CAPÍTULO 6

Generative Artificial Intelligence in the Classroom. Learning and Experience from the Student's

https://doi.org/10.22533/at.ed.0722511096

Martha Guadalupe Escoto Villaseñor
Instituto Politécnico Nacional
Centro de Estudios Científicos y Tecnológicos 1
Ciudad de México, México
https://orcid.org/0000-0002-9316-0681

María del Rosario García Suárez
Instituto Politécnico Nacional
Centro de Estudios Científicos y Tecnológicos 1
Ciudad de México, México

Rosa María Navarrete Hernández
Instituto Politécnico Nacional
Centro de Estudios Científicos y Tecnológicos 8
Ciudad de México, México

Isaac Getzael Mendoza Escoto
Instituto Politécnico Nacional
Centro de Estudios Científicos y Tecnológicos 2
Ciudad de México, México

ABSTRACT: This study analyzes how Upper Secondary students at the Centro de Estudios Científicos y Tecnológicos No. 1 of the Instituto Politécnico Nacional incorporate Generative Artificial Intelligence (GAI) into their learning process during the 2024-2025 school year. The main objective was to identify how these tools are used to complete school assignments, what benefits they offer when applied critically and creatively, and the risks associated with uncritical or dependent use. A mixed-methods approach, descriptive and exploratory in nature, was employed, including surveys and interviews with 50 students from different semesters. The results show an almost universal adoption (97%), highlighting that GAI has become

an everyday resource for completing academic tasks. Perceived benefits include time optimization, immediate access to explanations, and the ability to personalize the study pace. However, significant risks were identified: technological dependency, loss of intellectual autonomy, and the tendency to use GAI as a substitute — rather than a support — for independent thinking. A notable finding is that students recognize different types of specialized GAI tools depending on the nature of the task: from automated text generators to code generators, mathematical tools, and graphic resource creators. This diversity opens the door to more dynamic learning opportunities, provided there is clear pedagogical guidance. The lack of teacher support, on the other hand, fosters mechanical and superficial use. It is concluded that, when used judiciously, GAI can be a strategic ally in strengthening students' creativity, critical thinking, and autonomy. To achieve this, it is essential to design educational strategies that promote the responsible use of these tools, training teachers as guides capable of transforming the pressure to pass into a genuine motivation to learn

KEYWORDS: Generative Artificial Intelligence, Upper Secondary Education, Student Perception, Ethics in Educational Technology.

Inteligência Artificial Generativa na Sala de Aula. Aprendizagem e Experiência do Estudante

Resumo: Este estudo analisa como estudantes do Ensino Médio do Centro de Estudios Científicos y Tecnológicos No. 1 do Instituto Politécnico Nacional incorporam a Inteligência Artificial Generativa (IAG) em seu processo de aprendizagem durante o ano letivo de 2024-2025. O objetivo principal foi identificar como essas ferramentas são utilizadas para realizar tarefas escolares, quais benefícios oferecem quando aplicadas de forma crítica e criativa, e os riscos associados ao uso acrítico ou dependente. Foi utilizada uma abordagem de métodos mistos, de natureza descritiva e exploratória, incluindo questionários e entrevistas com 50 estudantes de diferentes semestres. Os resultados mostram uma adoção quase universal (97%), destacando que a IAG se tornou um recurso cotidiano para a realização de tarefas acadêmicas. Entre os benefícios percebidos estão a otimização do tempo, o acesso imediato a explicações e a possibilidade de personalizar o ritmo de estudo. No entanto, foram identificados riscos significativos: dependência tecnológica, perda de autonomia intelectual e a tendência de usar a IAG como substituto — em vez de apoio — ao pensamento independente. Um achado relevante é que os estudantes reconhecem diferentes tipos de ferramentas especializadas de IAG, dependendo da natureza da tarefa: desde geradores automáticos de texto até geradores de código, ferramentas matemáticas e criadores de recursos gráficos. Essa diversidade abre caminho para

oportunidades de aprendizagem mais dinâmicas, desde que exista uma orientação pedagógica clara. A falta de apoio docente, por outro lado, favorece um uso mecânico e superficial. Conclui-se que, quando utilizada de forma criteriosa, a IAG pode ser uma aliada estratégica no fortalecimento da criatividade, do pensamento crítico e da autonomia dos estudantes. Para alcançar isso, é essencial desenhar estratégias educacionais que promovam o uso responsável dessas ferramentas, capacitando os professores como guias capazes de transformar a pressão por aprovação em uma motivação genuína para aprender.

