

The impact of Generative Artificial Intelligence in higher education: a focus on ethics and academic integrity

El impacto de la inteligencia artificial generativa en educación superior: una mirada desde la ética y la integridad académica

O impacto da inteligência artificial generativa no ensino superior: uma perspectiva ética e de integridade acadêmica

生成式人工智能对高等教育的影响：从道德及学术诚信角度进行分析

تأثير الذكاء الاصطناعي التوليدي في التعليم العالي: وجهة نظر من الأخلاق والنزاهة الأكاديمية

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Abstract

Generative Artificial Intelligence (GAI) has revolutionized the field of higher education, and sparked debates on the potential of tools such as ChatGPT, Humata.ai or Sudowrite in teaching, learning and assessment processes. While their integration in this context offers numerous opportunities (e.g., instant feedback, generation of resources and teaching materials, adaptive learning, interactivity, etc.), it also poses significant challenges that raise ethical and academic integrity concerns, such as the reliability of information, transparency regarding the sources used, or data privacy and security. The aim of this article is to examine the ethical implications of GAI in higher education from a three-fold perspective (students, faculty, and institutions). Additionally, it aims to analyze its impact on aspects related to security, accessibility, sustainability and even new forms of plagiarism and academic fraud that involve impersonation of authorship. Based on the literature review conducted, and in accordance with the ideas proposed by some authors, possibilities for integrating GAI into university classrooms will be explored. This will be achieved through pedagogical practices that guide students in the proper use of GAI and enable faculty to seek new educational approaches. This transformation process will require the establishment of clear guidelines that align with ethical codes and integrity policies of higher education institutions. Ultimately, the reflection on how to combine education, innovation, and academic integrity will provide these three groups with a new opportunity to drive improvements in university education.

Keywords: ethics, academic integrity, Generative Artificial Intelligence (GAI), higher education.

Resumen

La Inteligencia Artificial Generativa (IAG) ha revolucionado el ámbito de la educación superior, y ha abierto el debate en torno al potencial de herramientas como ChatGPT, Humata.ai o Sudowrite en los procesos de enseñanza, aprendizaje y evaluación. Si bien su integración en este contexto presenta numerosas oportunidades (i.e., retroalimentación instantánea, generación de recursos y materiales docentes, aprendizaje adaptativo, interactividad, etc.), también plantea importantes desafíos que ponen en entredicho la ética y la integridad académica como la fiabilidad de la información, la transparencia respecto a las fuentes utilizadas o la privacidad y seguridad de los datos. El objetivo de este artículo es examinar, desde una triple perspectiva (alumnado, profesorado y centro), las implicaciones éticas de su uso en educación superior. Se busca también analizar su impacto en aspectos vinculados con la seguridad, accesibilidad, sostenibilidad e, incluso, nuevas formas de plagio y fraude académico que suplanten la autoría. A partir de la revisión bibliográfica realizada, y según lo que plantean algunos autores, se explorarán posibilidades de integración de la IAG en las aulas universitarias, mediante prácticas pedagógicas que orienten al alumnado en su correcta utilización, y permitan al profesorado buscar nuevos enfoques educativos. Este proceso de transformación exigirá el establecimiento de unas directrices claras que se ajusten a los códigos éticos y las políticas de integridad de las instituciones de educación superior. En definitiva, la reflexión sobre cómo aunar educación, innovación e integridad académica brindará a la comunidad universitaria una nueva oportunidad para impulsar mejoras en la enseñanza universitaria.

Palabras clave: ética, integridad académica, Inteligencia Artificial Generativa (IAG), Educación Superior.

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Resumo

A Inteligência Artificial Generativa (IAG) revolucionou o domínio do ensino superior e abriu o debate sobre o potencial de ferramentas como o ChatGPT, Humata.ai ou Sudowrite nos processos de ensino, aprendizagem e avaliação. Embora a sua integração neste contexto apresente inúmeras oportunidades (ou seja, feedback instantâneo, geração de recursos e material didático, aprendizagem adaptativa, interatividade, etc.), coloca também desafios importantes que põem em causa a ética e a integridade académica, como a fiabilidade da informação, a transparência em relação às fontes utilizadas ou à privacidade e segurança dos dados. O objetivo deste artigo é analisar as implicações éticas da sua utilização no ensino superior, numa tripla perspetiva (estudantes, professores e instituição). Pretende-se também analisar o seu impacto em aspetos ligados à segurança, acessibilidade, sustentabilidade e inclusive a novas formas de plágio e fraude académica que imitem ou roubem a identidade da autoria. Com base na revisão bibliográfica realizada, explorar-se-á a forma de integrar a IAG nas salas de aula universitárias, de forma controlada e respeitadora, através de práticas pedagógicas que orientem os estudantes na sua utilização correta e permitam aos professores lançar as bases de novos modelos educativos. Este processo de transformação exigirá o estabelecimento de diretrizes claras, em conformidade com os códigos éticos e as políticas de integridade das instituições de ensino superior. Em última análise, a reflexão sobre a forma de conjugar educação, inovação e integridade académica proporcionará a estes três coletivos uma nova oportunidade de promover melhorias no ensino universitário.

Palavras-chave: ética, integridade académica, Inteligência Artificial Generativa (IAG), Ensino Superior.

