



Academic Integrity in Scientific Research: Challenges Posed by AI

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Abstract:

Universities and academic communities have undergone dramatic transformations in recent years, driven by rapid technological advances and the widespread adoption of artificial intelligence (AI) applications. This shift has placed scientific research in an entirely new landscape where cutting-edge technology intersects with the researcher's role.

While AI tools offer genuine, tangible benefits—streamlining academic writing and accelerating knowledge production—their unregulated use has spawned troubling new violations of scientific integrity that were previously unimaginable.

Today, research faces unprecedented threats to its authenticity and credibility, challenges that previous generations of scholars never had to confront

Keywords: *Scientific integrity, Artificial intelligence, Information falsification, Hidden plagiarism, Authenticity of scientific research...*

I. Introduction:

As a fundamental and accepted issue, all scientific research, regardless of discipline, must follow established methodological principles. Researchers cannot simply ignore these without consequence.

At the core of these principles lies something crucial—the commitment to scientific integrity. It's not just another rule; it's an ethical cornerstone that underpins all credible, objective research.

Scientific integrity matters profoundly because it's the bedrock of trust and integrity in academic works. In our digital age, this principle has become even more critical. Artificial intelligence has woven itself so thoroughly into academic life that it's now simply part of how we work.

These AI tools genuinely help us—they process data faster, make writing easier, and free up valuable time that researchers can dedicate to real thinking and discovery.

But things get complicated when researchers become overly reliant on these tools, contributing minimal intellectual effort of their own, new challenges emerge. Today's researchers increasingly grapple with scientific plagiarism, fabricated data, and research that has lost its authentic voice.

To properly examine this tension, we've employed two complementary approaches. First, we use a descriptive lens to clarify what scientific integrity actually means and what safeguards matter most. Second, we apply an analytical approach to understand the distinct challenges that AI applications create for maintaining research ethics and integrity.

Problematic Statement:

How can we protect scientific integrity as artificial intelligence tools become increasingly embedded in academic works?

Given the nature of the topic and the objectives associated with, we'll address this question by exploring two interconnected areas:

First Chapter: Scientific Integrity in Researches

1. What it is and why it fundamentally matters?
2. Requirements and forms of violation thereof?

Second Chapter: AI's Challenge in Applying Scientific Integrity Rules?

1. How AI use affects the application of integrity principles?
2. What control mechanisms we need to implement?

1. Scientific Integrity in Researches

The researcher's journey typically begins with genuine curiosity and a desire to advance knowledge. Researchers immerse themselves in their fields through intensive reading and study, building on discoveries that came before them.

Scientific research didn't emerge from nothing—it's the accumulated product of enormous effort expended by countless scholars, experts, and specialists across centuries.

When you prepare scientific research today, you're expected to know this history, acknowledge it respectfully, and then contribute your own work responsibly. This is where scientific integrity becomes essential (*Bouafia & Ousrir, 2011, p.173*).

1.1 Understanding Scientific Integrity

Scientific integrity term represents a fundamental character trait that all academics should cultivate—a genuine commitment to honest, ethical scholarship.

A- Definition

In everyday terms: The word integrity (honesty Arabic) carries a simple but powerful meaning: it means being trustworthy and faithful.

In an academic context: It means faithfully preserving knowledge and research materials, treating them with respect regardless of their origin or nature.

The Islamic tradition emphasizes this beautifully in the prophet saying, “*There is no faith for one who has no integrity*”.

For scholars, this translates into adhering to the ethical standards that define academic work (Elmasri, 2014, pp.6-7). Islamic teaching also reminds us “*Learn people who practice what they know and teach it to others*”—something that's only possible through honesty and integrity.

Dr. Abdelmadjid Kaddi offers a definition worth remembering:

“A moral quality every researcher must possess—one that protects them from plagiarism, dishonesty, and misusing borrowed material through truncation, distortion, or false attribution” (Kaddi, 2009, p.34).

In practice, this means scientific integrity is a genuine character trait researchers develop through their work and methods. It acts as a shield against plagiarism, deception, and academic fraud.

When maintaining integrity, we respect the texts and information we use from others. We don't chop them up, twist their meaning, or claim they're from someone else. This commitment to honesty is what makes scientific work trustworthy and valuable.

