological and scientific principles aimed at studying and analyzing different phenomena and reaching findings that contribute to solving problems and enriching human knowledge.

In recent years, scientific research has undergone major transformations as a result of rapid digital development. Researchers have moved from relying primarily on traditional printed sources to using digital platforms, electronic databases, and virtual libraries. Access to scientific information has become easier and faster, which has contributed to increasing research output and improving the efficiency of the research process.

The digital environment has also generated new forms of research practice, including remote collaborative research, electronic publishing, the use of advanced statistical software, and big-data analytics. These developments have broadened the horizons of scientific research and enabled researchers to address more complex problems than was previously possible.

Despite these advantages, the digital environment has introduced new challenges, including the need for researchers to possess adequate digital skills, the ability to evaluate the credibility of electronic sources, and the need to confront academic plagiarism and the misuse of technology in scholarly work.

1.3. The Relationship Between Artificial Intelligence and Scientific Research

The relationship between artificial intelligence and scientific research has become increasingly interconnected in recent years. AI has evolved from being merely a supporting technical tool into an active component of many stages of the research process. Its various applications have contributed to accelerating research, improving the quality of scholarly outputs, and developing methods for data collection and analysis.

Recent Arabic studies indicate that AI tools help researchers gain rapid access to scientific information, organize references, extract findings, analyze quantitative and qualitative data, and support academic writing and the quality of scientific formulation.

A study conducted at Mouloud Mammeri University of Tizi Ouzou found that artificial intelligence is a key tool for accelerating scientific research, improving academic writing, assisting with data analysis, and detecting improper citation or plagiarism. Another study of postgraduate students showed that AI applications contribute to developing research skills and improving the ability to access, organize, and process information more efficiently. Nevertheless, the use of AI in scientific research raises questions concerning academic integrity, reliability of results, and intellectual privacy, making ethical and legal safeguards necessary to ensure responsible use within universities.

Accordingly, the relationship between artificial intelligence and scientific research can be described as complementary: modern technological capabilities can serve knowledge production, improve research performance, and enhance the quality of scholarly outputs, provided that the ethical and methodological standards governing academic work are respected.

2. Applications of Artificial Intelligence and Its Opportunities for Developing University Research

After clarifying the conceptual dimensions of artificial intelligence and scientific research, it is important to examine the practical applications of this technology within the university environment. This section therefore focuses on the main areas in which AI can be employed in scientific research, its role in improving research quality, and selected real-world models and experiences illustrating its growing impact on research practices.

2.1. Applications of Artificial Intelligence Across the Stages of Scientific Research

Artificial intelligence has brought about a fundamental transformation across the different stages of scientific research. Its role is no longer limited to purely technical functions; rather, it has become a supporting tool for researchers from the stage of identifying a research topic through to the publication of scientific findings. Its diverse applications have improved research efficiency and reduced the time and effort required to complete academic studies.

During information retrieval and the review of scientific literature, AI applications provide researchers with advanced capabilities for identifying sources relevant to a research topic by analyzing keywords and suggesting related studies. Some platforms can also summarize scientific articles and extract their principal findings, helping researchers form an initial understanding of a research topic in a short period of time.

During data collection and analysis, artificial intelligence has contributed to developing methods for processing quantitative and qualitative data. Intelligent algorithms can analyze massive datasets and identify patterns and relationships that are difficult to detect using traditional methods. Many disciplines, especially medicine, economics, and the social sciences, have benefited from these capabilities because they rely on large and complex databases.

AI has also been integrated into scholarly reference management through specialized software that helps researchers organize and document sources according to different academically recognized citation styles. This contributes to improving research quality and reducing citation errors.

In academic writing, generative AI tools now offer services such as language proofreading, paraphrasing, title generation, and summarization of scientific texts. These functions can improve the quality of scholarly output, while researchers remain responsible for verifying the accuracy and validity of the information produced.

