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Intelligent Plagiarism as a Misconduct in Academic Integrity

O Plágio Inteligente como Má Conduta na Integridade Académica

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Scientific research is based on the assumption of academic integrity and respect for ethical principles. However, plagiarism and other forms of misconduct have become problems that undermine the credibility of the scientific community. This has led to increasing awareness and attention to these topics nowadays.

Plagiarism is a grave breach of academic and scientific ethics, involving the misappropriation, whether intentional or not, of another's idea or work without proper citation of the original source.[1] It manifests in various forms and degrees of severity: from replicating small excerpts without citation, to the practice of 'salami publishing' – where a substantial work is dissected into smaller pieces for publication in different journals as distinct articles or outcomes. Incorrect bibliographic references, publication biases, and even publishing entire articles resulting from self-plagiarism or outright duplication are other forms.[2] It is essential to note that non-literal plagiarism, or the practice of rephrasing ideas in an indirect manner without attribution, is also considered unethical.

Scientific journals play a vital role in the detection and sanction of plagiarism[3]: editorial offices have traditionally essentially relied upon chance detection by reviewers or editors to discover that submitted work had been previously published. Now, due to efficient search engines, online publishing, and software algorithms, journals increasingly use software that can efficiently scan thousands of manuscripts in seconds and match the submitted text to already published text.

However, the emergence of advanced plagiarism masking techniques such as the use of automatic translators, the replacement of words and sentences, the use of manipulated or falsified images and diagrams, and even the purchase and sale of scientific publications through commercial services (paper mills) has become a worrying future trend. Technological advances and easy access to information have increased the opportunities for plagiarism through even more sophisticated and subtle methods. These include the use of pre-trained intelligent generative transformers or writing tools that enable automatic 'completion' of documents.[4]

On the one hand, we find Natural Language Processing (NLP) models that, among other things (virtual assistants, automated translation, analysis of feelings, grammar correction, automatic summarisation, semantic search...) create texts with Artificial Intelligence (AI). These models are focused on processing and understanding human language with the help of technologies that use algorithms to analyse, understand and produce texts. Regarding the latter[5] it is unlikely that traditional plagiarism checkers can be used to detect this form of cheating, as the NLP model generates a unique AI-generated response instead of copying an existing one.

On the other hand, artificial intelligence (AI) covers a broader field than just language processing and understanding, because it is developed through systems and machines that can perform tasks that require human intelligence, which has been an unprecedented development in recent months, particularly since the launch of AI chatbots in November 2022 and of ChatGPT (GPT - Generative Pretrained Transformer) in 2018. These programs were developed by the company OpenAI, which made a tool that is easy to understand and use available to society. Consequently, numerous authors are currently focused on providing their insights regarding its applications:

- AI can be a useful tool in academic writing, helping to organize material, edit and/or revise, solve problems, make decisions, and learn independently.[6]
- These types of technologies are leading to a post-plagiarism era where people and technology co-author texts, resulting in a human-technology hybrid.[7]
- In this sense, such applications cannot be included in the authorship when writing publications, but their use could be explained in the introduction, merits, or acknowledgments, as being responsible for the scientific results. In this sense, AI chatbots are not human and, therefore, in the current legal system, a text automatically generated by an AI chatbot cannot be a copyrightable work.[8] Journals such as Nature and Science have expressed the view that these

tools cannot be given authorship credits. However, there are already publications where GPT is listed as an author.[9]

We could be talking in this case about intelligent plagiarism, understood, in the words of the undersigned authors as the act of using AI and big data to generate texts automatically, but without using the appropriate data sources. In other words, using AI text generation capabilities to create content that appears to be original, but is actually based on copying and adapting existing material without acknowledging proper sources. Intelligent plagiarism involves the fraudulent use of technology and can be considered the misuse of knowledge or ideas. Artificial intelligence can train itself by sourcing large amounts of data and learning to produce coherent texts, but that does not justify the unethical use of technology to plagiarize or credit other people's intellectual work.