Palavras-chave: Inteligência Artificial Generativa, Ensino Médio, Percepção Estudantil, Ética em Tecnologia Educacional.

INTRODUCTION

The emergence of Generative Artificial Intelligence (GAI) has rapidly transformed multiple social spheres, often in almost invisible ways, yet with profound impacts on how we interact, learn, and produce knowledge. In education, these changes have been particularly intense, posing challenges for both students and teachers. While students quickly integrate GAI into their academic routines, teachers often struggle with uncertainty, lack of knowledge, and the need to rethink their pedagogical practices.

In the specific case of Upper Secondary students at the Centro de Estudios Científicos y Tecnológicos No. 1 of the Instituto Politécnico Nacional, it is essential to ask: How are they using these tools in their academic life? What is their perception of their usefulness and effectiveness? And how can their use be guided to enhance learning rather than replace it? These questions are relevant because GAI, while providing unprecedented access to innovative and personalized resources, also presents risks related to technological dependency, superficial learning, and academic integrity (Kasneci et al., 2023).

This research aims to explore these tensions from the student experience, analyzing not only the benefits and risks but also the opportunities that arise when GAI is used critically and under appropriate pedagogical guidance. Recent studies indicate that these tools can foster autonomy, creativity, and problem-solving if used as a complement to human thinking rather than as a substitute (Zawacki-Richter et al., 2019).

A notable aspect of this work is the recognition that GAI is not a single entity, but a diverse set of specialized applications: text generators, programming assistants, automatic translators, mathematical problem-solving platforms, and graphic resource creators, among others. Each responds to specific tasks posed by teachers, opening the possibility of personalizing and enriching learning experiences—or, conversely,

fostering dependence and discouraging independent thinking. The absence of teacher guidance can lead to purely mechanical use, failing to harness the educational potential of these technologies.

This study seeks to provide evidence on how new generations appropriate GAI, the expectations they build around it, and the challenges they recognize in daily use. The goal is to create a dialogue between students and teachers, proposing a model in which human–machine collaboration becomes a driver of educational innovation rather than a threat to learning. In doing so, the research contributes to a global discussion on the need to integrate GAI in an ethical, critical, and strategic manner in education, preparing students for the challenges of a constantly evolving digital future.

MATERIAL AND METHODS

The research was conducted using a mixed-methods approach, with a descriptive and exploratory design. Its purpose was to understand how Upper Secondary students from different semesters at the Centro de Estudios Científicos y Tecnológicos No. 1 of the Instituto Politécnico Nacional use Generative Artificial Intelligence (GAI) and their perception regarding its usefulness, benefits, and risks in the academic context.

The study population consisted of 50 students selected through non-probabilistic sampling, considering the inclusion of various educational levels within the institution to obtain a representative view of the school community.

Two main data collection techniques were employed: Structured surveys with closed and multiple-choice questions, aimed at gathering quantitative information about the frequency of GAI use, the most commonly used tools, and perceptions of their effectiveness.

Semi-structured interviews conducted with a smaller group of students to explore qualitative aspects related to experiences, benefits, and perceived risks in their academic training.

Quantitative data were analyzed using descriptive statistics, while qualitative data were processed through content analysis, identifying relevant thematic categories.

The study started from the hypothesis that students primarily use GAI as a support tool for information retrieval and schoolwork, perceiving it as efficient and practical. However, they also exhibit limited knowledge about its ethical and pedagogical implications, which may lead to dependency or the substitution of academic effort. As Neville (1992) notes, those who fail to adapt to the pace of the technological revolution risk becoming obsolete; in this context, the question arises whether technological dependency could become a new form of obsolescence.