摘要

生成式人工智能的出现给高等教育带来了革命化的影响，也开启了关于 ChatGPT、Humata.ai、Sudowrite 等工具在教育、学习及评估过程中应用潜力的讨论。如果说这些工具在该领域的使用确实带来了更多的机会（如实时反馈、教学材料及资源生成、自适应学习、互动等等），但与此同时，也对道德和学术诚信提出了挑战和质疑，如信息的可靠性、信息来源的透明度、数据的隐私和安全性。因此该研究主要从三个角度（学生、教师、机构）出发，对生成式人工智能的使用在高等教育中的道德影响进行查验。同时也对它在安全性、无障碍性、可持续性、甚至是模仿剽窃作者的作弊欺诈新形式等方面的影响进行分析。通过对已有文献的查验和参考，试图探寻将生成式人工智能融入大学课堂的方式，在可控且互相尊重的情况下，通过教学实践指导学生正确地使用人工智能，同时也为教师的教学新模式奠定基础。这一转变过程需要建立一系列清晰的符合道德标准和高等教育机构学术诚信要求的准则。总而言之，关于如何将教育、创新及学术诚信相融合的思考，为三个群体提供了推动大学教育改善的新机遇。

关键词: 道德、学术诚信、生成式人工智能、高等教育

ملخص

أو ثورة ChatGPT في مجال التعليم العالي. وفتح النقاش حول إمكانات أدوات مثل (GAI) أحدث الذكاء التوليدي الاصطناعي في عمليات التدريس والتعلم والتقييم. وعلى الرغم من أن تكاملها في هذا السياق يوفر العديد من Humata.ai أو Sudowrite الفرص (أي التغذية الراجعة الفورية، وتوليد الموارد والمواد التعليمية، والتعلم التكيفي، والتفاعل، وما إلى ذلك) فإنه يطرح أيضًا تحديات مهمة تدعو إلى التشكيك في الأخلاقيات والنزاهة الأكاديمية مثل موثوقية المعلومات أو الشفافية فيما يتعلق بالمصادر المستخدمة أو خصوصية البيانات وأمنها. هدف هذا المقال هو دراسة الانعكاسات الأخلاقية لاستخدامه في التعليم العالي من منظور ثلاثي (الطلاب والمعلمين والمركز). كما يسعى أيضًا إلى تحليل تأثيره على الجوانب المتعلقة بالأمن وإمكانية الوصول والاستدامة وحتى الأشكال الجديدة من الانتحال والاحتيال الأكاديمي التي تقلد التأليف أو تحل محله. واستنادًا إلى المراجعة البيبليوغرافية التي تم في الفصول الدراسية بالجامعة، بطريقة خاضعة للرقابة ومحترمة، من خلال الممارسات IAG إجراؤها، سنستكشف كيفية دمج التربوية التي توجه الطلاب في الاستخدام الصحيح، وتسمح للمعلمين بوضع الأسس لنماذج جديدة للتعليمية. وستتطلب عملية التحول هذه وضع مبادئ توجيهية واضحة تتوافق مع القواعد الأخلاقية وسياسات النزاهة لمؤسسات التعليم العالي. باختصار، إن التفكير في كيفية الجمع بين التعليم والابتكار والنزاهة الأكاديمية من شأنه أن يوفر لهذه المجموعات الثلاث فرصة جديدة لتعزيز التحسينات في التدريس الجامعي

الكلمات المفتاحية: الأخلاق، النزاهة الأكاديمية، الذكاء الاصطناعي التوليدي، التعليم العالي

Introduction

At the end of 2022, the world had entered a post-pandemic era after the COVID-19 health crisis. Society was facing unprecedented challenges in areas that transcended public health, and education was no exception. Just when higher education institutions were immersed in recovering in-person academic activities, there emerged a technological innovation that would mark a before and after: Generative Artificial Intelligence (GAI). Tools such as ChatGPT (Generative Pre-trained Transformer), Google Bard, Humata.ai, and Sudowrite quickly became bellwethers of this technological advance and gained masses of users. Still, they are not the only ones; new applications of this type, mostly free, are appearing every week. Their paid versions offer even more advanced functionalities, allowing more precise and coherent responses, higher token limits, internet browsing, text and image processing, document loading, and even real-time chatbot interaction through their voice systems. Readily available through the mobile ecosystem, they can be accessed quickly and conveniently from anywhere.

Although major technology companies (Alphabet, Amazon, Meta, OpenAI, among others) have been working on developing natural language processing models, this technological breakthrough has taken the world by surprise and has met with conflicting reactions. Many fear that it will transform key sectors of society like industry, financial services, and education and do away with jobs (Baskara & Mukarto, 2023; Javaid et al., 2023; Oppenlaender et al., 2023). They therefore oppose the use of these tools, arguing that they pose a threat to progress. Others consider their arrival to be an unprecedented technological revolution, an opportunity to drive innovation, increase productivity, and improve the quality of life (Dogru et al., 2023; Vidal et al., 2024). However, at the present time the prevailing view concerning this technology is a combination of enthusiasm mixed with apprehension about its impact, in contrast to the extremes of technophiles who defend it without regard to its risks and technophobes

who reject it without considering its benefits (Flores-Vivar & García-Peñalvo, 2023).

In general, artificial intelligence (AI) is defined as the ability of machines to imitate human intelligence (Turing, 1950). According to Russel and Norvig (1995, cited in Escobar, 2021), "by creating machines that feed on information, algorithms with which processes are developed, they are said to learn (receive information), reason (apply usage rules), and self-correct (improve the processes for which they were originally designed)" (p. 31). Indeed, when trained with large amounts of data, these systems are capable of understanding, arguing, solving problems, and making decisions. In this sense, Minsky (1990) pointed out some decades ago that even though how the brain went about its mental processes was still unknown, work was already being done to make machines do the same. Today, this has become a reality.

