THE ETHICAL USE OF ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION IN TEC21 MODEL

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ABSTRACT
Artificial Intelligence (AI) has grown exponentially in the last few years, and has presented opportunities and challenges in several sectors, including Higher Education. AI's potential to engineering companies is significant, nevertheless, there are concerns about the abuse of AI in decision making. In an educational context, some universities have forbidden the use of AI because it directly affects the understanding and learning process of students. Other universities, such as Tecnologico de Monterrey, promote the use of it as a tool to help students and teachers in the process of teaching-learning. It is important to understand the benefits, risks, and ethical concerns of the use of AI. This paper examines the implementation process of AI at the Tecnologico de Monterrey form learning and teaching approach, exploring the student and teachers' vision in the context of Tec21 Educative Model.

Keywords: Artificial Intelligence, teaching-learning, higher education, ethics

1 INTRODUCTION
Artificial Intelligence (AI) has grown exponentially in the last two years. This has had a significant impact in education, especially for Engineering teaching. It is important to educate future professionals to have a strong knowledge and foundations in their respective area; this education must be updated to understand and train students to new technologies, which will allow them to integrate into a future of work that requires this knowledge. The possibilities of empowering students of Engineering with specific AI tools are exponentially beneficial.
Nonetheless, design education now has a new challenge, "The establishment of rules and guidelines for the use of AI." The use of this technology is controversial, a lot of universities have been working to overcome this challenge, but on the other hand, AI has been forbidden in some universities because it affects the understanding and learning process of students. However, the progress cannot be stopped; hence, the present paper aims to lay the ethical foundations and unify the principles to be followed in the integration of AI in education.
Some efforts have been made to establish ethical principles, such as 'Ethical Guidelines for Trustworthy AI' published by The European Commission in 2019 [1], 'The Call for an AI Ethics' signed in 2020 by The Pontifical Academy for Life, Microsoft, IBM, FAO, and the Italian Ministry of Innovation [2], 'The Artificial Intelligence Act' released by the European Commission in 2021 [3], and the 'Recommendation on the Ethics of Artificial Intelligence' published in 2022 by UNESCO [4].

1.1 Depiction of Artificial Intelligence
To use AI as a tool, it is essential to first understand the definition of AI. According to UNESCO [5], AI refers to machines that imitate some aspects of "human intelligence", such as perception, learning, reasoning, problem-solving, language interaction, and creative work. When setting AI in education, multiple types of AI that can be considered, nonetheless all serve different purposes and will fall under one of two categories: AI based on capabilities and AI based on functionalities. Examples of those are search algorithms, languages processing, machine learning (ML), deep learning (DL), etc.

1.2 KEY principles of artificial intelligence

As mentioned before, educational institutions must establish guidelines to direct how to start using AI in a responsible, ethical, efficient, and clear way for different educational scenarios [6]. This is a great challenge due to the importance of shielding and strengthening the responsible and ethical use of AI tools, while simultaneously bringing benefits to accelerate and increase learning experiences. Multidisciplinary efforts involving different perspectives of scientists, philosophers, engineers, and stakeholders are necessary to implement AI in a beneficial and conscious way [7].

AI developments must incorporate human-centred ethical principles and embracing diversity, designing future-proof systems, periodically re-evaluating ethical compliance, and simplifying the concepts employed for a clearer, overall understanding [8].

Moreover, another key aspect is the respect for the autonomy of the person which is essential in the design of AI systems. AI systems should not unjustifiably subordinate, coerce, or manipulate; it should be designed to augment and enhance human cognitive, social, and cultural abilities [1]. Harm prevention, or non-maleficence, is an aspect of harm prevention that is fundamental. Systems must not cause harm or aggravate existing damage, and must protect human dignity, physical and mental integrity; as well as consider the environment and life in general [1].

Equity and explainability are principles that must be considered in the development and use of AI systems to make them fair, ensuring an equitable distribution of benefits and costs and avoiding discrimination or bias, ensuring transparency about who makes decisions and how they are made [1].

1.3 Benefits of artificial intelligence

Some of the advantages of the use of AI are that AI has the capacity to automate cognitive functions by establishing patterns, processing huge amounts of data, and making improvements with experience. In education AI provides a variety of options for the creation of written content, computer coded, images, video or audio; all of this can enhance traditional activities for the better understanding of students [9].

1.4 Risks of artificial intelligence

On the other hand, AI could represent a risk factor for humanity, to try to avoid the risks the AI Act in 2024 presented the first legal framework on AI, which addresses the risks of AI and positions Europe to play a leading role globally [10]. The framework defines a four-level risk scheme category: 1) Unacceptable, in which AI violates fundamental rights by declaring threat to the safety, livelihood. And right of peoples; 2) High Risk, in which AI must be subject to strict obligations prior to commercialisation to prevent adverse effects on people's safety and fundamental rights; 3) Limited Risk, where AI have transparency obligations to inform users of machine interactions; and 4) Minimal Risk, where AI has a low- or no-risk and has an free access. Education is positioned on the high-risk level [10].