The scope of the analysis was limited to identifying the uses, perceptions, benefits, and risks attributed to GAI within students' academic processes. It did not aim to comprehensively evaluate all available tools, but rather those most commonly used in the student environment, such as ChatGPT, Canva, and other resources students incorporate based on their academic needs.

Finally, it is acknowledged that the study does not intend to generalize the results to all educational levels. Rather, it seeks to understand the Upper Secondary experience in context, providing insights for future research and the design of institutional pedagogical strategies. As Prensky (2001) warns, new generations integrate digital technologies into their academic lives with ease, though not always from a critical perspective, which poses an additional challenge for their education.

RESULT

The data collection allowed us to identify how Upper Secondary students use Generative Artificial Intelligence (GAI) in their academic life, as well as their perceptions regarding its usefulness, benefits, and risks.

The findings show that GAI is primarily used for information retrieval, task organization, and the preparation of school assignments. Most students indicated that these tools enable them to work more quickly, improve the presentation of their products, and efficiently find academic resources. However, it was observed that a large part of this use occurs without critical reflection or awareness of its ethical and pedagogical implications. In this regard, as Selwyn (2019) notes, integrating AI in education does not automatically guarantee meaningful learning if it is not accompanied by guidance strategies and a reflective framework to steer its implementation.

Positive perceptions identified include support in organizing academic work, faster completion of school tasks, and immediate access to diverse information. At the same time, concerns were expressed regarding technological dependency, superficial learning, the lack of verification of obtained information, and unawareness of risks associated with uncritical use of these tools.

Regarding the impact on the quality of work, it was observed that students who combined AI-generated information with their own analyses and reflections produced more structured and in-depth outputs. However, around 65% of participants admitted feeling tempted to delegate the entire creation of their assignments to GAI, while 95% acknowledged using these tools during periods of academic overload. This finding underscores the need to strengthen critical thinking and ethical training in technology use.

Another relevant aspect was the increased interest in learning and active participation in class. The opportunity to access digital tools sparked students' curiosity to apply them not only for academic purposes but also in personal contexts. This aligns with the observations of Holmes, Bialik, and Fadel (2019), who emphasize that AI has the potential to enrich teaching and learning, provided it is implemented responsibly and with a balanced approach between innovation and ethics.

Figure 1 shows the Napkin tool, which creates graphics from a text input. In this study, we will explore some tools recommended by students to improve the quality of their academic activities.

Figure 1

Image generated by Napkin, AI 2025

ACADEMIC USE WITHOUT PEDAGOGICAL GUIDANCE

The findings show that many students integrate Generative Artificial Intelligence (GAI) into their academic lives with relative ease, even when they lack formal guidance to understand its scope, limitations, and risks. For most, the main value of GAI lies in passing the course and completing school requirements quickly and efficiently. This pragmatic perspective is associated with the immediate need to complete assignments, submit work on time, or cope with academic workload, rather than a genuine interest in knowledge construction.

In this context, GAI is perceived as an accessible and fast resource that "solves" urgent tasks, but not necessarily the important ones. While students acknowledge improvements in the presentation and technical quality of their work, they also admit

that they do not always engage in reflective thinking or strengthen their intellectual autonomy. This highlights a risk: when technology is used solely instrumentally, education risks being reduced to a mechanical process of passing, neglecting creativity, critical thinking, and meaningful content acquisition.

Another element revealed by the study is that social, academic, and even family pressures directly influence this dynamic. Fear of failing, comparison with peers who also use these tools, and the expectation to meet external standards contribute to mechanical and, at times, dependent use of GAI. This dependency intensifies in the absence of teacher guidance, as students reproduce superficial practices that limit the true educational potential of artificial intelligence.

Hence, the research emphasizes the need to establish pedagogical guidance to direct students toward ethical and formative use of these tools. Far from prohibiting their use, the challenge lies in channeling GAI as a means to enhance creativity, autonomy, and critical reflection, transforming the pressure to pass into motivation to learn.

Figure 2 shows an image created with ChatGPT, a tool with multiple functions and the most popular among students.

