

Brief Report

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Brief Report

Generative Artificial Intelligence in Healthcare Education: Challenges and Ethical Issues

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Abstract: Introduction. The integration of Generative Artificial Intelligence (GAI) in education is revolutionizing teaching methods, particularly in the training of healthcare professionals by facilitating simulations of complex clinical cases. However, challenges arise, such as information inaccuracy, which can lead to biased decisions. **Objectives and Method.** This study examines Spanish universities' policies regarding GAI use and evaluates the accuracy of responses from ChatGPT 3.5 in simple tasks. **Results.** Findings indicate that while university policies promote clarity and transparency in GAI use, they lack mechanisms to ensure that students verify the accuracy of the responses. **Conclusions.** GAI has the potential to enhance training in healthcare professions, but it is essential to address ethical and social challenges to ensure it complements rather than replaces practical training and/or dehumanise the treatment of the person.

Keywords: Artificial Intelligence; Higher Education; Health Education; Educational quality; Ethics

Introduction

Generative Artificial Intelligence (GAI) is revolutionizing various sectors, and education is no exception. The integration of generative AI in education is transforming traditional teaching methods and enhancing the learning experience for students globally. This technological advancement may improve the academic performance by personalized experiences (Chen et al., 2020; Crompton & Burke, 2023; Duarte, Montoya, & Bletrán, 2024). One of the most significant uses of generative GAI in education is personalized assessment and learning, since GAI algorithms analyze individual students' strengths, weaknesses, and learning styles to provide feedback and create customized learning paths.

Other GAI-related uses are related to grading and evaluation of papers and exams through image recognition and prediction systems; personalized intelligent teaching, through data mining and learning analytics; and online and mobile remote education, through edge computing, virtual personalized assistants and real-time analysis (Chen et al., 2020; Crompton & Burke, 2023; Liang et al., 2021; Zawacki-Richter et al., 2019). The proper use of GAI in academic education enhances the quality of education and ensures that each student can progress at their own pace with personalized experiences (Lin et al., 2023). In the same line, the Conference of Rectors of Spanish Universities (CRUE) points out that universities must lead the use of GAI, ensuring ethical and equitable use (Cruz et al., 2024).

Background

Quality of education is one of the 17 Sustainable Development Goals (SDGs) approved at the United Nations in 2015, considered crucial to ensure the sustainable development around the world (Carlsen & Bruggemann, 2021; United Nations, 2015, 2023). Sustainable education encompasses inclusive education, which highlights the key role of technology education in raising awareness of environmental sustainability and empowering people. In this line, technology offers the opportunity

to teach more effectively, improving accessibility, making learning more inclusive for students with special needs, and translating educational materials into multiple languages, breaking down language barriers and promoting global education equity (Iku-Silan et al., 2023). Generalizing the use of GAI in higher education would be possible by promoting the implementation of different systems, such as the Intelligence Tutoring Systems (ITS) (Feng et al., 2021) or chatbots platforms (Iku-Silan et al., 2023; Jeon et al., 2023).

These systems originated in the 1960s, but moderns ones allow more effective interaction and they are becoming very popular in a wide variety of areas of society, including education (Welskop, 2023). Intelligent tutoring systems (ITS) are generally defined as a computer learning environment that enhance the students' knowledge by artificial algorithms, with one-to-one tutoring, giving instant feedback, answering questions and providing additional resources for further learning. Different types are available, such as AutoTutor, which uses natural language to teach students subjects such as physics, or LabTutor for engineering students (Feng et al., 2021; Khalfallah & Ben Hadj Slama, 2019; Lin et al., 2023). Chatbots use natural language processing, machine learning and deep learning to simulate human conversation, and are equipped with an easy-to-use interface, as well as storage and feedback features that allow individualized guidance in learning. A large number of these platforms are available to deploy chatbots, such as Google's DialogFlow, Microsoft Bot Framework, ChatGPT or PandoraBots, and are used in different sectors such as health, office work, customer service and education (Følstad et al., 2021).

In the field of education chatbot key components are related to goal-orientation, embodiment, and multimodality, as well as feedback, thus providing a useful tool for promoting the interdisciplinary learning in the academic community (Iku-Silan et al., 2023; Jeon et al., 2023). Specifically, the use of ChatGPT is emerging as a new technology to empower students to take control of their learning experience and academic goals. Introducing ChatGPT as a learning tool can encourage students to think critically about the wider societal, ethical, legal and moral issues associated with the integration of GAI (Castonguay et al., 2023; Tam et al., 2023).

