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Traditional Safeguards of Scientific Integrity: A Critical Analysis in the Digital Environment

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Abstract :

After a period during which the use of artificial intelligence was effectively prohibited, it has recently experienced a marked rise in acceptance, owing to its rapid development, universities and academic journals have gradually shifted their approach from outright prohibition to regulated use. Notwithstanding this shift, the use of artificial intelligence continues to pose challenges to the principles of scientific integrity, the safeguards relating to scientific integrity, as provided for in legal texts, have proven insufficient to ensure its protection within the digital environment., this situation calls for the incorporation of scientific integrity ethics into artificial intelligence algorithms, as well as the revision of existing safeguards to ensure their alignment with the ethics governing the use of artificial intelligence and the ethics of academic conduct.

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Introduction

Technological development and the diversification of means of publication and communication have led to an exacerbation of practices of academic plagiarism and intellectual misappropriation. The rapid advancement of information and communication technologies has facilitated access to information and expanded the spaces for scientific publishing, thereby enhancing the dynamics of academic research and increasing the pace of intellectual production. However, this qualitative leap has not been without negative consequences, as it has been accompanied by an alarming rise in the phenomenon of academic plagiarism and misappropriation, which has become one of the most prominent challenges facing the university and research system, given its infringement upon the values of integrity and academic honesty and its undermining of the credibility of scientific output.

The seriousness of this phenomenon is reflected in the multiplicity of its forms and the evolution of its methods. It is no longer limited to literal copying or unauthorized quotation but has extended to more complex practices such as misleading paraphrasing, appropriation of ideas without proper attribution, manipulation of references, as well as the exploitation of digital media to conceal sources, the severity of this issue has further increased with the emergence of generative artificial intelligence technologies, which have made it possible to produce coherent scientific texts of high linguistic and methodological quality in

a very short time. This raises precise legal and ethical issues related to the identification of the author of scientific work, the regulation of the legitimate use of these tools, and their compatibility with the requirements of originality and innovation.

In response to these challenges, the Algerian legislator intervened to establish a legal framework aimed at preventing and combating academic plagiarism and at consolidating the principles of academic integrity within higher education institutions. In this context, Ministerial Decision No. 1082 of 27 December 2020 was issued, which constitutes a fundamental regulatory reference in this field. It defines the rules and procedures related to the detection and handling of academic plagiarism, identifies its various forms, establishes institutional mechanisms for its prevention, and provides for disciplinary sanctions against offenders, reflecting the legislator's orientation toward establishing an integrated system for the protection of academic integrity.

However, the question remains as to the effectiveness of this regulatory framework in achieving its intended objectives, particularly within a rapidly evolving digital environment in which methods of plagiarism develop in parallel with the tools designed to combat them. Another equally important issue arises regarding the extent to which the provisions of Ministerial Decision No. 1082 are capable of addressing the emerging challenges posed by the use of artificial intelligence in the production of scientific content, and whether these provisions are sufficient to ensure effective protection of academic integrity in light of this profound technological transformation.

Accordingly, the core research problem revolves around the extent to which Ministerial Decision No. 1082 of 2020 has succeeded in establishing effective safeguards for academic integrity and in reducing the phenomenon of academic plagiarism, as well as the adequacy of its provisions in keeping pace with the challenges imposed by artificial intelligence tools in the contemporary academic environment, and the extent to which these texts guarantee the protection of academic integrity within the context of the development of artificial intelligence tools.

THE FIRST TOPIC : Concept of Scientific Integrity and Its Forms

Scientific integrity is considered the cornerstone of scientific research; research cannot stand without integrity, and the researcher must bear responsibility for the intellectual output presented in terms of originality and soundness. We will address the concept of scientific integrity in the first requirement and its forms in the second requirement

First requirement: Concept of Scientific Integrity

Scientific integrity means the researcher's or student's commitment to attributing ideas, results, and data to their true sources, ensuring honesty and accuracy in documenting everything derived from others, while respecting the rights of previous authors and researchers¹. Scientific integrity branches into a set of basic principles, the most prominent of which are precise referencing, the principle of originality and innovation in research work, the principle of transparency in presenting methodology and results, in addition to the principle of respecting intellectual property as stipulated in the decree relating to author's rights and neighboring rights.