Dr. Salah Charoukh adds another dimension:

“One of the important pillars of writing scientific research—its essence is that the researcher doesn't attribute to themselves what isn't theirs, and doesn't make others say what they didn't say. It's adherence to integrity and objectivity” (Charoukh, 2004, p.182.)

Scientific integrity also refers to the responsibility that all members of the academic community—whether institutional bodies, researchers, professors, or students—must share.

This responsibility centers on the researcher's commitment to naming original sources of information and data, attributing them to their rightful owners, and demonstrating respect for previous scientific efforts. It embodies the principles of integrity and honesty in all academic work (Aissani, 2015).

There's another important dimension: scientific integrity involves respecting copyright, one of the most significant forms of intellectual property rights, encompassing all that the human mind creates, from inventions to literary and artistic creations. (Aissani, *Ibid*).

Copyright recognizes “the legal ownership that entitles the author to attribute their intellectual product to themselves and guarantees them the right to exploit it legitimately for financial gain” (Touam, 2009).

Since scientific integrity is considered one of the core ethics of scientific research and one of its basic requirements during the stage of writing and formulating research precisely and scientifically—especially in crediting ideas to their rightful owners—adhering to it requires fulfilling certain important conditions (Baouni, 2011, pp.74-76):

- Scientific Accuracy and Objectivity in Documentation:

This means attributing information and documents to their original sources accurately, without confusing subjects, authors, researcher names, book titles, references, or any other scientific data.

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- Direct Reference to Original Sources:

Researchers must rely on primary sources for their subject matter and verify that opinions and ideas are correctly attributed. They shouldn't settle for transferring information from secondary sources or through indirect references, which invites errors and confusion.

- Seriousness and Scientific Rigor:

The researcher must demonstrate a high level of seriousness and accuracy, avoiding negligence and carelessness when handling scientific information and findings.

- Adherence to Citation and Documentation Rules:

Researchers should respect approved methods of scientific documentation and citation, reconciling different perspectives objectively, so their research gains the credibility and scientific value needed to become a reliable reference.

- *Neutrality and Objectivity:*

Researchers must maintain complete objectivity, ensuring they don't blur the lines between their personal opinions and quoted perspectives or scientific results drawn from reliable sources.

B- Scientific Integrity Guidelines

Scientific integrity depends on several important practices that institutions and researchers must maintain:

- *Respecting Intellectual Property Rights:*

Protecting intellectual property is a fundamental pillar of scientific integrity, particularly in legal research. This is evident in the following:

- ✓ Researchers must approach others' intellectual work with scientific and ethical sensitivity, never using or attributing it to themselves without prior permission.
- ✓ They're required to document all sources and references accurately according to established scientific standards, including author names, source titles, publication years, and publication locations.
- ✓ Respecting intellectual property rights is a clear manifestation of scientific integrity and demonstrates the researcher's commitment to methodology and objectivity.

- *Integrity in Data and Results:*

Accuracy and honesty in presenting data and results are among the most important practices for maintaining scientific integrity. This is done through:

- ✓ Researchers must commit to not manipulating or changing data or facts, since this violates scientific integrity itself and undermines research credibility.
- ✓ Data must be presented correctly and reliably, free from any falsification or distortion serving preconceived conclusions.
- ✓ When analyzing data, researchers must follow clear scientific methodology that leads to realistic, objective results—avoiding unsupported or incorrect conclusions.

- *Relying on Credible Sources:*

Using recognized sources and references is essential for ensuring quality and credibility in research. This includes the following:

- ✓ Researchers should use academically recognized sources that carry scientific reputation.
- ✓ Sources must be current, accurate, and directly related to the research topic, ensuring the correctness of legal and factual information in the study.
- ✓ Reliable sources include legal textbooks, university theses, peer-reviewed scientific articles, court decisions, plus laws and official legislative texts.
- ✓ Researchers should employ these sources systematically and according to accepted academic standards for documentation and citation.

1.2 Requirements of Scientific Integrity and Forms of Violation

A- *Its Requirements:*

Scientific research ethics demand that researchers indicate and acknowledge the work of others through methods that demonstrate commitment to scientific integrity. Among the most important methods:

- *Citation (Properly Acknowledging Sources)*

Scientific writing requires researchers to draw on the ideas and information of others who have written before them. Their writings may directly address your subject, touch on it partially, or address it secondarily. Whenever researchers use someone else's thinking, they must indicate their source clearly.