With a focus on healthcare education, the use of GAI relies heavily on the accuracy of the information provided. If training programmes and prediction models use incomplete data, this can lead to biased decisions. Inaccurate information can lead to misdiagnosis, which can harm patients. It is therefore essential to ensure that GAI systems are truthful, well-designed and reliable (Reddy, 2024). However, due to the rapidly progress of models the verification of information becomes a huge task. For instance, the original GPT-1 was proposed in June 2018 by OpenAI, progressing to GPT-4.0 in March 2023 as a large multimodal model that accepts image and textual inputs. These models rely on pre-training in relevant tasks, such as answering medical questions, classifying clinical text, or translating medical records, but ChatGPT responses have shown a wide and, most importantly, unpredictable variation in quality and accuracy, which could be a barrier to implementation in healthcare education (Zhang et al., 2022).

Method

In this context, this is a study with two objectives. First objective was to describe the public policies of Spanish universities with respect to the use of generative artificial intelligence. To accomplish this objective, the authors visited the websites of different universities. Due to the lack of resources, not every university was included, but some of the most known. Second objective was to evaluate the precision of the responses when the task is simple rather than complex. To accomplish this objective, the authors asked ChatGPT-4.0 for a complete list of all Spanish universities.

Results

Websites. Policies and Recommendations

Table 1 shows where is possible to find policies and recommendations for the use of generative artificial intelligence in academic works in each of universities visited, and Table 2 shows the ethical aspects, policies and recommendations to conduct academic works for each university explored.

Table 1. Websites for ethical aspects and recommendations on the use of AI.

Universidad Oberta de Catalunya (UOC)	https://biblioteca.uoc.edu/es/biblioguias/biblioguia/Inteligencia-artificial-en-la-docencia/?tab=1
Universidad Internacional de la Rioja (UNIR)	https://www.unir.net/wp-content/uploads/2024/02/Declaracion-UNIR-para-un-uso-etico-de-la-IA-en-Educacion-Superior.pdf
Universidad Autónoma de Madrid (UAM)	https://www.uam.es/uam/media/doc/1606941290988/guia-visualizacion.pdf
Universidad de Granada (UG)	https://ceprud.ugr.es/formacion-tic/inteligencia-artificial
Universidad Carlos III de Madrid (UC3M)	https://e-archivo.uc3m.es/entities/publication/e560161f-44a3-43f5-9a4e-5175a052c2ec
Universitat Pompeu Fabra (UPF)	https://guiesbibtic.upf.edu/iag/docencia
Universitat de Lleida (UL)	https://adia.udl.cat/ca/com-fer-anar-la-ia/alumnat/suport-en-exercicis-i-activitats/
Universidad de Huelva (UHU)	https://www.uhu.es/sic/inteligencia-artificial/recomendaciones-y-recursos
Universitat Ramón Llull (URL)	https://www.url.edu/es/innovacion-docente-y-calidad/recomendaciones-para-el-buen-uso-de-las-herramientas-basadas-en-inteligencia-artificial
Universidad Politécnica de Madrid (UPM)	https://blogs.upm.es/observatoriogate/2024/03/04/el-uso-docente-de-la-inteligencia-artificial-en-la-educacion-universitaria/
Universidad de Cádiz (UCA)	https://medicina.uca.es/uso-adequado-de-la-inteligencia-artificial-en-medicina/
Universitat Rovira i Virgili (URV)	https://docs.campusvirtual.urv.cat/wiki/IA_i_aprenentatge_Ura_guia_per_100%99estudiantURV
Universidad de Cantabria (UC)	https://web.unican.es/buc/recursos/guias-y-tutoriales/guia?g=214

Note: Table was elaborated by authors.

Use of Chat GPT

The Appendix 1 shows a practical example of inaccuracies of GPT in a simple task. In this exercise the authors asked ChatGPT-4.0 for a list of all Spanish universities. In the first attempt, a total of 60 universities were listed, but the list was incomplete. For example, the Universitat Autònoma de Barcelona (UAB), the Universidad Oberta de Catalunya (UOC) and the Universidad Nacional a Distancia (UNED) were not included. In a second attempt, a total of 104 universities were listed, but again with errors. In this new list, the ChatGPT decide to divide universities into three sections: public, private and other. Some universities were duplicated and classified in two sections, such as the University of Zaragoza (UNIZAR) and the University Rovira i Virgili (URL), which were placed both in the public section and in the other universities section. Other specific errors concern to classification in the correct section. For example, the Universitat Internacional de Catalunya (UIC) was listed in the public section, although it is a private center. More details in the Appendix 1.

