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ORIGINAL

Ethics and Learning: Impact of Generative Artificial Intelligence on Higher Secondary Education

Ética y Aprendizaje: Impacto de la Inteligencia Artificial Generativa en la Educación Media Superior

Janette Aguilar Luévano[1] ✉, Paola Mercado Lozano[1] ✉, Fernando Ricardo Aguilar Ruvalcaba[1] ✉

[1]Universidad de Guadalajara. México.

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Corresponding Author
Janette Aguilar Luévano ✉

ABSTRACT

With the rise of digital technologies applied to education and the arrival of generative artificial intelligence (GAI) in classrooms, reflecting on the use of these tools from an ethical perspective in the construction of learning for upper secondary school students is important. It is clear that their use can serve as an aid to students, as they provide information and ideas in a very short time while also contributing to an improvement in educational dynamics because of the benefits of their use. However, the misuse of these technologies can lead to situations of plagiarism and intellectual appropriation of the content generated through these applications, which constitutes an obstacle to the construction of learning and the formation of responsible citizens. This paper presents a series of ethical reflections on the impact of the use of IAG in education, especially among young people in upper secondary and higher education, addressing the opportunities and challenges of its implementation. To this end, it draws on a review of the literature from the past three years in Mexico and an analysis of use cases among students at a public high school.

Keywords: Academic Ethics; Generative Artificial Intelligence; Education; Upper Secondary Education.

RESUMEN

Con el auge de las tecnologías digitales aplicadas a la educación y la llegada de la inteligencia artificial generativa (IAG) a las aulas, es importante reflexionar sobre el uso de estas herramientas desde una perspectiva ética en la construcción de los aprendizajes de los estudiantes de educación media superior. Es evidente que su uso puede fungir como una ayuda para el alumnado, ya que les brinda información e ideas en lapsos muy breves de tiempo, a la par que contribuye a una mejora en las dinámicas educativas debido a los beneficios de su uso. No obstante, el mal uso de estas tecnologías puede incurrir en situaciones de plagio y apropiación intelectual de los contenidos generados a través de estás aplicaciones, lo que constituye un obstáculo para la construcción del aprendizaje y la formación de ciudadanos responsables. Este trabajo nos presenta una serie de reflexiones éticas sobre el impacto que tiene el uso de la IAG en el ámbito educativo, especialmente en los jóvenes de educación media superior y superior, abordando las oportunidades, retos y desafíos que tiene su implementación. Para ello, se toma como referencia una revisión bibliográfica de los últimos tres años en México y el análisis de los casos de uso entre estudiantes de una escuela preparatoria de una institución pública.

Palabras clave: Ética Académica; Inteligencia Artificial Generativa; Educación; Educación Media Superior.

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INTRODUCTION

The use of generative artificial intelligence (GAI) in education is controversial at several levels, as its use by students tends to vary and be debated. According to Gallent-Torres et al.[1], before the arrival of Chat GPT and its exponential growth since November 2022, this technology already existed, and with it came various concerns about these innovations, which, although great efforts are currently being made to regulate them and ensure that they are beneficial to all users, continue to raise concerns in relevant areas such as user data privacy, the accuracy of information, clarity in the sources used, and proper attribution to authors, among others. One of the first documents to emphasize these issues is the document published by UNESCO in 2021, "Ethics of Artificial Intelligence,"[2] which pays special attention to the need to address the use of AI in general from an ethical perspective that guarantees the safety, inclusion, diversity, and physical and mental well-being of users, which is fundamental in the field of teaching and learning.

While the many qualities offered by this technology are undeniable, it is not without ethical questions. From a teaching perspective, there are several concerns related to the use of AI in education, especially with respect to how students may use it. Some of the questions that arise are the following: Can young people truly be taught to make good use of technology? How can we dissuade students from doing all their homework with AI? Even more importantly, how can we help young people think for themselves when AI is thinking for them?