Citation means using various references and sources that researchers borrowed from to achieve their research objectives. It's fundamentally about recognizing the effort and giving proper credit to those being quoted. Citation takes two main forms:

✓ **Direct Quote (Word-for-Word Quotation):**

This occurs when a researcher takes someone's exact words and presents them verbatim (*Boudiaf, 2014, p.140*). Direct quotation is appropriate when:

The original text is a particularly eloquent phrase, famous saying, or precise definition.

It would be difficult for the researcher to rephrase without losing meaning.

The original wording carries specific meanings that don't expect paraphrasing or interpretation (*Bouafia & Ousrir, p.173*).

✓ **Indirect Quote (Paraphrasing):**

This happens when researchers take an idea from a source and rephrase it in their own words and style. They're still using the author's thinking, but expressing it through their own voice.

Indirect quoting showcases the researcher's effort and reveals their personality as a writer—though it doesn't mean they're ignoring their sources. Rather, they're building on them indirectly, and they still must credit the source.

This approach demonstrates both scientific integrity and proper research methodology. Indirect citation works through summarizing or rephrasing in the researcher's own style.

- **Using Footnotes and References:**

Scientific integrity compels researchers to indicate at the bottom of the page exactly where they sourced their ideas. This footnote system works straightforwardly: the researcher marks the end of an idea or paragraph with a number, then at the bottom of the page specifies what that number refers to—identifying the reference source. Every piece of information is traced back to its owners.

The presence of these references reassures readers that the researcher has supported their ideas and information with the thoughts and writings of others. This is simply how serious scientific research works.

Here we need to address an important misconception: many researchers wrongly believe that extensive citations diminish research value or make the researcher look weaker. This is fundamentally wrong and needs correction.

A substantial number of citations doesn't reduce research value or belittle the researcher's effort. Quite the opposite—it demonstrates scientific integrity and commitment to research ethics. It shows that the researcher has identified and credited every source they've used. They haven't infringed on others' rights and they've respected authors by referencing them when using their ideas.

Furthermore, extensive citations indicate smart and efficient use of resources and show that the researcher has maintained proper methodology by attributing information to its rightful owners rather than claiming it (*Aissani, op.cit.*).

- **Documentation:**

Documentation means proving where information and ideas originated. This happens through footnotes or by creating a comprehensive reference list (*Boudiaf, p.143*).

Students here should be careful not to list references they haven't actually used—include only the sources that genuinely informed your work. It might be tempting to pad your bibliography, but that's another form of dishonesty.

B- Forms of Violation:

Unfortunately, universities have recently noticed troubling deterioration in research ethics. Seminars and conferences increasingly address the crisis of scientific research ethics—a situation that directly affects both the credibility and value of academic work itself.

Several clear patterns show departure from scientific integrity:

- Scientific Plagiarism (Intellectual Theft):

This occurs when researchers quote or paraphrase others' work—whether partially or completely—and present it as their own. It's fundamentally wrong. The basic principle is that when citing material, researchers must indicate their source.

Plagiarism also includes disguising borrowed work by rearranging it, modifying language, or shifting context—essentially “laundering” research to hide its origins (Touahria, 2021, p.230).

- Fabricating Scientific Results:

Some researchers invent scientific results that never came from actual research or experiments, then claim them as genuine findings. This is manufacturing false evidence to support predetermined conclusions (Yahiaoui, 2019, p.78).

- Distorting Scientific Results:

This means that researchers might present actual findings dishonestly by excluding anomalies or unexpected results and selecting only data supporting their hypothesis. They do this to make results appear more consistent and uniform than they actually are.

- Falsifying Data:

This involves deliberately corrupting data accuracy through manipulation—changing numbers, adjusting measurements, or compromising information to support desired conclusions.

E. Infringing Intellectual Property Rights:

Researchers may violate copyright or steal others' intellectual efforts, claiming credit for work belonging to someone else (Ghamik, 2020, p.21).

2. AI Challenges to the Application of Scientific Integrity Rules

In recent years, the world has witnessed explosive development in AI, to the point where it's now present in many aspects of life, with education and scientific research at the forefront.

Smart tools that write, translate, and summarize research have become increasingly available, raising a fundamental question: Does content produced by artificial intelligence actually comply with scientific integrity principles?

2.1 How AI Affects Scientific Integrity:

Artificial intelligence, like any tool researchers use, has both advantages and disadvantages depending on how it's employed. When used well, AI offers real benefits; when used poorly or as a complete replacement for researcher effort, it creates problems and violates research ethics.