Discussion

The use of GAI in higher education offers great opportunities for improving education and training. However, the findings suggest that the generalised use of GAI in different academic tasks and training programmes should be carefully considered and reviewed. To promote the ethical use of GAI, administrators need to establish public policies and promote equal access and opportunity in education using these new technologies. However, the challenges and specific ethical and social issues in this area need to be carefully addressed.

In terms of challenges, it is noted that the ability to add value to education should encompass both the professor's skills in using technology and the student's skills in interacting with technology and constructing their knowledge. However, previous research suggests that both professors and students are not sufficiently prepared to use technology properly, even considering that students are digital natives, and also highlights the lack of infrastructure to use the technology of Wi-Fi or smartphones, the lack of technological support and the training (Daniela et al., 2018). Regarding training, it should be noted that the quality of the information obtained from GPT depends on the specific instructions or questions called prompts. These prompts should have specific characteristics to elicit a right response, including the clarity (clear and easy to understand), specificity (with details to guide the response), context (background information), structure (logical organisation of the prompt), tone and style (indicate the desired tone, such as informal or formal), constraints (specify word limits or areas of interest) and examples (when appropriate, provide examples of the type of response expected) (OpenAI, 2023; UNITEC, 2024). If these considerations are not taken into account, simple tasks and instructions as the authors performed in this work may lead to mistakes.

Besides, some educators may be uncomfortable with automating certain tasks and relying heavily on technology in the teaching and learning process. The use of GAI can make them feel insecure about their role in education, fearing that these new technologies could replace the essential human interaction needed for quality education (Duarte, Montoya, & Beltrán, 2024). Other identified challenges may be related to the lack of relevant learning resources for adaptative learning, lack of GAI research on socio-emotional aspects or ineffective evaluation methods of GAI (Chiu et al., 2023). There are also seems to be an imperative discourse to implement new technologies in higher education, which may complicate rather than facilitate their use to improve the quality of education (Bearman et al., 2023).

Some ethical issues are also important to consider ensuring that GAI is implemented in a fair and beneficial manner in the education and training of healthcare professionals (Díaz-Guio et al., 2023; Du Boulay, 2023). As GAI can be used by students to solve assessment activities, one of the issues of particular concern to teachers is academic dishonesty. In the same vein, over-reliance on GAI for writing essays or solving clinical cases does not seem to enhance students' competence acquisition. If GAI is used indiscriminately and without limits, and this dynamic is accepted in higher education, there is a risk that students will not develop their creative and critical thinking skills. Students need to learn to relate complex ideas and concepts, to think critically and to make decisions. The development of these skills during their academic education is essential for them to be able to carry out their future professional activities with excellence, confidence and security (Ponce de Leon et al., 2023). For this reason, guidelines and policies for promoting good practice in academic context are needed.

With the focus on healthcare education, it is important not to overlook that algorithms provide responses based on available information and do not have the capacity to discern whether this information is correct or incorrect. As a result, they may reach biased, limited or inaccurate conclusions. For instance, the most widespread use of GPT in healthcare is the academic writing, and some ethic concerns are related to the 1) risk of incorrect information, 2) citation/reference inaccuracy, 3) restricted knowledge before 2021, 4) legal issues, 5) risk of misinformation, and 6) lack of originality (Sallam, 2023). It is essential, therefore, that generative AI aligns with social values and that there is human oversight in its design, development, and applicability (Chiu et al., 2023). To address these concerns, some organizations have developed recommendations on the use of GAI in education (European Parliament, 2020; UNESCO, 2021). The main ethical principles that must be considered in the use of AI in education are transparency and accountability, safety and protection, sustainability and proportionality, governance, human-centred approach, privacy, and inclusivity (Nguyen et al., 2023). In particular, the European Parliament highlighted the crucial role of GAI in potential discrimination in terms of equity and inclusivity. Paradoxically, the use of GAI can contribute to widespread education, but it can also be discriminatory, as students need access to wireless and

training in new technologies, as well as the opportunity to have access to computers or mobile devices (Parlamento Europeo, 2024).