GAI stands out as an area of special interest within the field of AI. It is an advanced language model (Large Language Models, LLM for short), capable of generating text, images, voice, code, music, etc. in response to user requests expressed in natural language. It is important to note this feature because the content generated by this system can be taken for that provided by a human expert. Nevertheless, the model operates based on probabilities, which means that it evaluates the probability (suitability) of words or phrases in a given context. Its output may contain errors, so users need to check the output. Despite this, the technology provides a good simulation of surpassing human capabilities and will continue to evolve and attain ever higher levels of perfection in operation.

Some authors have classified these intelligent systems into four types: a) systems that think like humans; b) systems that act like humans; c) systems that think rationally, and d) systems that act rationally (Russell & Norvig, 1996). Other experts divide them into two categories: weak AI and strong AI. The former, also known as narrow AI, refers to systems designed to perform a task or to solve a

concrete problem, while the latter refers to systems capable of performing any cognitive task that a human being can do (Soto, 2023). In other words, the first type is based not on reasoning but on processing an action, while the second type imitates human behavior. Many of these systems are based on Machine Learning, a branch of AI that focuses on studying programs that learn or evolve based on their experience, with the goal of performing a specific task better each time (Bordignon et al., 2023). Other systems are based on Deep Learning, a branch of Machine Learning that employs numerous neural network architectures to address various challenges in fields such as natural language processing, bioinformatics, etc. (Osorio, 2023).

In terms of legislation, efforts to regulate AI have been gathering momentum in recent years. An example of this is what is happening in the European Union. Its parliament approved two resolutions in October 2020. One focused on the framework of the technical aspects of AI, robotics, and related technologies. The other dealt with recommendations for a civil liability regime for AI aimed at the European Commission (Tapia, 2020). Harmonized rules on artificial intelligence were established in 2021 (Ebers, 2023). A year later, ethical guidelines on the use of AI and data in teaching and learning were established for educators (Nguyen et al., 2023), and recently the AI Act was presented with the aim of establishing a common regulatory and legal framework in the European Union to have legal effect and validity before 2026.

Other international organizations have joined in the initiative to regulate the use of AI in higher education. For example, in 2019 the Organization for Economic Cooperation and Development (OECD, 2022) issued a set of intergovernmental policy guidelines on AI that, while not legally binding, are considered influential in establishing future international standards. That same year the United Nations Educational, Scientific and Cultural Organization (UNESCO) drafted the Beijing

Consensus on Artificial Intelligence, a document containing 44 recommendations aimed at responding to the opportunities and challenges presented by AI in education, in such areas as planning AI in educational policies, education management, skills development, gender equality and inclusivity, transparency, ethics and academic integrity, etc. These aspects were discussed in greater detail in the publication *Artificial Intelligence and Education. Guidance for Policy Makers* (UNESCO, 2021). On November 23, 2021 UNESCO approved the Recommendation on the Ethics of Artificial Intelligence (UNESCO, 2022), the first global norm on the ethics of AI, adopted by the 193 member states. This document examined the ethical implications of AI use in different areas of activity (e.g., data policy, international cooperation, environment and ecosystems, culture, communication, and information, etc.). Specifically, in area 8, education and research, it encouraged member states to work together on global training in AI to "empower people and reduce the digital divides and digital access inequalities resulting from the wide adoption of AI systems" (p. 34). It also advocated for promoting "prerequisite skills" (e.g., basic information literacy, digital and coding skills, critical thinking, etc.), identified as key actions for developing and supporting the scientific community in "contributing to policies and in cultivating awareness of the strengths and weaknesses of AI technologies" (p. 36). In 2023 UNESCO published a quick start guide to ChatGPT and artificial intelligence in higher education addressing some of the main ethical challenges and implications of AI in educational environments and offering practical steps universities could take (Sabzalieva & Valentini, 2023). All these guidelines have been drawn up to address the ethical and legal challenges posed by using this technology in higher education and in that way minimize its potential risks.

With the above in mind, this paper examines how this technology can challenge academic integrity in teaching and learning processes and the ethical implications of using

GAI in higher education based on three perspectives (students, faculty, and institutions). It also considers its impact in such areas as, for instance, security, accessibility, privacy, and transparency and emphasizes the importance of fostering an ethical commitment by the university community to preserving the fundamental values of higher education (honesty, responsibility, respect, etc.) and preventing new forms of plagiarism and academic fraud intended to imitate or supplant authorship.

Based on the literature review conducted, we explore how GAI can be integrated into university classrooms in a controlled and respectful manner through teaching practices that guide students in the proper use of this technology and how to help faculty lay the foundations for new educational models.

Previous studies on GAI in education and its implications concerning academic integrity

During the literature review, open and closed-access databases were consulted (Scielo, Redalyc, Web of Science, Scopus, EBSCO and JSTOR), and priority was given to research articles published in the last year that approached GAI from different perspectives: some studies focused on its transformative potential (Sun et al., 2023), others on the implications of GAI use in teaching and research (Farrokhnia et al., 2023), others on potential risks that could compromise ethics and academic integrity (Sullivan et al., 2023), and still others on the relationship between humans and the biosphere (Terrones, 2022) including sustainability issues. Clearly, this subject has elicited significant scientific interest (as well as media interest), and this in turn has advanced the state of knowledge in this field.