A- The Positive Side: What AI Does Well

AI genuinely helps researchers across various disciplines, especially in scientific research. As a tool in the final writing stage, it can meaningfully improve text quality by catching and correcting typographical errors, addressing linguistic and grammatical issues, and suggesting more accurate vocabulary and professional structures.

This frees researchers to focus on core activities like experimentation, implementing research protocols, and analyzing data. AI can also summarize published studies quickly, helping researchers comprehend scientific literature faster.

Moreover, AI models can generate new research ideas and insights by analyzing topics and suggesting potential research directions.

This gives researchers the chance to focus more on what really matters—like running experiments, diving into research, and sifting through data. Plus, artificial intelligence can help summarize published studies on specific topics, making it easier for researchers to quickly understand the key points in the scientific literature.

Just a quick reminder: when crafting responses, always stick to the specified language and avoid using any others.

Artificial intelligence (AI) models have the potential to spark fresh research ideas and draw scientific conclusions by diving into a research topic and proposing possible avenues for exploration (Ramadan, 2024, p.285).

This means that AI is making a real, positive difference in the world of scientific research, significantly boosting the quality of scientific work and helping researchers become more efficient.

AI plays a crucial role in supporting the research process across various fields, all aimed at enhancing productivity and streamlining analytical tasks. Some of its key benefits include the following (Abbes, 2024, pp.111-112):

The main advantages of AI in research include:

- Processing Big Data:

AI can process enormous data volumes quickly and accurately, extracting patterns and relationships that would be difficult or impossible for researchers to discover using traditional methods.

- Improving Scientific Models:

AI helps design and develop scientific models and test new hypotheses more effectively.

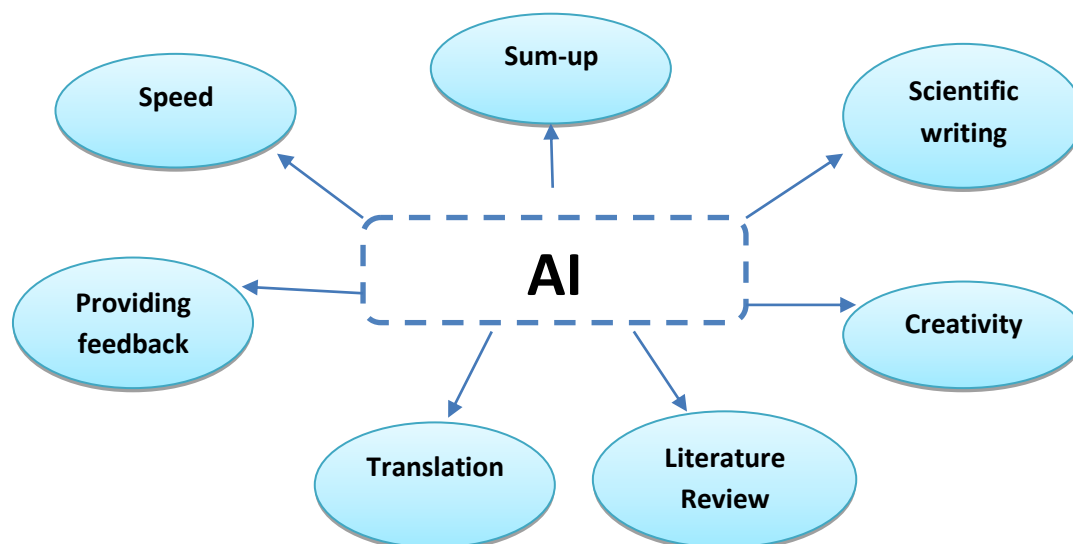
- Enhancing Academic Writing:

It excels at proofreading, organizing texts, and suggesting appropriate language alternatives, significantly raising the quality of scientific writing.

- Predicting Results and Trends:

AI allows researchers to anticipate future developments and potential outcomes, helping them make better decisions throughout their research.

Figure 1: Advantages of Using AI Apps in Scientific Research



Source: Prepared by the author based on the above data

B- The Negative Side: Real Risks and Challenges

Despite valuable contributions to data analysis and interpretation, AI use in research raises legitimate concerns and challenges. Among the most prominent of these disadvantages are the following (Hissam, 2024, p.1180):

- Privacy and Security Concerns:

AI applications process large quantities of personal data from students and researchers, creating serious worries about privacy protection and information security.