Figure 2

Image generated by Chatgpt, AI 2025

PRESSURE FROM SOCIETY AND INSTITUTIONS

The research reveals a fundamental problem in today's education: the pressure exerted by society, family, and educational institutions on students. This pressure manifests in an obsession with passing subjects and strictly meeting assessment requirements. Rather than a genuine desire to learn, students' main objective becomes satisfying these external expectations—a vicious cycle that undermines the true purpose of education.

Within this context of pressure, Generative Artificial Intelligence (GAI) emerges as a convenient tool for students. However, in most cases, its use is instrumental. Students employ it to produce assignments quickly and obtain grades, prioritizing efficiency over knowledge construction. Teachers may praise the work submitted or even present it as exemplary, despite requiring less effort and time. This behavior is reinforced by a system that rewards visible outcomes: families value tangible results, such as good grades; society idolizes academic success; and schools demand strict adherence to standards.

All these factors create an environment where GAI use becomes mechanical and, at times, even fraudulent. Instead of fostering creativity and critical thinking, a "shortcut" mindset is promoted to meet the system's demands.

The solution could be the design of pedagogical strategies that promote ethical and educational use of artificial intelligence. This requires teachers trained and knowledgeable about GAI tools. Rather than banning these tools, students should be taught to use them as a complement to enhance their academic experience. Another challenge is changing the focus of evaluation—from merely measuring results to valuing the learning process, fostering curiosity, autonomy, and critical thinking. However, the large number of students in the classroom makes this process difficult to implement. It is important to promote the idea that success is not only about achieving a good grade but also about using tools to continue learning throughout life.

NECESSITY AS A DRIVER OF USE AND THE ROLE OF THE TEACHER

Students' use of Generative Artificial Intelligence (GAI) is not a spontaneous act but a direct response to their immediate needs. Young people turn to it to complete assignments, meet deadlines, and, essentially, pass their courses. The speed, accessibility, and ability of GAI to simplify academic processes make it an extremely attractive tool, which explains its rapid adoption. However, this immediate functionality does not guarantee deep learning or the development

of autonomous knowledge. Few educators instruct their students on how to use these tools appropriately. This lack of pedagogical guidance allows superficial and mechanical practices to take root easily, reinforced by academic pressure and the easy access to digital resources. This phenomenon confirms the warning that the absence of teacher guidance fosters instrumental use of GAI, increasing the risk of dependency and fragmented learning.

To transform this scenario, it is essential to redefine the role of the teacher. The research highlights the need for educators who are not only knowledgeable about GAI but also capable of directing its use toward the development of critical skills, creative thinking, and intellectual autonomy. Real change will not come from banning the technology but from integrating it meaningfully into the teaching process.

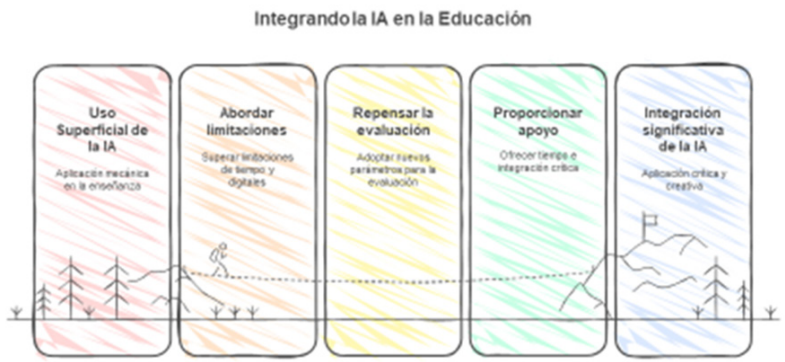

Figure 3

Image generated by Napkin, AI 2025

DIVERSITY AND DYNAMISM OF GENERATIVE ARTIFICIAL INTELLIGENCE TOOLS

Initially, the research aimed to focus on widely known and used platforms by students, such as ChatGPT or Gemini, to analyze their adoption, functionalities, and associated perceptions. However, during the process, it became evident that the landscape of Generative Artificial Intelligence (GAI) tools is much broader and more dynamic than initially expected.

A large number and variety of resources were identified, each with particular characteristics, differentiated approaches, and varying levels of complexity. Furthermore, these tools are updated at an astonishing pace: new functions, enhanced processing capabilities, integration of multiple services and applications, and more

sophisticated algorithms constantly emerge, altering the user experience and expanding academic use possibilities.