Most research on the ethical use of AI in education seems to focus *a priori* on the need to establish policies, standards, and regulations on its use in schools[3] or on addressing the teaching perspective from its use as an aid to teaching tasks, as well as concerns about its proper use by professionals in training, who are generally found in universities. However, despite the importance of responding to each of the questions raised, it would be worthwhile to take a closer look at students from an earlier stage in their education, preparing them to be citizens capable of performing effectively and ethically in the world of technology and artificial intelligence in all its forms, including generative AI.

Therefore, this work aims to investigate the perspective of upper secondary school students at one of the schools in the Guadalajara Metropolitan Area, Escuela Preparatoria 15, to determine what their concerns are about the use of these innovations, as well as their concerns and, above all, their motivations when using them.

According to Zepeda Hurtado et al.[4], in recent years, AI, defined by Rusell et al.[5] as "the science and engineering of creating intelligent systems, especially intelligent computer systems," has expanded into different sectors, with education being the one where it is beginning to have a significant influence on different stages of the educational process, including planning, adaptation to individual needs, evaluation, and monitoring.

This has resulted in multiple improvements, such as the automation of administrative tasks, the personalization of learning, and a significant improvement in teaching. On the other hand, students can also obtain various benefits, such as assistance in their learning; the possibility of receiving both information and instant feedback, ideas, and suggestions; and personalized advice through the AI itself and its tools.

However, the misuse of these technologies is also a real concern in the academic world. Unfortunately, it is very easy and tempting to use AI to perform various academic tasks without properly attributing to the authors or validating the information to ensure that it is accurate. Without mentioning the moral and ethical implications of cheating and plagiarism through these technologies, as Catari Bautista[6] points out, how cases of these practices have increased because of the use of digital technologies can be seen.

The use of AI in various sectors of society is not new, as it has been around for more than half a century.[3] However, its exponential growth in the past three years, with the launch of applications such as *Chat GPT, Meta AI*, and *Gemini,* among others, has contributed not only to 2023 being considered the year of AI, owing to all the excitement it generated in various sectors, with education being among the most involved.

The academic literature that has emerged on the subject mostly concludes by recognizing the transformative power of these applications in everyday life, as well as their great educational potential, while establishing the need to rigorously analyze the possible negative effects and limitations of these tools.[3]

Generative artificial intelligence (GAI) is defined as the ability of machines to emulate human intelligence using advanced linguistic models that produce images, text, and other content in response to user requests made in natural language.[1]

Along the same lines, Andión[7] proposes categories of GAI based on roles: assistants, agents, and consultants.

The aim of this research is to analyze the perspectives and concerns of upper secondary education students regarding the use of IAG.

METHOD

For this theoretical reflection, the methodology implemented consisted of a documentary review of the literature in Mexico over the past three years, which was complemented by the application of a survey instrument, which was administered through *Google Forms* to a total of 84 students at an institution belonging to the higher secondary education system (SEMS) of the University of Guadalajara (UdeG), such as Preparatory School No. 15.

The purpose of this work is precisely to rethink the use of IAG and the ethical implications of the use of this technology by students, since although it is presented as a particularly useful tool for obtaining varied information, problem solving, and even as a source of inspiration for the creation of text, code, and/or audiovisual materials, it can also be easily exploited for dishonest purposes such as the intellectual appropriation of information generated through these applications, plagiarism, and cheating, among other unethical behaviors.

The sample consisted of 84 students who, at the time of the research, were enrolled in the first semester of high school in the new General High School study program at Preparatory School No. 15. These students belong to the SEMS program at the University

of Guadalajara (UdeG), each with different knowledge and skills. They come from different secondary schools, as well as from a variety of families with different socioeconomic statuses and diverse values, personalities, attitudes, and aptitudes. They are between 14 and 17 years old. In general terms, it can be said that they are energetic, talkative students with a constant need for attention and recognition. In academic terms, they tend to be mostly consistent with their assignments, despite having problems following verbal and written instructions; thus, reading comprehension and critical thinking are areas of opportunity to be reinforced during their academic careers.