1.5 Ethical use of AI at universities

In the case of education, the Office of Educational Technology [11], in its publication "Artificial Intelligence and the Future of Teaching and Learning: Insights and Recommendations" provides a framework to start including the use of AI at the organisational level in the educational field throughout the teaching-learning process. It gives recommendations according to different stages of how to align certain tasks to open a gap and facilitate adoption.

- Teaching: Implement AI to improve teaching work, manage risks, and provide relevant information for close teaching and generate empathy with students.
- Learning: Use of educational technology to make recommendations tailored to each one. It is essential to have a process for identifying biases and to secure equity in learning.
- Evaluation: Implement AI-led assessments to guide training on a broader spectrum of skills, with a focus on learning optimization. Educational decisions should focus on students, teachers, and the community.
- Research: Use to personalise learning resources, to facilitate the adaptation of materials to neurodiversity students and cultural and community requests.

1.6 Ethical AI at Tecnologico de Monterrey Educative System

The University has already published the rules and guidelines for the use of AI at the institution, Figure 1, and has shared several documents and courses so the teachers, students, and collaborators can learn

about the different available AI tools and understand the ethical implications of their use. Some examples of this are AI tools as the ones that are shown in table 2 [12].

Figure 1. Ethical AI guideline of Tecnologico de Monterrey

A pilot study was conducted during the spring semester of 2023 in Digital Education courses at Tecnologico de Monterrey, exploring the integration of generative artificial intelligence tools, mainly ChatGPT, in the educational field. The study was carried out by teachers, together with pedagogical experts, to design innovative educational activities that incorporate AI in an ethical and responsible way in the teaching-learning process. The results mention favourable acceptance by teachers and students, a positive assessment of the development of critical and ethical skills, as well as the promotion of a responsible use of these tools in the educational environment. The groundbreaking pilot study highlights the importance of ensuring a responsible use of these tools to ensure their effectiveness in the teaching-learning process, thus offering enriching and high-quality educational experiences [13].
Since the breakthrough of AI into everyday life, Tecnologico de Monterrey has provided resources dedicated to effectively integrating AI into educational practice.

Table 2. AI Tools used at Tecnologico de Monterrey

Actions using AI	**AI tools**
Image generation	DALL-E, Midjourney, Pollinations.
Text generation	ChatGPT, Perplexity.
Video generation	Genmo, CharacterGPT, Artflow, FILM, EbSynth, Fliki.
Presentation generation	Tome, Beautiful AI.
Audio generation	ElevenLabs, Azure text to speech, Rifussion.
Fostering creativity	Plaito, QuillBot, Brainly.
AI online courses	IA for everyone, AI chatbots without programming, AI applications with Watson, How to use AI responsibly, Elements of AI.
More AI tools	Video Playlist: AI Tools, AI Tools for Teachers by Christiam Mendoza, AIFINDY, Elements of AI.

Artificial intelligence (AI) has been incorporated within the institution to optimise operations and enrich service experiences in multiple ways:

- In 2021, TecBot was designed to make it easier to connect students, teachers, and collaborators to different systems within the edtech ecosystem. TecBot in 2023 was upgraded to different service modules to have more personalised and accurate capabilities [14].
- Professor Atom 2.0 is an academic assistant, a reference within the institution for the use of artificial intelligence. Specialised in guiding professional students in Intelligent Physics content by offering explanations of concepts, giving examples of problems with subject procedures to support learning, and resolving doubts at any time in a personalised way [14].

- The TECgpt initiative represents the spirit of the institution in the search for innovation and educational excellence. Offering a generative platform for the institution's community, which has its own AI model capable of synthesising, generating ideas, creating images, carrying out procedures and searching for information within a secure technological environment while safeguarding data privacy [14].

1.7 Tecnologico de Monterrey AI Ethical guidelines

Tecnológico de Monterrey has shared with its teachers and collaborators the guidelines to adopt artificial intelligence in a responsible and transparent manner during the educational environment. These include a series of concrete actions and protocols to ensure AI understanding and positively contribute to student learning. They reflect Tecnológico de Monterrey's commitment to academic excellence and ethics in the use of emerging technology.

In addition, it highlights actions to be followed to address any breach of academic integrity and inappropriate use of AI. Moreover, it also emphasises the importance of continuous training and access to specialised resources through the Center for Teaching Development and Educational Innovation (CEDDIE) and Teaching Hub.

It is essential that the use of AI is deliberately integrated into activities that encourage critical thinking and is explicitly stated in curricula. The combination of AI with other technologies and pedagogical strategies enriches the learning experience. Furthermore, teachers are reminded that they are models of academic integrity and must ensure quality and transparency in the use of AI tools in their own educational practice. It is important to reflect on the interaction of human beings and AI systems, since technology will become increasingly active, immersed, and powerful in the relationship with us, human beings [15].