2.2. Contribution of Artificial Intelligence to Improving the Quality of Scientific Output

The use of artificial intelligence in scientific research has generated numerous benefits that have positively affected the quality and efficiency of research output. One of the most significant benefits is the acceleration of research, as researchers can shorten periods that previously had to be devoted to information retrieval, data analysis, and the preparation of scientific reports.

AI can also enhance scientific accuracy by reducing human errors associated with data processing and analysis. Because AI systems can handle enormous volumes of information, researchers may reach more accurate and objective results than through methods relying exclusively on human effort.

Another important contribution is support for scientific innovation. Intelligent models can identify new patterns and suggest research hypotheses that may not be immediately apparent to researchers. This has contributed to developments in several fields, especially medical, technological, and engineering research.

Recent Arabic studies indicate that AI applications can develop researchers' skills and increase research competence by facilitating access to scientific knowledge and improving the ability to analyze, organize, and use information in academic studies.

Artificial intelligence has also strengthened international research collaboration. AI-supported digital platforms provide broader opportunities for communication among researchers and for sharing scientific data and expertise, thereby facilitating joint research with higher quality and greater scholarly impact.

2.3. Real-World Models and Experiences in Using AI for Scientific Research

Recent years have witnessed several pioneering experiences demonstrating the growing importance of artificial intelligence in developing scientific research. A prominent example is Mohamed bin Zayed University of Artificial Intelligence in the United Arab Emirates, the world's first graduate-level university dedicated entirely to artificial intelligence. The institution seeks to support specialized research and develop highly qualified professionals in this strategic field.

In 2023, UNESCO issued guidance on the use of generative AI in education and research, calling for the benefits of these technologies to be harnessed while respecting ethical and academic standards that protect research integrity and the quality of knowledge production.

At the Arab level, a field study conducted at Mouloud Mammeri University of Tizi Ouzou found that students and researchers increasingly rely on AI applications for information retrieval, data analysis, and preparation of scientific research, while recognizing the importance of responsible use. A recent Egyptian study likewise found that AI applications contribute significantly to developing scientific research skills among postgraduate students, particularly in collecting, organizing, and analyzing information and preparing scientific reports.

These examples demonstrate that artificial intelligence is no longer merely a future technology; it has become a practical reality directly affecting research methods and knowledge production in universities and research centers. This requires academic institutions to develop clear strategies for benefiting from AI capabilities and guiding their use in ways that serve the objectives of scientific research and knowledge development.

3. Challenges of Using Artificial Intelligence and Its Future Prospects in Universities

Despite the significant opportunities offered by artificial intelligence for scientific research, its use also raises ethical, legal, and organizational challenges that require careful examination. This section addresses the main issues associated with AI in academia, while considering its future prospects and the requirements for ensuring effective and responsible use.

3.1. Ethical and Scientific Challenges of Using AI in Scientific Research

The rapid spread of AI applications in universities has produced profound changes in the ways knowledge is generated and scientific research is conducted. Although these technologies offer substantial benefits in accelerating access to information, analyzing data, and improving research outputs, their use has generated ethical and scientific concerns that are widely debated by researchers and academic institutions.

One of the most important challenges concerns academic integrity. Generative AI applications can produce complete scientific texts or substantial portions of research papers, raising fundamental questions about the extent of the researcher's personal contribution and the legitimacy of relying on such tools when preparing research and university theses. Universities are also concerned that uncontrolled use of AI could weaken critical-thinking and scientific-analysis skills among students and researchers.

Many universities worldwide have therefore adopted policies governing AI use in scientific research. In 2023, the University of Oxford emphasized that the use of AI tools in academic writing does not relieve researchers of full responsibility for the content of their scholarly work and stressed the importance of disclosing the use of such tools when preparing research or scientific reports.