Similarly, GAI can reflect and perpetuate gender or ethnic biases due to the lack of available published information (Alonso-Rodríguez, 2024; Parlamento Europeo, 2024). In a health context, this can lead to inequalities in treatment and diagnosis for different groups of people, or even suggest unsafe or untested treatment options. For this reason, is needed to learn to use GAI responsibly and to check the answers we get before accepting them as valid (Zhang et al., 2022; Zhang & Boulos, 2023). Thus, it is essential to develop and use algorithms that are fair and do not discriminate against any demographic group, helping to avoid the perpetuation of stereotypes (Cernadas & Calvo-Iglesias, 2020; Parlamento Europeo, 2024). Additionally, evidence-based practice requires considering not only the best available evidence but also the preferences of the person being treated, thereby requiring the individualization of care (Zalabegui, 2017). In this same direction, it is important that the use of AI does not dehumanize the necessary interaction between professionals and users (Rozillio-Mercado et al., 2024). Working with people, providing care and well-being, requires healthcare workers to be constantly updated. GAI can promote knowledge by taking into account the available evidence, but it must always go through the process of verification. The final decision must be critical, reasoned and consciously taken by a human.

And last, but not least, another important ethic issue is the privacy and security of student data. Collecting personal data and using GAI in education may raise concerns about data privacy and security, especially if the data is shared or sold to third parties. There are concerns about the collection and storage of personal user data (Duarte, Montoya, & Beltrán, 2024; Zhang & Boulos, 2023). According to regulation on artificial intelligence of The European Parliament (2024:28) "privacy and data management" means that generative AI systems are developed and operated in accordance with privacy and data protection standards, while processing data that meet high standards in terms of quality and integrity" (Parlamento Europeo, 2024). Thus, the correct use of GAI encompasses the proper regulation to protect the intimacy and privacy of students.

Limitations and Strengths

The limitations of this study are mainly related to the lack of resources, time and personnel, which did not allow to visit every university in Spain to describe their policies in this area. It should be noted that not all universities publish their GAI protocols. Future lines should extend the research to each university in order to identify possible gaps in this regard in higher education institutions. These findings may allow the unification of policies, criteria and recommendations in the Spanish university system.

Conclusions

Using GAI in higher education for health professions offers great opportunities to improve the education and training of health professionals. However, the challenges and specific ethical and social issues in this area need to be carefully addressed to ensure that GAI complements rather than replaces practical training. Students therefore need to learn to use GAI as an additional tool and not to rely entirely on it for clinical decision making. On the other hand, administrators need to train faculty in the use of GAI and establish policies for the ethical use of GAI in higher education. It is also considered important for universities to develop policies that promote equal access and opportunity in education using GAI. The main recommendations for ethical use, collected on the websites of the universities that have made this information available for public consultation, emphasize the ethical, responsible and critical use of GAI, the use of GAI only in cases where it has been approved by teachers, and the citation of the tools used. With the aim of improving students' critical thinking, the authors consider it interesting to clarify what verification methods have been used to check that the results obtained by GAI are true and unbiased. Health students therefore need to learn to use GAI as an additional tool and not to rely entirely on it for clinical decision making.

Table 2. Ethical aspects and recommendations in university guidelines on the use of AI.

Recommendations	UOC	UNIR	UAM	UG	UC3M	UPF	UL	UHU	URL	UPM	UCA	URV	UC
Developing policies that promote equal access and opportunity in learning using AI													
Using IA responsibly and critically	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Training of students and teachers in the ethical use of AI is required	✓				✓	✓	✓	✓					
Make use of AI to solve evaluation activities only in the permitted cases	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
All evaluation activities should explicitly state what types of uses of AI are permitted	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	
Identify the options of one of the AI in the statements of the assessment tests (use of AI not allowed; allowed with limitations; allowed without restrictions; or the activity requires the use of AI)	✓	✓						✓		✓			
Cite the tools used for the realization of assignments	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Identify the text or images generated by AI systems (traceability)	✓	✓				✓		✓	✓			✓	
Recommendation for making a critical review and verification of the results by IA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
If AI has been used, ask students to indicate which verification methods they have used.													

Note: UOC=Universitat Oberta de Catalunya; UNIR=Universidad Internacional de la Rioja; UAM=Universidad Autónoma de Madrid; UG=Universidad de Granada; UC3M=Universidad Carlos III de Madrid; UPF=Universitat Pompeu Fabra; UL=Universitat de Lleida; UHU=Universidad de Huelva; URL=Universitat Ramón Llull; UPM=Universidad Politécnica de Madrid; UCA=Universidad de Cádiz; URV=Universitat Rovira i Virgili; UC=Universidad de Cantabria.

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