Violation of scientific integrity takes multiple forms, the most dangerous of which is scientific plagiarism or appropriation, consisting of transferring chapters, paragraphs, or complete results from others' works without reference or with a formal reference that does not reflect the extent of the quotation², including copying university theses, articles, or books and resubmitting them as original production, or translating foreign works and presenting them as new research without mentioning the original author³.

As for violation of scientific integrity in the digital environment, it manifests in new forms of scientific plagiarism, namely the complete generation of texts, attributing writing, authorship, and text production to artificial intelligence, as well as appropriation and production of content with false originality, thereby placing the researcher in intentional or unintentional plagiarism resulting from ignorance of the idea's owner

second requirement: Forms and Safeguards of Scientific Integrity

The forms and safeguards of scientific integrity are multiple and apply whether to traditional scientific research or using artificial intelligence tools.

First section: Intellectual Property and Quotation as Safeguards of Scientific Integrity

One of the safeguards of scientific integrity is that every idea or information taken from another source must be attributed to its owner and documented according to an approved scientific documentation system⁴. It is incumbent upon the researcher not to attribute to themselves a part or all of it or to neglect indicating the source of any idea or information; it is also appropriate to note that the researcher must avoid citing scientific references and relying on them without direct reference to them, not through an intermediary reference.

Quotation enhances continuity in information transmission and integrative knowledge building by crystallizing and improving the idea from one author to another without wasting the right of the original idea owner. It is advisable for the researcher to read and comprehend what they will quote from ideas and opinions, with discussion, analysis, and evaluation of the ideas while considering the requirements and rules of scientific research. Literal or quasi-literal quotation or rephrasing without explicit reference to the source is prohibited, and the permitted quotation proportions must be respected⁵.

Excessive use of artificial intelligence in summarization and rephrasing without indicating the original source constitutes a form of scientific plagiarism⁶. Entrusting summarization and rephrasing tasks to artificial intelligence must be done with extreme caution, considering that excessive summarization and rephrasing deprives the idea of its meaning, as artificial intelligence does not attribute it to the idea's owner, thus placing the researcher in scientific plagiarism. Among the safeguards of scientific integrity is also respecting others' intellectual property and not attributing others' work to oneself, wholly or partially, in any form (texts, tables, images, digital data).

Second section: Safeguards for Handling Information and Research Results

In this context, the researcher must possess and adhere to a set of qualities.

The researcher must be honest in collecting information, refraining from fabricating data, adding false information or data, or deleting what does not align with their inquiries with the intent to direct and distort results to match erroneous ideas they have adopted and wish to defend⁷.

The researcher should also be faithful in analyzing and interpreting information by applying appropriate analysis methods and following known scientific research methodologies, presenting results as they are, even if contrary to expectations or personal interest⁸.

Artificial intelligence tools cannot be relied upon to achieve neutral results, as they exhibit bias depending on the nature of the data provided; thus, the researcher must use them cautiously and not rely on them entirely to preserve research results and their integrity⁹.

They must be transparent in presenting research methodology and procedures, enabling others to understand what the researcher has done and verify results when necessary. The researcher must also present the results reached with integrity and credibility, without falsification or concealment of negative results.

Applications of artificial intelligence cannot be relied upon as scientific references or reliable information sources because their content changes according to the posed question and its formulation, making their results fluctuating and unstable.

Third Requirement: The Shortcomings of Academic Integrity Controls in the Face of the Legitimacy of Using Artificial Intelligence

When a researcher is permitted to use artificial intelligence within what is considered a legitimate proportion, this permission does not precisely indicate whether such use was limited to language editing, assistance in organizing ideas, preliminary translation, or whether it extended to analyzing results, writing parts of the research, or even composing entire texts.

Accordingly, the relative measure of use, although apparently useful, remains incapable of distinguishing between the different forms of use in terms of scientific value and ethical legitimacy¹⁰.