Another important scientific concern is AI hallucination, whereby some AI applications generate information, references, or data that appear plausible but do not actually exist. The risk increases when researchers rely on such outputs without consulting original sources to verify their accuracy, which may result in the dissemination of inaccurate information in scientific publications.

AI also raises questions about the scientific reliability of information, particularly in fields requiring a high degree of precision in interpreting and analyzing results. Intelligent algorithms depend on large datasets that may contain errors or biases, which can directly affect research outputs. Accordingly, specialists emphasize that AI should be used as an assistant to the researcher rather than as a substitute for the researcher.

Algorithmic bias is another significant challenge. Intelligent systems learn from their training data, and if those data contain social, cultural, or linguistic biases, the resulting outputs may reproduce those biases. This is particularly relevant in some social-science and humanities research, where findings may be influenced by the nature of the data used to train intelligent models.

A study by Nouf Mubarak Al-Qahtani of Saudi postgraduate students found a high level of awareness of the benefits offered by AI applications in scientific research, alongside increasing concerns about the reliability of AI-generated information and the possibility of overreliance on such tools in academic work.

These findings show that successful use of AI in scientific research depends not only on access to modern technological tools, but also on establishing an academic culture based on scientific responsibility and intellectual integrity. This is necessary to benefit from AI while preserving the fundamental principles and ethics of scientific research.

3.2. Legal and Regulatory Challenges of Using AI in Scientific Research

In addition to ethical and scientific challenges, the use of AI in scientific research raises a number of legal and regulatory issues that have become increasingly prominent in academia. This is partly because technological development is progressing more rapidly than the legal frameworks governing it, creating new issues that require precise and balanced legislative responses.

Intellectual property is one of the most debated legal issues in the field of artificial intelligence. Intelligent applications can produce scientific texts, images, graphs, and various forms of content with scientific value, raising questions about ownership of these outputs: does ownership belong to the user who entered the prompts and instructions, the company that developed the system, or should these outputs be governed by a new legal regime distinct from traditional intellectual-property rules?

This issue is particularly important in academia, where researchers increasingly rely on AI applications to assist with scientific reports, data analysis, and initial drafting of parts of research papers. Consequently, many journals and universities emphasize the need to disclose the use of such tools in order to preserve scholarly transparency and respect intellectual-property rights.

Personal-data protection is another major legal challenge. Many intelligent systems process enormous quantities of data, which may include personal or sensitive information relating to participants in scientific studies. It is therefore necessary to balance the benefits of AI with privacy requirements and data-protection rules under applicable legal standards.

This is especially important in medical, social, and psychological research that relies on individual-level data. Misuse or leakage of such data may violate the fundamental rights of research participants, prompting many research institutions to strengthen digital-security measures and develop clear research-data management policies.

A prominent example is the European Union's Artificial Intelligence Act (AI Act), adopted as a comprehensive legal framework for regulating AI according to different levels of risk. The legislation seeks to balance technological innovation

with the protection of individuals' fundamental rights and freedoms. It also imposes specific obligations on developers and users of high-risk AI systems, including requirements concerning transparency, risk management, and human oversight. At the university level, many leading academic institutions have begun developing policies governing AI use in education and scientific research. Universities such as Oxford and Cambridge emphasize disclosure of AI use in academic work, the principle that AI tools cannot replace the researcher's or student's intellectual effort, and the user's full responsibility for the accuracy of information contained in scholarly work.

In the Arab world, most universities are still developing policies and guidance governing AI use. Despite growing awareness of the importance of these technologies, there remains a need for clear legal and ethical frameworks specifying the conditions under which AI may be used within academic institutions, while preserving academic integrity, intellectual-property rights, and personal-data protection.

Overall, successful integration of artificial intelligence into scientific research depends not only on technological progress, but also on the existence of a comprehensive legal and regulatory system capable of keeping pace with rapid developments and balancing scientific innovation with legal and ethical protection.