2 CASE STUDY: AI DURING CLASSES

After the publication of the academic rules for the Tecnologico de Monterrey there was a need for analysing some teachers and students' aspects. The objective was to identify patterns of use, to learn about perceptions of the veracity of the outputs and whether there are concerns regarding its ethical use. A random sample of 58 individuals was taken among students and teachers to ascertain how they interact with AI technology. From which 34 were students and 24 teachers.

The response was observed through surveys, which was focused on ascertaining how they interact with AI technology, if they had preferences of certain AI systems and their context of use; the assessment of reliability, the measures in place to verify the information and to identify any biases thereby, and the most important to us was to identify if IA was used in unethical way. It was expected that with the survey, it would be possible to detect whether AI systems are being used to solve exams, in order to identify certain anti-bias mechanisms and initiatives to reinforce academic integrity. Hence, with the assessment of the results, we would be able to see if it's possible to determine if the tendency is prone to educational innovation.

2.1 Results

The survey showed that the percentage of teachers that had used AI in the teaching-learning process is 95.8% and 43.5% of them use Apps to detect the use of AI being Turnitin the most common. It is important to note that Turnitin is a tool that is currently integrated on the Canvas educational platform used by the university. Also, 12.5% answered that they did not know that there exists a tool for verifying plagiarism. On the other hand, the percentage of students who have used AI to solve school tasks was 94.1%.

The most common app that has been used by both groups was ChatGPT, with a percentage of 26.3% for teachers and 42.3% students. Teachers had used also Turnitin (15%), Grammarly (8.8%), DeepL (6.3%), MindMeister (6.3%), Research Rabbit (2.5%), WeVideo (1.25%), ReMarkable (1.25%), among others. Students have used Wolfram Alpha (18.3%), Grammarly (16.9%), DeepL (5.6%), MindMeister (2.8%), ReMarkable (2.8%), Turnitin (2.8%), WeVideo (2.8%), Copilot (1.4%), Sway (1.4%), among others.

As we can see in Figure 2, teachers found more sources of bias in the AI applications, being the most common found gender bias for teachers and educational level for students. Nevertheless, in both groups more than 50% have not found any kind of bias.

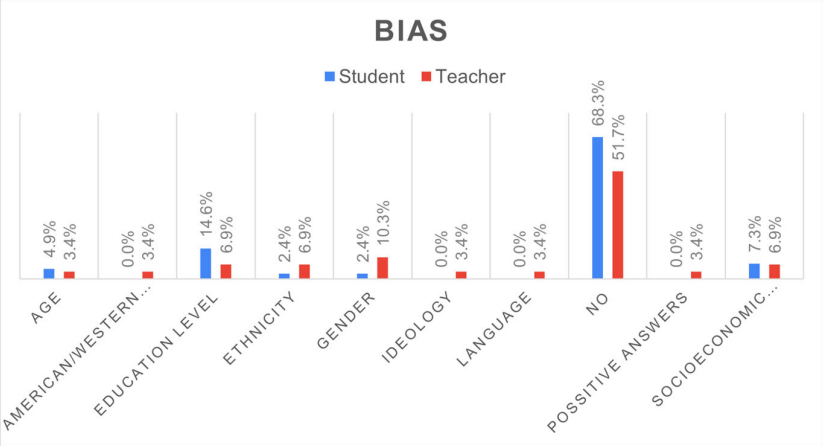

Figure 2. Bias percentage of Tecnologico de Monterrey teachers

In terms of reliability of the information 91.7% of the teachers and 85.3% of the students validate the reliability of the information. Also, 87.5% of the teachers and 82.4% of the students do a reference check. The results of the survey showed that 17.7% of the students claimed that they had used AI for exams resolution while 16.7% of the teachers have found the use of AI for exams resolution by the students. Only 1 teacher asked for the use of AI in the exams, 8.3% of the teachers found more than 2 students per group that had used AI for exams resolution.

3 CONCLUSIONS AND RECOMMENDATIONS

The use of AI in education in Engineering can be positive and offers potential to enhance teaching and learning experiences, but it is essential to have a pedagogical strategy perspective, with an intentional instructional design linked with disciplinary objectives, competencies and ethical values. AI allows the student to have a diversity of exercises, cases of analysis, knowledge practice, simulation of operations, and creative processes by exposing them to varied learning experiences. Care must be taken for the unethical use of AI as for cheating in exams, and more effort has to be done to encourage students to verify the quality, reliability and validity of the information.

AI also provides educators direct benefits in their work process, AI can optimise routine tasks, administrative matters or creation of evaluation instruments. Active exploration of AI tools, encouragement of critical thinking and creativity, establishing rigorous ethical guidelines, boosting digital literacy, and continuous training and support are few recommendations for the integration of AI into daily activities. In conclusion, by following guidelines, educational institutions can leverage AI to enrich the learning experience while maintaining ethical standards and enhancing educational outcomes. Nevertheless, still a lot of students are not aware of the existence of the rules and guidelines for the use of AI (only 2.8% know the existence of it). A lot of work must be done to inform students about the regulations at the university. For future work, it should be interesting to analyse if those tendencies have changed and compare the two findings in order to know if the ethical behaviour improves in students.

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