Additionally, many of the new platforms integrate several functions that were previously separate. For example, some allow users to generate text, summarize information, create graphics, perform data analysis, and produce multimedia content within a single digital environment. This functional convergence enables students to access multiple resources from a single tool, optimizing their time and simplifying work processes, but it also increases the complexity of learning to use these technologies ethically and responsibly.

This finding highlights that research on GAI cannot be limited to individual platforms; it must consider an ecosystem in constant evolution, where technological updates and resource diversity are key factors in how students incorporate these tools into their learning. At the same time, it underscores the need for teachers and educational institutions to stay informed and trained to guide use in an ethical and pedagogically meaningful manner.

Throughout this paper, we have presented some tools used by students to integrate or facilitate academic activities. Figure 4 shows Gemini being used to create a timeline for the Analytical Geometry learning unit.

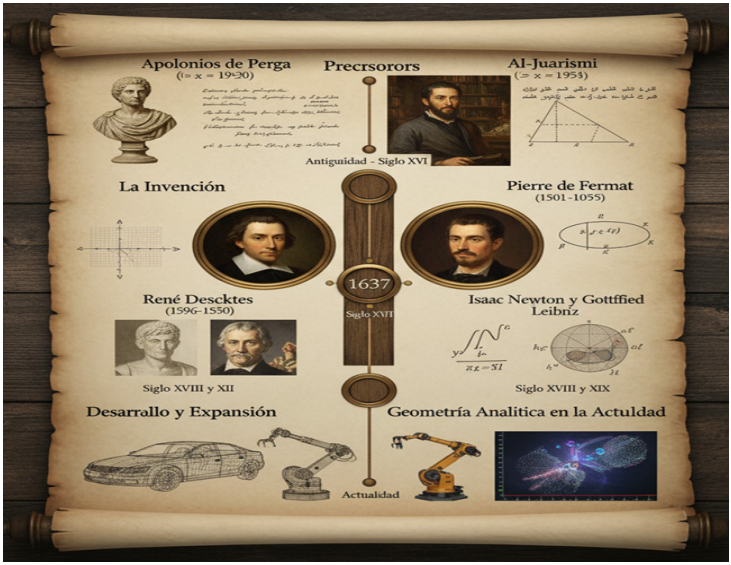

Figure 4

Image generated by Gemini, AI 2025

Figure 5 shows some tools among the vast diversity existing in the digital world; this serves as an invitation to explore them.

INTELIGENCIA ARTIFICIAL EN EDUCACIÓN

1	Smodin.io	Reescribir texto
2	Cymath	Resuelve problemas de matemáticas paso por paso
3	UDocz	Anotas el tema de tu tarea y te da trabajos ya realizados sobre el tema
4	cogram	Toma notas automáticas en reuniones virtuales
5	https;//soundraw.is/	Creador de música sin derechos de autor
6	Glasp	Subraya y toma notas desde cualquier web
7	slideAI	Crea presentaciones y guion con AI
8	excelFormulaBot	Transforma sus instrucciones de texto en fórmulas de Excel
9	quillbot	Parafraseo y gramática
10	Midjourney	Crea logotipos, crea arte
11	Add animation	Animación de dibujos
12	docsity	Anotas el tema de tu tarea y te de trabajos ya realizados sobre el tema
13	Beta.Tome.app	Presentaciones automáticas de cualquier tema y en cualquier idioma
14	Photomath	Utiliza la cámara del teléfono móvil para reconocer patrones matemáticos y mostrar la solución directamente en la pantalla.
15	Magicstudio.com/magiceraser	Editor de fotos
16	Fliki https;//fliki-ai/	Introduces un texto y seleccionas el mejor video que mejor corresponde a la frase- puedes hacer hasta 10 videos de 1 minuto, también te permite poner voz artificial

Figure 5

Own elaboration

DISCUSSION

The results obtained show that the integration of Generative Artificial Intelligence (GAI) in the academic field responds primarily to immediate needs: completing assignments, meeting deadlines, and passing courses. This finding highlights that, although students adopt these tools with great ease, their use tends to be superficial or mechanical when there is no pedagogical and ethical guidance to support their effective application. The absence of teacher accompaniment may encourage routine practices or technological dependence, limiting autonomous knowledge construction and the development of critical skills.