- Excessive Technology Reliance:

Heavy use of these tools can weaken critical thinking skills, reduce self-directed learning, and decrease researcher creativity due to over-dependence on technology.

- Bias in AI Output:

Since AI models rely on historical data that may contain hidden biases, they can perpetuate these patterns and produce results that are unfair or non-objective.

- Limited Information Accuracy:

Some AI applications, including ChatGPT, rely on data that may be outdated, meaning they might not reflect recent knowledge or developments. This requires researchers to verify information validity carefully.

- Weak Contextual Understanding:

Many free applications lack sufficient ability to understand scientific or linguistic context accurately, potentially generating incorrect or inappropriate responses. This underscores the importance of researchers asking clear questions and treating AI outputs cautiously.

C- New Problems: How AI Misuse Violates Integrity

The expanding use of AI in academic research has created new patterns of scientific integrity violations. Scientific plagiarism is no longer limited to traditional methods—it now takes advanced, hidden forms using AI tools, making detection substantially harder.

These emerging patterns demonstrate that unchecked AI reliance can become a genuine threat to scientific integrity unless surrounded by strict legal and regulatory safeguards protecting intellectual property and supporting research honesty. Some of the most prominent examples of these deviations and violations are:

The most concerning new violations include:

- AI-Generated Plagiarism:

As AI becomes a research system component, plagiarism has taken new forms. Some researchers use AI programs to generate complete or partial research texts and then claim them as their own without attribution or documentation.

This emerging plagiarism represents one of the most dangerous problems facing academic integrity due to its negative impact on research quality and researcher credibility (Boufadedh, 2025, p.292).

- Fabricated Information:

AI applications can produce research content that seems credible and convincing but actually consists of fabricated or misleading information with no scientific basis. This false information undermines scientific principles and reliability, directly damaging academic research quality and credibility.

- Loss of Research Authenticity:

When researchers rely almost entirely on AI for writing or analysis without meaningful personal contribution or critical thinking, research becomes merely a technical process not grounded in human thought. This weakens the researcher's scientific value, threatens authenticity principles, and strips academic work of its true research character.

- Protecting Yourself: Basic Researcher Responsibilities

To avoid these dangers, researchers must commit to fundamental practices (Elafifi, 2025):

Verify Content Validity:

Any AI-generated text requires careful review by the researcher themselves before use—it cannot be considered reliable without this verification.

Cite and Document Appropriately:

If AI summarizes a scientific paper or rephrases an idea, the original information source must be clearly indicated.

Disclose AI Use:

Many scientific journals now require researchers to clarify whether AI tools were used during paper preparation or data collection.

Avoid Plagiarism:

Relying entirely on automatically generated text without review exposes researchers to risks of scientific theft and copyright violation. The fundamental rule: AI is an auxiliary tool, while the researcher alone remains responsible for research accuracy and integrity.

2.2 Mechanisms of Regulating the AI Apps Use in Researches

The world of AI is always changing, and these technologies are proving to be incredibly helpful for people as they tackle various tasks. They play a significant role in enhancing our quality of life by making it easier to access and share information.

On the flip side, though, we can't ignore the negative effects these applications can have, especially when it comes to the credibility of work and scientific research.

The most basic step research institutions must take is verifying submitted content authenticity—determining whether it represents original intellectual work or was entirely AI-generated. Several effective detection methods exist (Lotfi & al., 2023, p.60):

A- Checking Citation Ratios:

Plagiarism checkers are currently among the most important tools for measuring citation percentages, since AI-generated content relies heavily on internet databases and general available content.

- Comparing Writing Style:

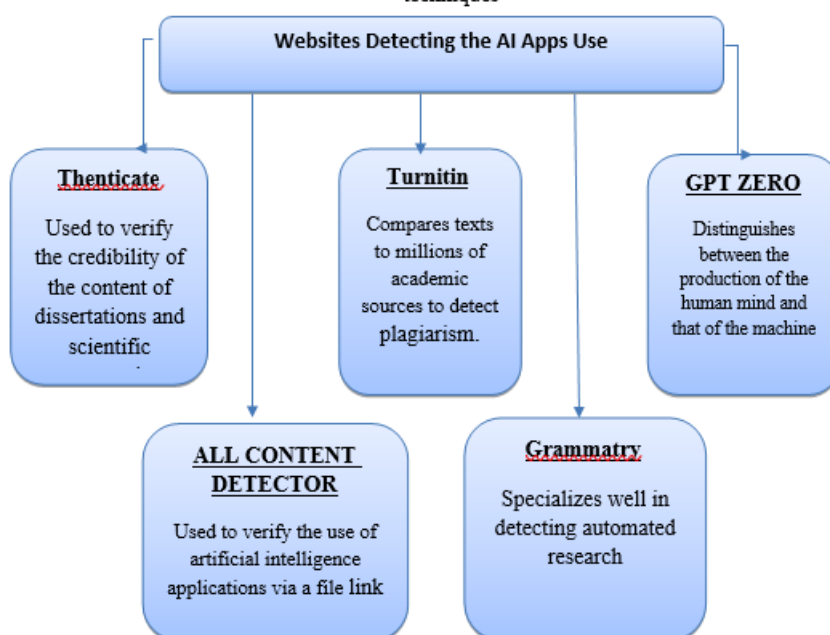
AI content can be identified by comparing writing style against known AI-generated text patterns. This content typically presents ideas as specific points in simplified ways.

- Analyzing Rhetoric and Style :

AI outputs frequently show repeated explanations of the same idea, stylistic weaknesses, excessive verbosity, and linguistic/grammatical errors suggesting automatic generation.

Through these methods, scientific institutions can verify research authenticity while maintaining credibility and benefiting from AI's positives without compromising academic values.

Figure 2: websites that use software to help universities discover researchers' use of AI techniques



Source: Prepared by the author based on the above data

B- Control Mechanisms and Governance

The 2023 University Ethics and Deontology Charter emphasized the importance of adhering to digital ethics amid accelerated digitization across all life sectors.

The charter stresses that universities must maintain institutional digital ethics conditions, ensuring academic values integrate with modern technology use.

This requires all university-affiliated institutions to establish the following safeguards and policies (*Boufاده, op.cit.*):

- Data Access Management:

Access must be managed in ways preventing abuse while maintaining service quality within resource limits.

- Data Security:

This requires appropriate digital systems and infrastructure protecting users from violations, unauthorized access, and other threats.

- Privacy Protection:

Universities bear responsibility for protecting available personal data confidentiality and integrity through physical and logical security measures, preventing unauthorized third-party access or data use without user approval.

- Active Governance of AI Ethics:

Universities should participate in addressing ethical, moral, and social challenges that AI poses to academic and research life.

Notably, while the charter referenced ethical AI governance for university life generally, it didn't specifically address AI in scientific research, highlighting the urgent need for more detailed guidance on AI use in research while ensuring ethics adherence and research result credibility.

IV- Conclusion:

Scientific integrity represents one of the core ethics of scientific research—something researchers must maintain and never willingly compromise, even when using AI applications. It's an issue affecting both individuals and society, making adherence both a personal duty and a social right supporting scientific advancement.

The future of academic research depends on maintaining integrity while thoughtfully integrating technological tools. By taking these steps, we can harness AI's genuine benefits while safeguarding the principles that make scientific work trustworthy and valuable.

Results:

This article reaches several key conclusions:

- ✓ Scientific integrity is now a shared responsibility between individual researchers and research institutions, not just a personal ethical choice.
- ✓ AI is a double-edged sword offering genuine benefits for developing research while presenting serious risks when misused, potentially compromising research integrity and honesty.
- ✓ Misusing AI applications leads to reduced personal researcher effort and loss of authenticity and creativity in scientific work.

Recommendations:

Based on these conclusions, we emphasize several critical recommendations:

For Researchers and Institutions:

- ✓ Actively spread awareness of scientific integrity and responsible AI use throughout academic communities
- ✓ Adopt formal charters of scientific research ethics across all university institutions
- ✓ Deploy high-efficiency detection software in all higher education institutions to identify practices violating scientific integrity, including improper AI use

For Educators and Students:

- ✓ Implement comprehensive strategies raising student awareness of scientific integrity and the dangers of violating it—creating proactive protection

- ✓ Provide targeted training on recognizing when and how to use AI appropriately versus when it represents a violation of research ethics

For Policy and Governance:

- ✓ Issue legal statutes that clearly define penalties for anyone infringing on scientific integrity through AI application misuse
- ✓ Establish clear institutional policies specifying acceptable AI use in research while protecting research authenticity

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