However, the exponential growth of GAI in the last year has led many universities to put off taking any clear position regarding this new technology and adopting different strategies to address the challenges it poses in higher education: from prohibiting all forms of AI at

the university, to exploring how students and faculty can take advantage of its potential to improve the teaching and learning process (Lievens, 2023), to including specific references to its use in teaching guides and drawing up guidelines and codes of conduct in this regard. It should be borne in mind that because GAI is still in its early stages, institutions and educators will face a number of ethical and logistical challenges when trying to incorporate this technology into existing curriculum structures (Healy, 2023).

According to Sullivan et al. (2023), the use of AI tools in university assessments raises concerns about academic integrity. Cases in which large numbers of students have used ChatGPT in assessment tasks have been reported, leading some universities to ban its use. This raises questions about how to ensure equity and authenticity in assessments and how to prevent academic fraud from compromising the educational system. Furthermore, there is an additional limitation: the speed at which updates emerge and the time it takes to respond to them. While the various parties involved in the educational process debate their use, students and faculty have already begun using AI in their academic work without any institutional regulatory framework.

In this regard, Chan's (2023) proposal could hold out interest for establishing a sustainable AI education policy framework that addresses the multiple implications of its use in university teaching. His model is organized into three dimensions:

- Pedagogical: focused on using AI in an ethical and responsible manner to improve teaching and learning outcomes.
- Governance: focused on issues related to privacy, security, and responsibility, which involves defining clear policies, guidelines, and regulations for the use of AI and requires promoting awareness and responsibility among the parties involved; and
- Operational: aimed at addressing aspects related to infrastructure and

training and providing the necessary resources and training to enable faculty, students, and technical staff to understand and use AI properly.

These three dimensions require a review of educational models and curricula to improve learning and adapt it to current training needs.

At the same time, there are a series of concerns related to the use of AI and academic integrity, including: (i) plagiarism and the generation of non-original content (Ellis & Slade, 2023); (ii) the use of tools that detect text generated by AI (GPT Zero, AI Text Classifier, Originality AI, and Crossplag) (Weber-Wulff et al., 2023); (iii) the implementation of alternative assessment plans; (iv) dependence on these systems (which would lead to a weakening of critical thinking skills in some users and difficulty in detecting false or incorrect information in responses); and (v) the possibility of propagating biases in the results generated (Wach et al., 2023).

The preceding issues will evolve over time as GAI use becomes more widespread, and hence it is essential to take measures that foster ethical, responsible, and reliable AI use. Therefore, effective integration into the learning process should be encouraged instead of resisting change or prohibiting use. Accordingly, some authors have proposed a series of measures that will have a positive impact on the relationship between humans and AI from an ethical perspective (Fui-Hoon et al., 2023).

Firstly, the existence of a regulatory framework that addresses issues such as data privacy, security, algorithmic transparency, and responsibility in automated decision-making is required (Kasneci et al., 2023). Additionally, possible ethical challenges involving equity, discrimination, transparency, biases, etc. that could potentially arise from using an AI system need to be taken into consideration from the system's very inception in its initial design stages, including an advance evaluation of the repercussions that could ensue from its implementation. Such an

evaluation would help identify and mitigate potential ethical issues and promote greater responsibility when AI systems are used. This would also entail understanding how an AI model works to be able to ascertain the reasons underlying its automated decisions (Sullivan et al., 2023).

Unquestionably, these measures would not be possible without promoting multidisciplinary collaboration among specialists in the fields of technology, law, sociology, education, and other relevant disciplines. Analyzing ethical challenges from different perspectives will ensure a comprehensive approach to decision-making affecting the future of AI. Combining these inquiries with awareness-raising strategies, literacy programs, and policies or regulations will require substantial changes in the way society learns, teaches, and acts. Because this field of study is novel in higher education and is currently engaged in a process of ongoing transformation, the ideas presented here will continue to evolve and will need to be updated as new - and as yet unforeseeable - ethical challenges arise in the coming months.

AI, a challenge to academic integrity

Although generative technology has been in existence since before the launch of ChatGPT in November 2022 (Sullivan et al., 2023), the level of sophistication and quality of outcomes now attained raises important ethical dilemmas regarding the reliability of information, transparency of the sources used, data privacy, and authorship, as well as regarding the security, inclusion, diversity, and physical and mental well-being of users, aspects emphasized by UNESCO in its document on *The Ethics of Artificial Intelligence* (2021), the first global regulatory framework in this area.

These issues represent a source of concern because inappropriate use of this disruptive technology in higher education can foster inequality, exclusion, discrimination, and even digital divides among members of the academic community. In other words, these tools can increase inequalities in access to technology, perpetuate prejudices and

stereotypes, and exclude those users who are less skilled in a digital environment, which is precisely what should be avoided. To avoid this, it is necessary to analyze the risks and challenges that higher education faces in the short and medium term taking the current technological situation into account. These risks include inherent biases in the data used to train AI engines; incomplete or false content that could confuse researchers, teaching staff, and students in their academic tasks; the emergence of new forms of plagiarism and academic fraud (Cotton et al., 2023) and authorship impersonation; information veracity issues; lack of transparency, etc. To meet the challenges posed by this technological revolution, training, information, and awareness-raising initiatives by and for the academic community to integrate GAI into teaching-learning processes naturally and effectively will need to be undertaken. Similarly, clear guidelines that are in keeping with ethical codes and integrity policies of higher education institutions will have to be established.