The research also reveals that the pressure exerted by family, school, and society reinforces this utilitarian view of GAI. The importance given to grades, timely submission of work, and visible results motivates students to prioritize efficiency and speed over reflection, creativity, and deep understanding. In this context, GAI becomes a strategic resource to meet immediate objectives, even if it entails risks of dependence, superficial use, and the loss of critical thinking.

At the same time, students have access to a broad and dynamic ecosystem of digital tools: text generators, editing applications, learning platforms, automatic problem-solving systems, and virtual assistants that integrate multiple functions in a single environment. This diversity, in constant evolution, contrasts with the limited resources of the traditional classroom and conventional methods such as textbooks and manual exercises. While GAI makes it possible to solve complex problems in minutes and quickly prepare summaries or presentations, traditional methodologies still play an essential pedagogical role: they foster deep understanding, analytical discipline, and the development of critical cognitive skills.

These findings highlight the need to strike a balance between the digital and the traditional. GAI does not replace human learning; rather, it can complement it by enhancing creativity, autonomy, and critical thinking, as long as there is a solid pedagogical framework and well-prepared teacher intervention. The ethical and pedagogical training of teachers becomes a determining factor in transforming the pressure to pass into motivation to learn, ensuring that technology is used as a strategic ally in meaningful learning rather than as a merely instrumental resource.

Finally, the discussion emphasizes that the effective integration of technology requires a broad educational vision capable of articulating the speed and accessibility of digital tools with the formative richness of traditional methods. Only through such articulation will it be possible to build a balanced educational model, in which collaboration among students, teachers, and artificial intelligence generates authentic learning and prepares new generations for a constantly evolving digital future, fully aligned with the objectives and findings presented in the research summary.

CONCLUSION

This research demonstrates that Generative Artificial Intelligence (GAI) has become a central component of the academic experience of upper secondary students, not only as a support tool but also as a factor reshaping the way knowledge is learned and constructed. Its adoption—driven by immediate needs, social and academic pressures, and ease of access—shows that young people integrate these technologies quickly, though often without a deep understanding of their ethical, pedagogical, and cognitive implications.

The study highlights that GAI holds transformative potential for education, with the ability to foster creativity, critical thinking, autonomy, and collaboration between students and teachers, provided its use is framed within conscious and ethical pedagogical guidance. The findings also indicate that without proper direction, these tools risk becoming merely instrumental, limiting meaningful learning and reinforcing technological dependence.

From a futuristic perspective, the analysis reveals that the incorporation of GAI is not a passing phenomenon but a dynamic process that will transform traditional educational models and demand continuous updating from teachers, institutions, and students. Preparing new generations for a digital future involves not only mastering tools but also developing critical competencies to discern, evaluate, and employ technology responsibly and strategically.

In summary, this research underscores the importance of building an educational framework that bridges the best of digital innovation with traditional pedagogical methods. Only in this way can GAI consolidate itself as a strategic ally, capable of transforming education into a more creative, ethical, and collaborative space, fully prepared for the challenges of the future—ensuring that technology enhances, rather than replaces, human learning.

REFERENCES

Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. Center for Curriculum Redesign.

Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., ... & Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. Learning and Individual Differences, 103, 102274. https://doi.org/10.1016/j.lindif.2023.102274

Luckin, R. (2018). Machine learning and human intelligence: The future of education for the 21st century. UCL Institute of Education Press.

Neville, C. (1992). The computer revolution in education. Routledge. https://www.tagusbooks.com/leer?isbn=9788499894577&li=1&idsource=3001

Prensky, M. (2001). Digital natives, digital immigrants. On the Horizon, 9(5), 1–6. https://doi.org/10.1108/10748120110424816

Selwyn, N. (2019). Should robots replace teachers? AI and the future of education. Polity Press.

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – Where are the educators? International Journal of Educational Technology in Higher Education, 16(1), 39. https://doi.org/10.1186/s41239-019-0171-0