To apply the instrument, the Academic Integrity Questionnaire developed by McCabe and Treviño (1993) was adapted. This questionnaire uses a Likert scale applied to different questions to explore the frequency with which students use these tools and the ease of access they have to them, as well as to assess the degree of students' knowledge of institutional regulations and the ethical implications of using the GAI, following the guidelines established in similar studies such as those proposed by Ulloa-Duque.[8] It was decided to adapt the questionnaire according to the educational level and the participants' familiarity with the GAI, ensuring that the items were understandable and relevant in their academic context. The resulting instrument establishes five central dimensions as objects of concern and analysis, as well as 12 items that address how students perceive and use generative artificial intelligence from an ethical perspective, which can be seen in table 1.

Table 1. Adapted Academic Integrity Questionnaire

Dimension	Items	1	2	3	4	5
Use and Accessibility of IAG	1. I use generative artificial intelligence tools to obtain ideas or information for my academic tasks.					
	2. Accessibility to technology at my school facilitates the use of GAI to support my studies.					
Ethical Knowledge and Understanding	3. I am familiar with my institution's policies regarding the use of digital tools and GAI.					
	4. I am aware that using GAI-generated content without proper citation constitutes plagiarism.					
	5. I consider it important to reflect on the ethical use of GAI in the learning process.					
Perception of Benefits and Challenges	6. I believe that IAG can improve my learning if used ethically.					
	7. I am concerned that misuse of IAG could affect my academic integrity.					
	8. The use of IAG makes it easier to obtain information in a short period of time, which can lead to dependence on technology in my learning process.					
Plagiarism Behaviors and Risks	9. On occasion, I have considered using AI-generated content without crediting the source.					
	10. The pressure to meet deadlines leads me to look for shortcuts, such as using AI, without ensuring the correct attribution of the content.					
Reflection and Responsibility	11. I take responsibility for using AI in an ethical manner that respects copyright.					
	12. I believe it is essential to develop skills to identify and avoid dishonest practices related to the use of AI.					

Note: Prepared by the author based on the Academic Integrity Questionnaire developed by McCabe and Treviño

The analysis of the data collected was based on two fundamental sources: the review of articles and documents that support the construction of the state of the art and the results obtained through the data collection instrument used in the research. For this purpose, descriptive analysis was selected as the main data analysis technique. This methodology was chosen because of its ability to provide a clear and detailed view of the data, allowing not only an accurate description of the variables but also a deeper interpretation of them. The central objective of this analysis was to thoroughly examine the results of the survey administered to students, considering key aspects such as frequencies, percentages, means, and standard deviations. These statistical elements provide a solid basis for understanding the distribution of responses and the most common trends among participants.

Similarly, this descriptive approach aims not only to organize and synthesize information but also to interpret the general perceptions of students regarding the use of IAG in their educational context. It is crucial that this analysis also considers the ethical perspective promoted on campuses, since understanding the impact of IAG must go beyond technical aspects and consider the possible ethical dilemmas related to its use. In this sense, descriptive analysis allows for a comprehensive approach to student perceptions, providing data that allows for reflection on ethical responsibility and the possible challenges associated with the use of IAG in the academic sphere.

RESULTS

As expected, most students in high school 15 use AI, especially GAI, to support their academic and daily activities. This is reflected in the survey results, where a significant percentage of students agree and strongly agree with most items. In the first dimension, regarding the use and accessibility of these technologies at school, very few students considered these tools to be

inaccessible (14,7 % of them), and fewer than 12 % of the students (11,76 % exact) disagreed with the use of AGI to support their academic tasks. Notably, in at least this dimension, no students strongly disagreed.