In principle, the use of AI tools should not, *a priori*, be considered any kind of academic dishonesty or abuse, but what it can cause depends more on how the tool is used. An example is using AI tools to automatically generate parts or even an entire scientific article without properly identifying the original authorship. This may include the creation of separate sections such as introduction, methods, results, and conclusions without actual authorship input, which would undermine academic integrity and violate ethical principles of research and dishonest behavior in the publication of scientific articles.[10]

There is currently an open debate surrounding the need and implications of adopting this type of technology in research and in society in general. The discussion revolves around whether researchers should avoid using this technology or exercise caution in its use, particularly in the context of training future research personnel. In this regard, the Committee on Learning and Teaching of the European University Association recently published a document with key points on the impact of AI tools in higher education and responsible use, where it is pointed out that any attempt to ban AI would be futile and that the higher education sector must adapt its approaches in such a way that AI is used effectively and appropriately. While there are several shortcomings associated with the use of AI such as lack of references to information sources, biases in data and algorithms, intellectual property and copyright, or issues related to privacy, data security, and fairness, there are also numerous potential benefits for academic work, including greater efficiency, personalized learning, and new ways of working.

The application of these systems based on chatbots has challenges and limitations related to ethics, whereby awareness, sustainability, and continuous adaptation to the development of these systems will become an emergency situation.[11] It is important to note that the dishonest use of AI in the development of a research paper goes against the basic ethical principles of research such as honesty, transparency, and due attribution. Such practices can damage the credibility of science and undermine faith in scientific progress.

AUTHOR CONTRIBUTIONS

All authors contributed equally to this manuscript.

COMPETING INTERESTS

The authors have declared that no competing interests exist.

FUNDING SOURCES

REFERENCES

1. Wilches-Visbal JH, Castillo-Pedraza MC, Pérez-Anaya O. El plagio y las revistas depredadoras: un problema económico y ético en universidades públicas de Colombia. Rev Cubana Infor Cienc Sal. 2022;33:e1911.
2. Zúñiga-Vargas JP. Comportamiento ético en la publicación científica: malas conductas y acciones para evitarlas. Rev Educ. 2020;44:1-10.
3. Higgins JR, Lin FC, Evans JP. Plagiarism in submitted manuscripts: incidence, characteristics and optimization of screening-case study in a major specialty medical journal. Res Integr Peer Rev. 2016;1:13.
4. Gayed JM, Jonson MK, Oriola AM, Cross JS. Exploring an AI-based writing assistant's impact on English language learners. Comput Educ Artif Intell. 2022;3:7.
5. Lesage J, Brennan R, Eaton SE, Moya B, McDermott B, Wiens J, et al. Exploring natural language processing in mechanical engineering education: implications for academic integrity. Int J Mech Eng Educ. 2023;0:1-18.
6. Salvagno M, Taccone FS, Gerli AG. Can artificial intelligence help for scientific writing? Crit Care. 2023;27:1-5.
7. Eaton SE. Artificial intelligence and academic integrity, post-plagiarism. University World News. [cited 2023 Mar 04]. Available from: https://www.universityworldnews.com/post.php?story=20230228133041549.
8. Lee JY. Can an artificial intelligence chatbot be the author of a scholarly article? J Educ Eval Health. 2023;20:6.
9. GPT Generative Pretrained Transformer, Thunström AO, Steingrimsson S. Can GPT-3 write an academic paper on itself, with minimal human input? HAL Sciencie ouverte. 2022;8.
10. Lund BD, Wang T, Mannuru NR, Nie B, Shimray S, Wang Z. ChatGPT and a new academic reality: artificial Intelligence-written research papers and the ethics of the large language models in scholarly publishing. Jasist. 2023;74:570-81.
11. Kooli C. Chatbots in education and research: a critical examination of ethical implications and solutions. Sustainability. 2023;15:5614.