3.3. Future Prospects and Requirements for the Responsible Use of AI in Scientific Research

Rapid technological transformations indicate that artificial intelligence will play a central role in shaping the future of scientific research over the coming decades. AI applications have moved beyond limited experimental use and are becoming an integral part of knowledge-production systems in many advanced universities and research centers. Continued advances in machine learning, deep learning, and natural language processing are expected to produce fundamental changes in research methods, methodologies, and tools.

One important indicator of this transformation is the expected growth of AI's economic contribution worldwide. PricewaterhouseCoopers (PwC) estimated that artificial intelligence could contribute approximately US\$15.7 trillion to the global economy by 2030, illustrating the scale of the technology's expected impact across productive, scientific, and knowledge-intensive sectors.

In academia, AI is expected to become an essential partner for researchers across the different stages of the research process. Rather than merely collecting and analyzing information, future intelligent systems may assist in building predictive models, proposing scientific hypotheses, designing research experiments, and analyzing results more rapidly and accurately.

Some research laboratories have already begun using AI to discover new drug compounds and analyze complex genetic data, thereby shortening periods that previously required years of conventional research. A prominent example is DeepMind's AlphaFold system, which can predict the three-dimensional structures of proteins with high accuracy. This achievement has been regarded as a major scientific breakthrough in molecular biology because of its potential to accelerate medical research and the development of new drugs and therapies.

At the Arab level, promising experiences also reflect growing interest in AI and scientific research. Mohamed bin Zayed University of Artificial Intelligence is a leading example, as it is the world's first graduate university specializing entirely in artificial intelligence and has contributed to supporting specialized research and preparing professionals capable of leading innovation and technological-development projects in the Arab region.

In Saudi Arabia, recent years have witnessed substantial expansion in specialized research centers focused on artificial intelligence and data analytics as part of Saudi Vision 2030, which identifies digital transformation and the knowledge economy as key pillars of future development. These initiatives have strengthened the research environment and created new opportunities for researchers and students in AI and data science.

Recent scientific reports also indicate that the use of AI tools is becoming increasingly common within the global academic community. Nature surveys conducted in 2024 showed that a considerable proportion of researchers had begun using AI applications for literature review, academic editing, and assistance with preliminary data analysis, reflecting the gradual integration of these tools into everyday research practices.

However, effective use of AI remains dependent on universities' and research institutions' ability to provide an enabling environment for responsible adoption. This requires investment in digital infrastructure, advanced scientific databases, and researcher training in the use of intelligent applications in accordance with established academic and ethical standards. It also requires updating educational programs to include courses on AI, its ethics, and its applications in scientific research.

Strengthening a culture of academic integrity is among the most important requirements for responsible AI use. AI should be regarded as a supporting tool for the researcher rather than a substitute for the researcher. Scientific creativity, critical thinking, formulation of research problems, and interpretation of findings remain fundamentally human tasks that cannot be eliminated regardless of the sophistication of intelligent systems.

The future of scientific research is therefore likely to involve an integrated relationship between human intelligence and artificial intelligence, in which advanced technological capabilities serve the research process while preserving the core principles of scientific research, particularly objectivity, academic honesty, and intellectual independence. Such integration can improve research quality and strengthen universities' ability to respond to the knowledge and technological transformations of the contemporary world.

Conclusion

Amid the rapid digital transformations of the contemporary world, artificial intelligence has emerged as one of the most important technological innovations capable of producing fundamental changes across different fields, particularly scientific research. This study has shown that AI applications are playing an increasingly important role in supporting the research process by facilitating access to information, analyzing data, organizing references, and improving academic writing, thereby increasing researchers' efficiency and accelerating knowledge production.

The study has also demonstrated that the use of artificial intelligence in scientific research is accompanied by challenges concerning academic integrity, information reliability, personal-data protection, and intellectual-property rights. This requires universities and research centers to establish clear legal and ethical safeguards that ensure responsible use and reduce potential negative effects.