Knowing how GAI can challenge academic integrity at these educational levels is extremely important. Firstly, because such knowledge becomes a necessity when designing a roadmap that guarantees compliance with ethical standards and the quality of university education. Secondly, because all technological innovation should be investigated, not disdained, avoided, or forbidden (Flores-Vivar & García-Peñalvo, 2023). And thirdly, because investigating how this technology can undermine the basic values of higher education will allow a more effective evaluation of the impact this type of misconduct may have on the teaching-learning process.

Let us next look at the impact of AI from the vantage point of each of the different groups concerned (students, faculty, and institutions), which will be responsible for promoting integration of this technology at institutions and adopting the necessary measures to ensure reliable and honest use.

Three perspectives on the impact of GAI

GAI has transformed our way of understanding and approaching university education. Its integration in this sphere has brought such enormous benefits as personalized learning, intelligent tutoring, generation of educational content, and immediate feedback or evaluation of academic performance. However, exploring how this disruptive technology can limit the development of certain competencies in students, hinder the research work of faculty, or challenge the internal policies of institutions shows that the parties involved need to take a critical position on this topic and seek a balance among innovation, creation, ethics, and academic integrity.

Impact on students

From a student-centered education perspective, there has been considerable debate about whether or not these tools foster the spread of dishonest behavior by students. Although the number of empirical studies analyzing fraudulent use of GAI among students is still small (Sullivan et al., 2023; Waltzer et al., 2023), interest in addressing this issue is growing. Evidence of this is provided by research that has approached this question from different angles in which ethics and academic integrity are also part of the discussion. For example, Sullivan et al. (2023) examined the potential ChatGPT holds out for learning and providing support for students rather than viewing it as a risk to their education. However, based on the systematic review they conducted, the authors identified 88 articles that addressed misuse of these tools, student fraud, essay subcontracting to chatbots, increased plagiaristic behavior in academic work, and cheating on university entrance exams. They nonetheless pointed out that spreading the position that GAI as a tool for deception or cheating could give some students the impression that these are widespread practices and tempt them to engage in illicit behaviors (Cotton et al., 2023).

Other studies, such as the one by Waltzer et al. (2023), have compared human writing with GAI-generated writing, fostering debate about whether texts produced by this technology can be considered authentic or not, given that there is a marked similarity that tends to make them indistinguishable. This situation naturally transitions into delving into the concepts of authenticity, originality, authorship, and misappropriation, since the line that separates what is genuinely human from what is created by machine is becoming increasingly blurred. As Lancaster (2023) pointed out, this new educational scenario in which original texts can be generated using GAI presents students with a significant challenge. Students who do not make an effort on their part but limit themselves to copying content generated automatically are liable to enter into a dynamic in which GAI is a crutch that encourages dependence rather than a tool for fostering their intellectual growth. This behavior could be considered akin to that of someone who pays someone else to write a paper they should have written themselves. Such a text would have the appearance of being authentic, but this would be misleading, as it would not have been created by the student (Lancaster, 2023).

Furthermore, the ease of access to this technology is compounded by an additional incentive that could encourage misuse of GAI by students: the cost is low or even nil. While some studies have taken this aspect to be a democratizing element (e.g., more people can access these tools without incurring high costs) (Kasneci et al., 2023), others have viewed it as a temptation that could even result in students' selling the output to their peers (Qadir, 2023). Indeed, the versatility of these tools is such that they could provide disparate answers for an entire class group (Lancaster, 2023). This could redirect the attention of the cleverest students from concentrating on solving problems or using critical thinking in their areas of study to creating the best questions or prompts to achieve their goals in the shortest possible time. Therefore, learning would be replaced by a sort of competition in which students would become mere consumers of

prefabricated answers instead of developing basic skills of expression, comprehension, and analysis. This attitude could affect their own view of themselves as students, their satisfaction in doing their own work, their pride of effort, and their ability to act independently. Only those students who use GAI critically and responsibly will learn to handle tools that will be part of their professional environment. In contrast, students who use these tools to obtain better grades that they do not deserve will end up carrying their insecurities and unethical practices into the workplace (Guerrero-Dib et al., 2023).

It is worth noting, therefore, that the use of GAI does not exempt students from their academic responsibilities and from observing their institution's rules and values. Hence if an instructor expressly prohibits its use in an activity or assessment and students disobey that injunction, this conduct would violate academic integrity and would therefore be punishable. GAI also does not exempt them from being critical of the information they consume, quite the contrary: at these educational levels, verifying data authenticity should be a priority (as well as a competency to be developed). GAI is well known to generate coherent but inaccurate output. It can provide broken links or references to sources that sometimes do not exist and even contribute to the spread of fake news, which complicates the task of verifying information. This idea is also connected with the concept of transparency (Gallent, 2024). Understanding how these tools operate and are trained, the data they use, or how they are updated is essential to be able to rely on this technology and contribute to future advances. This will also help students to reflect on and understand the limits between the legitimate use of GAI (as a learning tool) and dishonest misuse of the technology.

Impact on faculty

While GAI has the potential to transform teaching and facilitate educational processes by creating personalized learning experiences, by reducing the time needed to prepare

materials, and by assisting faculty members in their research work, it also poses ethical and pedagogical challenges for them. First, this technology could increase the digital divide among teaching staff (UNESCO, 2022) depending on their level of access to, knowledge of, and competence in using GAI. The fact is that not all faculty members are in the same career stage, have received the same training, or display the same interest in this technology. Even their need to incorporate it into their teaching can differ. However, they all must look at it critically, adapt to it, and use it for their own and their students' benefit, adding value to their learning experience.