Table 2. Questionnaire results

	1	2	3	4	5
Item 1	0	12 (14,7%)	35 (41,1%)	25 (29,4%)	12 (14,7%)
Item 2	0	10 (11,7%)	29 (35,2%)	20 (23,5%)	25 (29,4%)
Item 3	0	25 (29,4%)	17 (20,5%)	32 (38,2%)	10 (11,7%)
Item 4	0	10 (11,7%)	12 (14,7%)	35 (41,1%)	27 (32,3%)
Item 5	0	6 (7,14%)	15 (17,6%)	30 (42,8)	27 (32,3%)
Item 6	0	9 (10,7%)	13 (15,4%)	28 (33,3%)	34 (40,4%)
Item 7	0	12 (14,7%)	25 (29,4%)	40 (47,0%)	7 (8,8%)
Item 8	5 (5,88%)	22 (26,7%)	33 (38,2%)	22 (26,7%)	2 (2,9%)
Item 9	10 (11,76%)	7 (8,8%)	27 (32,3%)	30 (35,2%)	10 (11,7%)
Item 10	0	15 (17,6%)	22 (26,4%)	32 (38,2%)	15 (17,6%)
Item 11	0	25 (29,4%)	20 (23,5%)	27 (32,3%)	12 (14,7%)
Item 12	0	15 (17,6%)	22 (26,4%)	20 (23,5%)	27 (32,3%)

Table 3. Averages and standard deviation

Item	Average	Standard deviation
Item 1	2,44	13,48
Item 2	2,71	11,78
Item 3	2,32	14,02
Item 4	2,94	12,97
Item 5	3,00	13,95
Item 6	3,04	15,87
Item 7	2,50	12,99
Item 8	1,93	10,80
Item 9	2,27	11,69
Item 10	2,56	11,03
Item 11	2,31	11,03
Item 12	2,70	10,33

This may be due to a variety of factors, including the ease with which a large part of the young population can obtain a smart device and the tendency to use programs and applications that employ AI, such as *chat GPT, gemini*, or other tools. At least at Preparatory School 15, most of the student population claims to have access to a smart device, mostly cell phones, as well as access to various technologies to support their studies. In line with the above, and in terms of general technological accessibility, it is worth mentioning that, at least within the educational institution, students have free public internet access in all areas, as well as the possibility of using computers through the loan of computers in the self-access area of the school library.

In the second dimension concerning knowledge and ethical understanding of IAG, the responses provided by students in items 3, 4, and 5 indicate that students understand, at least at a conceptual level, how educational policies work in relation to the use of these technologies. In this regard, the educational institution's regulations, while not strictly prohibitive, seek to promote the development of critical thinking and students' own reasoning, avoiding encouraging the use of these tools for simple tasks or projects, exams, or any other activity intended to reflect students' knowledge and creativity. Through constant reinforcement by teachers, efforts are made to guide students so that they can use these tools effectively and ethically, continually reminding them that misuse of these applications can result in various penalties, depending on the severity of the offense, while proper use can greatly contribute to improving the quality of their learning. An example of this could be their application in high school English classes, where students are encouraged to avoid using the translation functions of these tools and are instead redirected to use them as a conversation guide to practice the language.

Notably, in this dimension, once again, no students completely disagreed, although several disagreed. This contrasts with the third dimension, "Perception of Benefits and Challenges," where students expressed this feeling about the idea that IAG could create dependency and affect their learning processes. Considering that the institution itself has detected that students rely heavily on AI and IAG to complete their academic activities and that in previous research conducted in similar contexts, such as that presented by Aguilar Luévano, et al.[9], it is also the students themselves who claim to use these technologies to support them in most of their tasks, in significant percentages. Therefore, a connection can be made between the fact that students, despite using these tools regularly, may not be fully aware of the degree of dependence that can be generated or at least believe that they currently have total control over them.

Finally, the fourth and fifth dimensions, which focus on analyzing student behavior and their academic responsibility in the face of the risk of plagiarism, show that most students agree with using IAG to support themselves in their schoolwork, even when this sometimes involves taking credit for the source, which can sometimes affect copyright and hinder the construction of their own

learning. Paradoxically, they are aware of the importance of copyright and give credit to sources, with the majority in favor of taking responsibility for the use of IAG. Likewise, students fully agree that it is necessary to develop and strengthen their skills in the use of these tools to avoid engaging in dishonest practices; thus, adequate training can be highly beneficial for students.