International and Arab experiences confirm that artificial intelligence is no longer merely a supporting technical tool but has become an active partner in developing research systems and strengthening scientific innovation. Nevertheless, the success of this transformation depends on academic institutions' ability to balance the enormous potential of these technologies with the fundamental principles of scientific research, particularly objectivity, academic honesty, and intellectual independence.

Accordingly, the future of scientific research is not moving toward replacing researchers with artificial intelligence, but toward building a complementary relationship between human and artificial intelligence. In this relationship, humans remain the guides, evaluators, and creators, while technology serves as a supporting instrument for expanding the boundaries of knowledge and accelerating its production. Such integration can open promising prospects for universities and research centers to address contemporary challenges and contribute more effectively to development, innovation, and the knowledge society.

The study reached the following main findings:

- Artificial intelligence has become an essential tool for developing scientific research and improving its efficiency.
- AI contributes to accelerating access to information, analyzing data, and improving the quality of scientific outputs.
- AI provides promising opportunities for scientific innovation and the development of modern research methods.
- Its use raises ethical and legal challenges concerning academic integrity, intellectual property, and data protection.
- The future of scientific research is moving toward integration between human intelligence and artificial intelligence.

Based on these findings, the following recommendations are proposed:

- Establish university policies and guidelines governing the use of artificial intelligence in scientific research.
- Strengthen training for researchers and postgraduate students on the responsible use of AI applications.
- Integrate AI ethics into academic and research programs.
- Develop universities' digital infrastructure and scientific databases.
- Support specialized Arabic research on artificial intelligence and its academic applications.
- Strengthen the principles of academic integrity when using intelligent tools in scientific research.

References

Arabic References

- Abdel Salam Nassar, Ahmed Said, and Mohamed Nagah Abu Saleh. "The Role of Artificial Intelligence Applications in Developing Scientific Research Skills among Postgraduate Students." *Cairo Journal of Social Work*, Vol. 44, No. 1, 2024, pp. 136–170.
- Hanash, Khaira, and Ahmed Ben El-Chine. "Artificial Intelligence between Innovation and Ethical Responsibility in Scientific Research." *Journal of Islamic Sciences and Civilization*, Vol. 10, No. 2, 2025, pp. 599–616.
- Yassine, Saad Ghaleb. *E-Management and the Prospects of Its Applications in the Arab World*. Dar Al-Manahij for Publishing and Distribution, Amman, Jordan.
- Kabaïli, Louiza, and Amal Zaamoum. *The Role of Artificial Intelligence in Developing Scientific Research Methods at the University*. Master's thesis, Mouloud Mammeri University, Tizi Ouzou, Algeria, 2025.
- Al-Qahtani, Nouf Mubarak. "The Role of Artificial Intelligence Applications in Scientific Research as a Predictor of Research Self-Efficacy among a Sample of Saudi Postgraduate Students." *Arab Studies in Education and Psychology*, Vol. 152, No. 1, 2024, pp. 483–514.

Foreign References

- DeepMind. *AlphaFold: Predicting Protein Structures with High Accuracy*. Research Reports and Official Publications.
- Nature Portfolio. *Reports and Surveys on the Use of Artificial Intelligence in Scientific Research*, 2024.
- PricewaterhouseCoopers (PwC). *Sizing the Prize: What's the Real Value of AI for Your Business and How Can You Capitalise?* PwC Report, 2017.

Official Documents and Reports

- European Union. *Artificial Intelligence Act (AI Act)*, 2024.
- Mohamed bin Zayed University of Artificial Intelligence. *Official Reports and University Documents*.

- Saudi Data and Artificial Intelligence Authority (SDAIA). National Artificial Intelligence Reports and Initiatives within Saudi Vision 2030.
- University of Oxford. Guidance on the Use of Generative AI in Education and Research, 2023.
- UNESCO. Guidance for Generative AI in Education and Research, 2023.