This shortcoming becomes especially clear in the fact that the measure of use groups together, under one heading, heterogeneous practices. Some use artificial intelligence to generate keywords, improve drafting style, or make preliminary translations; these uses may be considered acceptable so long as they remain secondary. By contrast, others resort to these tools to generate entire research texts, fabricate citations, or produce analyses they did not actually master, these practices directly affect the originality and integrity of the research, therefore, including all of these acts under a single “rate of use” would strip the standard of legitimacy of its real meaning¹¹.

Moreover, the relativity of use may implicitly suggest that merely using artificial intelligence, so long as it remains within a certain proportion, confers a form of legitimacy or acceptable normality. For this reason, many serious research institutions and universities do not focus solely on the volume of use; rather, they are primarily concerned with the conditions of such use, the limits of disclosure, and the duty to verify its results.

A researcher may heavily rely on artificial intelligence tools in producing texts, summarizing references, or processing data, without this necessarily reflecting on the depth of analysis or the originality of the results. Excessive dependence on these tools may also weaken the researcher’s critical and creative role, as the researcher shifts from being an authentic actor in knowledge production to someone who merely rephrases content generated by intelligent systems.

In addition, such reliance often leads to the production of superficial research. Artificial intelligence tools, despite their power, cannot grasp precise scientific contexts or ensure the soundness of conclusions without human intervention. One of the main problems associated with the relativity of use is the absence of precise standards defining the boundary between assisted use and substitute use, which raises ethical issues affecting the originality and credibility of the research.

Accordingly, the shortcomings of academic integrity controls lie not only in leniency toward the use of artificial intelligence, but also in the adoption of quantitative standards that do not reveal the true nature of this use nor define its effects¹².

Therefore, the legitimacy of using artificial intelligence in scientific research should not be measured by the extent of its presence in the work, but by the extent to which it remains within the limits of a supporting tool, together with a commitment to disclosure and verification of its results, and without allowing it to replace the researcher in thinking, analysis, and inference. This is in order to uphold the principles of transparency and scientific integrity.

THE SECOND TOPIC : Disciplinary Safeguards for Scientific Integrity

In addition to preventive measures, the legislator enacted the University Ethics and Morals Charter as well as Decision 1082, which includes a system of disciplinary measures varying according to the perpetrator's status and the act's severity, aimed at protecting scientific research and curbing scientific plagiarism

First requirement: Digital Ethics in the University Ethics and Morals Charter

The rapid development in implementing digitization programs in all aspects of life requires the university community to keep pace with the conditions established for digital ethics within the sector. Therefore, all institutions affiliated with the sector must provide the material and moral conditions to ensure the following basics:

Managing access to data in a way that prevents breaches while maintaining service quality within allocated resources.

Securing data by protecting digital systems, infrastructure, and users from breaches, unauthorized access, and other cybersecurity threats

Ensuring respect for privacy by the university institution committing to protecting the confidentiality and safety of personal data available through physical and logical security means, so that no third party has access to personal data or uses it for any purpose without the concerned user's consent.

Protecting the material or moral property rights of the author and inventor in using their product

Combating bias and discrimination that may occur in digital technologies, such as biased algorithms or datasets ,providing and protecting the electronic signature, considered an authority guaranteeing electronic exchanges and requiring software updates and technological vigilance.

Actively contributing to establishing frameworks and mechanisms for the ethical governance of artificial intelligence through institutional participation in addressing all ethical, moral, and social challenges posed by artificial intelligence daily to university and research life

The Algerian legislator in the charter did not address the ethical safeguards that the researcher must observe in scientific research and curb unethical practices in using artificial intelligence, but only stipulated ethical governance of artificial intelligence

Second requirement: Protection from Scientific Plagiarism in Decision 1082 and Its Application to the Digital Environment

The Algerian legislator defined scientific plagiarism in Article 3 of Decision 1082 as any act committed by a student, professor-researcher, university hospital professor-researcher, permanent researcher, or anyone participating in forgery, proven by one of the following acts:

- Appropriation and forgery of results in required scientific works or any other scientific or pedagogical publications.
- Cheating in required scientific works or any other scientific or pedagogical publications.