Some instructors fear that GAI may replace them or alter their role as facilitators of learning, which could result in a loss of autonomy, creativity, and interaction with students (Ayoola et al., 2023). This change could lead them to act as mere supervisors or to execute the instructions of GAI without thinking beyond them. It could also affect their motivation, involvement, and commitment to the profession.

As for students, though for different reasons, GAI could also encourage them to engage in plagiaristic behavior due to the pressure they feel to publish or obtain funding. Thus, they could be tempted to appropriate the ideas of others, alter the work of others without giving due credit, or use false or unchecked information. They could also intentionally resort to data fabrication, improper authorship, self-plagiarism, manipulation of results, and even violation of the privacy and anonymity of possible conversations recorded through GAI {according to Ausín (2021), "individuals can become identifiable from data that, at first glance, are anonymous" (p. 7)}. Faculty members who use this technology and engage in illicit conduct in their teaching or research may see their reputations tarnished; lose their credibility with students, colleagues, and the academic community; limit their career growth; and cease to contribute to the advancement of knowledge through original research.

Instead of engaging in activities that undermine ethical values and academic integrity, their scientific contributions must abide by the principles of transparency and reproducibility. Authors must describe in detail the methodology used, how they achieved their results, and the procedures they followed in performing their research. It is important for them to mention explicitly whether they have used GAI systems to enable future readers to be aware of this when replicating their study. Authors such as Dergaa et al. (2023) have raised the question of whether GAI should be included as another entry in the list of references for academic papers and scientific publications.

Students are often blamed for using GAI to copy. But who supervises plagiarism in learning content? Students are asked not to use GAI to fool their instructors, but who controls what lecturers offer their students? This could ultimately lead to the ludicrous situation in which all "learning" effort is being done by machine, that is, instructors obtain ideas for content or tasks to check that students have assimilated knowledge from a GAI engine, and students use that same or another GAI engine to obtain the correct answers. This would be preposterous if interest is placed on evaluating outcomes instead of processes, which in turn raises the issue of ethical co-responsibility among faculty.

Faculty must make an ethical commitment to themselves and to their profession and must manifest that commitment in their attitudes and conduct, inasmuch as they play a crucial role in the education of future generations. They must promote awareness of the limitations of these language models so that they are used as support tools, not as stand-ins for other sources of authority (Pavlik, 2023) and must emphasize the importance of verifying and questioning generated content, since it might be protected by copyright. To be in a position to do this, they will require effective training, and this is where the institution comes into play.

Impact on institutions

Higher education institutions should take advantage of the potential of GAI to improve the efficiency of their administrative processes, make strategic decisions, and offer personalized learning experiences. These tools can also be useful for predicting and improving student retention, identifying possible dropout risks, analyzing data on student academic performance, and optimizing the management of available resources (human and material) (Sullivan et al., 2023). However, implementing GAI in university institutions entails a series of ethical challenges related to security, data privacy, the ability to interact with these models, and training, which is an essential factor in this technological revolution.

Training the university community (from students to academic and administrative staff) to integrate GAI into their academic and professional practice is important for two reasons. First, because, *a priori*, using a system with "imperfections" generates misgivings that act to limit the willingness to use it. If it is not used, it is not familiar, and it is not integrated into daily practice, which prevents the acquisition of certain specific competencies, such as the ability to adapt to emerging technologies or the ability to check the information consumed. Second, because using these tools helps gain an awareness that they should not replace critical thinking, analysis, or personal reflection (Kasneci, 2023). Therefore, a balance must be found between the contribution of technology to academic and scientific work and developing skills that will ensure the success of the teaching and learning process. Training should be aimed at meeting the demands of faculty, students, and administrative staff to make them familiar with the uses of these language models so that they can integrate them into their daily lives without prejudice or fear.

In this connection some authors have pointed out that universities have chosen to modify their courses and study plans to make them less vulnerable to GAI (Ausín, 2021) and that instructors are going back to supervised written tests (Littleton & Fox, 2023), despite recognizing that they are not the best learning

solution. It would be preferable to focus on designing tasks that allow critical thinking or creativity (e.g, debates, complex problems, practical cases, simulations, podcasts, comparing texts, etc.) and on exploring collaborative work through research projects that combine technology and reasoning and digital and physical environments. Training should allow constant feedback on the use of these systems and promote the creation of learning communities that share practices and perspectives (an initiative that could even be incentivized financially).

Coming back now to the issue of the ethical challenges this technology poses, universities face important decisions regarding the use and development of GAI. For example, they must think about how to guarantee the privacy of student and faculty data on digital platforms for accessing, managing, and checking information. Any unauthorized access could have serious legal and ethical consequences, so developing safeguards and cybersecurity policies is imperative. These policies should be accompanied by academic integrity codes and protocols that define ethical guidelines, expected conduct, and the penalties for malpractice when using GAI.

Lastly, a further ethical challenge institutions must face is bias and discrimination in automated decision-making (Flores-Vivar & García-Peñalvo, 2023). For example, when these tools are tasked with selecting candidates for academic programs or evaluating student performance in a subject, there is a risk that the outcomes will be influenced by inherent biases in the training data. Algorithm review measures need to be implemented to identify and correct such biases and ensure equity and equal opportunities for all.