DISCUSSION

Based on the proposals of authors such as Alpizar Garrido et al.[10] and the findings of the case study, most students are not truly concerned about the ethical implications of using AI, nor all the problems that can be broken down from its use. Even issues that cause alarm among a significant part of the academic and scientific community in relation to the risks of using AI in general still do not resonate with most high school students, attracting minimal attention from the students surveyed. These data indicate that students may not be fully aware of the ethical risks of using AI in their education, highlighting the importance of including ethical training in the use of these technologies.[11,12,13]

For Alpizar Garrido et al.[10], the use of AI and IAG does not generate real concern for students, in contrast to the perceived benefits, such as clearer explanations, access to up-to-date information on various topics, and the personalization of learning, among others. However, those who expressed concerns in their research mentioned issues related to the use of personal data, privacy, equity, access to technology, and algorithmic biases, among others.[14,15] By extrapolating these observations to the field of our work, we can detect a parallel in which students express feeling

The use of AI in education is becoming increasingly common in the educational field. The number of students who are more interested in these technologies and their ability to generate information almost immediately is growing daily. Moreover, concerns are growing about their implementation, especially related to the use of personal data, privacy, and possible algorithmic biases. Although, as Alpizar Garrido et al.[10] mention, the benefits perceived by students, such as clearer explanations, access to up-to-date information, and personalized learning, seem to outweigh the concerns, these concerns should not be dismissed. Therefore, despite the concerns that may arise regarding their implementation, teachers, students, and educational authorities must work together to ensure that these tools fulfill their purpose of helping students.

CONCLUSIONS

Rather than slowing down its application in the education sector, it is necessary to teach students to implement it from an ethical perspective focused on learning itself, with teachers as the main guides in this arduous task. In this regard, Fernández Mármol[16] emphasizes that AI must be implemented with a critical and ethical vision so that it is used as a complementary tool for education and not a substitute for student or teacher work; therefore, both parties must be trained in its use. Similarly, this author highlights the need to develop clear and specific regulations to prevent abuse or unethical behavior through these technologies.

One of the most relevant aspects to rethink about the use of these innovations in the field of education is the perspective of the students themselves on this issue, that is, how students feel about the use of AI in their learning and the advantages or disadvantages they see in the use of this technology applied to their own educational process, their doubts and fears, or even the difficulties they face in implementing it in an optimal way.

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AUTHOR CONTRIBUTION

Conceptualization: Janette Aguilar Luévano, Paola Mercado Lozano, Fernando Ricardo Aguilar Ruvalcaba.
Data curation: Janette Aguilar Luévano, Paola Mercado Lozano, Fernando Ricardo Aguilar Ruvalcaba.
Formal analysis: Janette Aguilar Luévano, Paola Mercado Lozano, Fernando Ricardo Aguilar Ruvalcaba.
Research: Janette Aguilar Luévano, Paola Mercado Lozano, Fernando Ricardo Aguilar Ruvalcaba.
Methodology: Janette Aguilar Luévano, Paola Mercado Lozano, Fernando Ricardo Aguilar Ruvalcaba.
Project management: Janette Aguilar Luévano, Paola Mercado Lozano, Fernando Ricardo Aguilar Ruvalcaba.
Software: Janette Aguilar Luévano, Paola Mercado Lozano, Fernando Ricardo Aguilar Ruvalcaba.
Supervision: Janette Aguilar Luévano, Paola Mercado Lozano, Fernando Ricardo Aguilar Ruvalcaba.
Validation: Janette Aguilar Luévano, Paola Mercado Lozano, Fernando Ricardo Aguilar Ruvalcaba.
Visualization: Janette Aguilar Luévano, Paola Mercado Lozano, Fernando Ricardo Aguilar Ruvalcaba.
Writing – original draft: Janette Aguilar Luévano, Paola Mercado Lozano, Fernando Ricardo Aguilar Ruvalcaba.
Writing – review and editing: Janette Aguilar Luévano, Paola Mercado Lozano, Fernando Ricardo Aguilar Ruvalcaba.