Ministerial Decision No. 1082 of 2020 enshrines a specific definition of scientific plagiarism as any unlawful seizure or use of others' ideas, texts, results, or data, wholly or partially, by any means, in an academic or research work¹³. This definition emphasizes the elements of attributing others' production to oneself and the absence of proper attribution in various paper and digital publishing media¹⁴, applying to scientific works submitted for university degrees, theses, and articles published in scientific journals

Penalties include academic sanctions such as canceling the defense¹⁵, withdrawing the degree, or nullifying the published article, in addition to disciplinary sanctions that may affect the professor, researcher, or student, including the right to compensation for damage suffered by the original author¹⁶. These penalties serve to curb behaviors contrary to research ethics.

Among the most prominent violations constituting a breach of scientific integrity safeguards

The digital environment is fertile ground for violating scientific integrity, as artificial intelligence application content is unreliable in source, with false and inaccurate information.

Scientific plagiarism, primarily manifesting in information attributed by the researcher without proper documentation, such as copying texts or chapters from

books, articles, theses, or websites; scientific plagiarism by word substitution, which is quotation with changing some words to make it innovative; stylistic scientific plagiarism, involving theft of logical thinking in presenting ideas in sequence and how information is displayed; and idea scientific plagiarism when drawing on an idea from another researcher's production.

Also, cheating in scientific works, such as relying on commercial services to prepare theses and research and attributing them to oneself, or complete reliance on artificial intelligence to create and generate the work, constitutes a violation of scientific integrity.

Third requirement : Mechanisms to Enhance Scientific Integrity and Prevent Scientific Plagiarism

The legislator enacted a set of legal texts providing mechanisms to enhance scientific integrity and prevent scientific plagiarism

Decision 1082 adopts a set of preventive mechanisms, primarily integrating methodological training on scientific research methodology and ethics into study paths, especially at Master's and Doctorate levels, to raise students' awareness early of the risks of undermining scientific integrity¹⁷, the decision also stipulates adopting technological means to monitor academic works, such as specialized software for detecting similarity rates at faculty and laboratory levels¹⁸.

Among the preventive measures is also adopting clear internal regulations for preparing and defending memoranda and theses, by defining deposit stages, initial monitoring of similarity rates, and the honor declaration signed by the student and supervisor before referring the work to defense or publication committees¹⁹.

The decision also encourages fostering a culture of reporting scientific plagiarism, by granting the harmed party the right to resort to competent authorities to claim protection of their moral rights under the laws protecting author's rights and neighboring rights.

The Algerian legislator limited reference to artificial intelligence in the scientific research ethics charter within the general framework of digital governance²⁰, without clarifying the scope of its use or the areas permitting the researcher to employ it.

Conclusion

Scientific integrity is the foundation for building sound knowledge and fostering trust in intellectual production. The research ethics charter and Decision 1082 represent an advanced step in establishing scientific integrity and combating scientific plagiarism in the university through precise concepts and objective rules highlighting the necessity of instilling a culture of scientific integrity among

students and researchers. However, they are ineffective for use in the artificial intelligence era, as scientific integrity now relies on a mix of clear ethical values, adherence to ethical publishing rules, and the necessity of digital mechanisms to detect plagiarism and regulate artificial intelligence use that respects scientific research ethics.

Through the research, we reached the following results:

- ✓ Legal texts remain inadequate for protecting scientific integrity amid the tremendous development of artificial intelligence programs.
- ✓ The researcher must exercise responsibility when using artificial intelligence.
- ✓ Artificial intelligence cannot be relied upon for generating and creating texts, to preserve scientific integrity, as its results are variable and fluctuating, and it cannot be trusted to attribute information to its owner.

Accordingly, the following can be proposed:

- ✓ Scientific integrity and artificial intelligence are a fundamental topic in scientific research, requiring balance between benefiting from these technologies' capabilities and ensuring commitment to ethical standards, necessitating updating scientific research ethics to keep pace with rapidly evolving artificial intelligence programs.
- ✓ It is urgently necessary to localize the ethical imperative and scientific research ethics in artificial intelligence program algorithms.
- ✓ Amending the scientific research ethics charter to necessarily adopt artificial intelligence in scientific research with binding guiding indicators, emphasizing that artificial intelligence is a secondary tool in scientific research.
- ✓ Necessity to strengthen the researcher's ethical control by disclosing artificial intelligence use and not attributing its outputs as the researcher's original effort, without attributing authorship to artificial intelligence.

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