Analyzing these issues from this three-fold perspective (students, faculty, and institutions) making ethics and academic integrity a central concern should be a priority on institutional agendas, especially with education in the midst of the current process of technological transformation.

Some proposals for integrating GAI in higher education

According to Sullivan et al. (2023), numerous publications have highlighted the massive potential of GAI in the field of education yet have expressed only some general notions about integration, and only a few have put forward concrete proposals concerning specific aspects of putting it to use. Attention has been drawn to the following aspects, to mention just a handful: creating personalized academic tasks, using artificial intelligence to edit or create reports to assess student work, obtaining simple explanations for complex concepts, holding brainstorming sessions, correcting code in different programming languages, producing rough drafts, generating content as food for critical thinking in class, creating evaluation rubrics, overcoming writer's block, and generating citations.

In line with one of the overarching objectives of this article, some proposals for integrating GAI into higher education environments that follow from the preceding discussion are featured below.

For instance, using chatbots or virtual assistants that can assist students and faculty members in real time (García-Brustenga et al., 2018). These systems can answer questions, solve problems in all fields of knowledge, offer academic guidance, and even detect emotional states. However, implementing them is a challenge for universities, since clear rules of use must be established.

One initiative targeting university professors would be to implement tools for automating the process of generating exercises and performing assessments. This would facilitate the creation of more varied tests with different levels of difficulty as well as provide students with instant feedback (Vidal et al., 2024).

A proposal within the framework of implementing metaverse applications in the university setting is developing simulations and virtual learning environments to create

realistic scenarios difficult to set up in real life. This could be especially useful in a range of disciplines, such as health and engineering (Aydin, 2023; Gutiérrez-Cirlos et al., 2023). GAI offers a wide variety of tools for creating educational multimedia content such as videos, infographics, and animations. Making use of this potential could have a positive impact on creating increasingly attractive and accessible content, which would help motivate students.

An interesting proposal that could have significant repercussions in this area is translating educational content into different languages. This capability could also be used to provide automatic transcription and real-time subtitles (Baskara & Mukarto, 2023), which would foster inclusivity and equal opportunities (Porto-Castro, 2022) by helping students with hearing disabilities.

Another suggestion relates to research and data analysis activities (Cárdenas, 2023). GAI tools are capable of analyzing large data sets and generating useful information to improve institutional decision-making. This could also facilitate collaboration in research projects, helping researchers and students to work together to generate ideas and content.

Authors like Sun and Hoelscher (2023) have contributed to advancing this field by making a series of recommendations that can enable lecturers to successfully integrate GAI in the classroom. They have put forward a broad range of proposals, and just a few are featured below by way of example:

- Agreeing on and defining what is meant by "appropriate use" of GAI in academic tasks.
- Creating exams that are difficult to complete with the assistance of a GAI engine, such as having to analyze images, graphics, video fragments, or any content that cannot be automatically interpreted. The usefulness of this recommendation is likely to be short lived, however, since the time when GAI will be able to interpret this type of content is not far off.

- Designing assessment proposals that promote verbal expression in synchronous environments, such as real-time discussions and debates.
- Designing academic tasks that cannot easily be solved by AI engines, e.g., tasks that involve complex thinking in very specific situations or contexts. In the authors' opinion, assigning the same task to an entire class might deter students from trying to pass a GAI engine's output off as their own, because their answers will be quite similar to those of other classmates who use the same GAI, and instructors can readily identify students who are not submitting original work. Thanks to the human capacity to learn and recognize patterns, experienced lecturers can reasonably suspect when a text they are reading has a certain flavor of having been created by GAI.

To avoid unpleasant surprises, OpenAI (2023) recommends:

- Sharing the conversations generated with the GAI engine (having the application save the conversation and making it available by means of a link). This enables instructors to analyze and evaluate the interactions between students and the GAI. Students can share their conversations with each other for group learning. Students can use the record of their conversations to monitor their progress, while lecturers can make a personalized assessment based on those individual records.
- Evaluating the different competencies students develop in their interaction with the GAI, e.g., the relevance of the questions asked, the relevance of the information obtained, and the ability to critically evaluate that information while disclosing possible biases and errors in the answers.

All these measures will contribute to the GAI's being perceived as a learning tool rather

than just as a simple robot for doing assignments.

Discussion

This year, 2023, could be considered the Big Bang of GAI given the exponential growth experienced by these tools (Chance, 2022; Faraboschi et al., 2023). There is no sign that this growth will be slowing down anytime soon. Leading companies such as OpenAI, Alphabet, Meta, and Amazon announce new functionalities in these systems daily, making them into powerful and highly sophisticated language models. The latest updates suggest that GAI engines will be multimodal, meaning that they will be able to listen, observe, and interact with users (Du et al., 2023; Lv, 2023) and access updated information from the Internet in real time. They will therefore not be restricted to data from before September 2021, as has been the case up to now, which represents a giant leap forward in the evolution of this technology.

The findings reported in the literature have given rise to much debate surrounding the impact of GAI on teaching and learning processes in higher education. On the one hand, these tools have the potential to automate teaching and research-related tasks. On the other, there are limitations in respect of content generation (due to questionable and unreliable quality) and the observance of copyright and other intellectual property rights. These models imitate human discourse by appearing to be able to think and converse like humans. Some authors have compared GAI to a "stochastic parrot" (Bender et al., 2023), referring to the fact that these language models repeat words or perform actions without any deeper understanding of their meaning. Nevertheless, given their rapid evolution and level of reasoning, this characterization may not be accurate for long (Arkoudas, 2023).

For university students, one aspect that has been noted in most of the sources consulted is that students have been using these tools experimentally, without any clear guidance from the faculty or any official rules regulating responsible and ethical use from educational

authorities (Cotton et al., 2023; Lancaster, 2023). The darker side of GAI is evidenced by the academic plagiarism students commit by appropriating texts for which they cannot claim any legitimate intellectual authorship. Additionally, when engines are asked to report the sources they have used to generate content, they provide broken links and fictitious references (Wach et al., 2023). This requires users to have a skillset that enables them to evaluate the quality of the results. Therefore, Stojanov (2023) has recommended that GAI not be used by students with only a basic knowledge of a subject, as they would not be able to detect biases or erroneous ideas in the output. Hence the importance of supervision or collaborative support.

For faculty, various articles consulted in the review have focused on describing how these tools can be used to enhance teaching practice and research-related activities, for instance, by automating tasks, summarizing content, obtaining freely distributable images, transforming text into audio and vice versa, enabling new content to be generated in extremely short time spans (Baidoo-Anu & Ansah, 2023; Ahmad et al., 2023). However, they need to feel supported by their institutions and to clearly understand the expectations associated with these tools throughout the teaching-learning process, giving special attention to assessment practice (Cooper, 2023). They are also exposed to situations of academic plagiarism and ethical dilemmas (Zhu & Yang, 2023).

Finally, for educational institutions, it has been noted that most do not yet have rules to regulate GAI use in place (Lievens, 2023). Consequently, some universities have chosen to prohibit using ChatGPT (or other similar tools) in academic work, which will negatively affect students' overall education. Failing to adopt AI in academia can also affect universities' reputations (Cárdenas, 2023). The challenges that educational institutions face are multiple: promoting responsible use of GAI, stopping breaches of academic integrity, and informing and raising awareness about the ethical implications and human rights

associated with using these tools (Gutiérrez, 2023).

The future of higher education would appear to be uncertain since GAI has only just started to take off. Nevertheless, its effects are beginning to be felt in both face-to-face and virtual learning environments. Therefore, cooperation and communication among the different players will be crucial to successfully meeting the new challenges posed and making the necessary adjustments to strengthen rather than weaken the educational system.

Conclusions, limitations, and outlook

Society is immersed in a process of digital transformation that affects all areas and disciplines, which some experts have called the "fourth industrial revolution" (Escobar, 2021), an era that will be remembered for the emergence of "intelligent" systems (conversational robots, virtual agents, etc.) capable of imitating human behavior in a rational way and emulating the ability of humans to think logically, make decisions, and solve problems. This process has an impact on higher education that needs to be explored on two fronts: (i) studying GAI tools themselves (describing their uses and functionalities and analyzing their applications and the competencies necessary to obtain better results); and (ii) reflecting on the ethical consequences and limitations that arise in both legs of the teaching-learning process as well as in administrative and service processes and in research.

Furthermore, these impacts should be analyzed based on three perspectives (students, faculty, and institutions), focusing on ethics and academic integrity. The conclusion obtained based on the literature review is that students must be able to generate original texts even when using GAI without engaging in dishonest behavior that compromises their principles and education. Faculty members, on their part, must make an ethical commitment to themselves and to their profession, using GAI as a support tool, not as a stand-in for their teaching and research work. In their turn, institutions must take advantage of their

potential of AI to enhance the efficiency of their administrative and educational processes and must tackle the ethical challenges connected with security, privacy, transparency, and equity. They must also draw up clear policies and rules for regulating the use of these systems to avoid any violation of the basic values of higher education.

There is today a widespread sense of transformation and change that goes hand in hand with a certain feeling of loss, as if we were leaving something behind, as if students are going to stop learning certain things and hence are going to be less competent in the future. However, we have already experienced this feeling in the past. The automation of tasks has resulted in a huge amount of practical knowledge being displaced by technology and falling by the wayside, from transforming a piece of obsidian into a cutting tool, to making rope from reeds or animal hair, to building tools for working the land. We can adopt an attitude of defeatism or resistance to change (which would be of no use), or we can embrace the opportunities that this technology proffers in the educational environment. In any case, the first step is to recognize that evolution is an intrinsic part of progress and that it benefits individuals but does not exempt them from critically evaluating the possible implications and consequences.

This study has some limitations, including a very significant one. The field of GAI is new and extremely fluid, and the ideas put forward could well become obsolete in just a short time due to the emergence of new tools and functionalities. Nevertheless, it is focused on present circumstances and is intended to provide a solid foundation for understanding the ethical risks facing higher education one year after this technology came on the scene. Another limitation is that the literature review conducted has not been systematic but has been based on a selection of relevant recent sources, which may have left out some equally interesting contributions.

For future research we would suggest conducting quantitative and qualitative studies

compiling the perceptions and experiences of different educational agents regarding GAI use and studies exploring best educational practice and assessing how to minimize the aforementioned risks. Differences and similarities between different groups, contexts, disciplines, levels, and teaching modalities could also be analyzed with a view to collecting empirical evidence to improve (i) strategic decision-making on the use of GAI in higher education; (ii) the design of pedagogical strategies that promote ethical and responsible behavior in a digital environment; and (iii) the establishment of institutional policies that integrate GAI into teaching-learning processes and in so doing helping to overcoming the current *terra ignota* in this field.

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