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Student perceptions of generative artificial intelligence in educational institutions in Imbabura: an exploratory analysis

Percepción estudiantil sobre la inteligencia artificial generativa en instituciones educativas de Imbabura: un análisis exploratorio

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Abstract

The study analyzes students' perceptions of the use of generative artificial intelligence (GAI) in educational institutions in Imbabura, Ecuador. The objective was to understand how adolescents interpret and value these emerging technologies in a context where their incorporation into schools is still incipient and lacks consolidated pedagogical frameworks. A non-experimental, cross-sectional, and quantitative–descriptive design was employed, based on a structured survey applied to 318 students aged 11 to 17 years, selected through

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purposive sampling. The instrument, validated by expert judgment and with a Cronbach's alpha above 0.80, explored four dimensions: level of knowledge, forms of use, perceived usefulness, and perceived reliability of AI. The findings show a high degree of familiarity with the concept of AI and a positive perception of its usefulness, although school-related uses remain concentrated on instrumental activities such as information searches, translation, and exercise solving. Most students acknowledge that AI can generate incorrect answers, reflecting a certain level of critical awareness, although a group still maintains uncritical trust. The study provides local evidence to guide pedagogical strategies, teacher training, and educational policies that foster a critical, creative, and humanizing use of AI in secondary education.

Keywords: artificial intelligence; computer assisted instruction; digital literacy; secondary education; student attitudes

Resumen

El estudio analiza la percepción estudiantil sobre el uso de inteligencia artificial generativa (IAG) en instituciones educativas de Imbabura, Ecuador. El objetivo fue comprender cómo los adolescentes interpretan y valoran estas tecnologías emergentes, en un contexto donde su incorporación escolar aún es incipiente y sin marcos pedagógicos consolidados. Se empleó un diseño no experimental, transversal y cuantitativo–descriptivo, basado en una encuesta estructurada aplicada a 318 estudiantes de entre 11 y 17 años, seleccionados mediante muestreo intencional. El instrumento, validado por juicio de expertos y con un alfa de Cronbach superior a 0,80, indagó en cuatro dimensiones: nivel de conocimiento, formas de uso, percepción de utilidad y percepción de confiabilidad de la IA. Se evidencia alto grado de familiaridad con el concepto de IA y una valoración positiva de su utilidad, aunque los usos escolares se concentran en actividades instrumentales como búsqueda de información, traducción y resolución de ejercicios. La mayoría

reconoce que la IA puede generar respuestas incorrectas, lo que refleja cierta conciencia crítica, aunque un grupo mantiene confianza acrítica. El estudio aporta evidencia local para orientar estrategias pedagógicas, formación docente y políticas educativas que promuevan un uso crítico, creativo y humanizador de la IA en educación secundaria.

Palabras clave: alfabetización digital; educación secundaria; enseñanza asistida por computadora; inteligencia artificial; percepción del estudiante

Introduction

Generative artificial intelligence (AI) has become one of the most influential technological developments in recent years, with a growing impact in various fields, including education. Tools such as ChatGPT, Bard, and Copilot have opened up new possibilities for accessing information, solving problems, and creating digital content, but they also pose challenges related to their pedagogical incorporation.

In the Ibero-American context, García-Peñalvo et al. (2024) warn that the emergence of generative AI is transforming the way students interact with knowledge and requires a rethinking of the role of teachers. In secondary education, do Santos (2024) identifies potential in the teaching of social sciences, but also limitations arising from instrumental and uncritical use. Similarly, Salas Acuña and Amador Solano (2023) report that ChatGPT can be a useful resource in the revision of academic texts, but always mediated by teacher guidance. From a broader perspective, UNESCO (2023) and Artopoulos and Lliteras (2024) agree that, alongside the benefits, there is an urgent need to develop critical literacy skills in AI that enable students to deal with the biases, misinformation, and erroneous responses generated by these tools.

In Latin America, studies reflect a heterogeneous picture regarding the integration of artificial intelligence in education. According to regional mapping promoted by the OEI and Fundación ProFuturo (2025), while some countries are making progress in incorporating AI

into educational policies and curricula, others still face significant structural barriers related to access, teacher training, and digital equity. In Ecuador, although there are emerging experiences of educational innovation that aim to integrate AI tools to personalize teaching and facilitate access to resources (Gonzáles Torres et al., 2025), their application at the secondary level is still limited and fragmented. This is largely due to the absence of a consolidated pedagogical framework to guide these initiatives, which raises legitimate questions about their real contribution to learning and how students experience them on a daily basis in their school environment (Andrade Peña et al., 2024).

In Ecuador, secondary school students are beginning to interact with generative artificial intelligence applications—such as assistance in searching for information, translating texts, or solving exercises—spontaneously and without systematic pedagogical mediation. Andrade Peña et al. (2024), in an analysis of Ecuadorian secondary education, highlight that this informal interaction is mainly carried out on the students' initiative, with little teacher guidance and a lack of clear institutional policies. Similarly, Jara Alcívar (2024), after conducting a survey of 800 stakeholders in the education system, identifies that although there is a largely positive perception of the impact of AI on education, significant challenges remain: lack of adequate technological infrastructure, lack of teacher training in the use of AI, and clear regulatory gaps regarding data protection and ethical use. Thus, a paradox emerges as a central problem: students use AI enthusiastically, but its real usefulness in learning, its reliability, and the formative role of the school continue to generate uncertainty.

In the province of Imbabura, secondary school students have begun to use generative artificial intelligence tools in school activities such as searching for information, translating texts, solving exercises, and creating images. This use, however, occurs spontaneously and with little teacher guidance. Although many students say that AI helps them learn, they also recognize that it sometimes provides incorrect answers, raising doubts about its reliability and the true contribution of these tools to learning. Faced with this ambivalence between enthusiasm and uncertainty, the central question of this research

arises: how do secondary school students in Imbabura perceive the use of generative artificial intelligence in their learning process?

This article aims to analyze student perceptions of the use of generative artificial intelligence in educational institutions in the province of Imbabura. Based on a survey of students between the ages of 11 and 17, it seeks to identify their level of knowledge about AI, the main ways it is used, their assessment of its contribution to learning, and the limitations they perceive. The study aims to provide local evidence to strengthen the national discussion on educational innovation, offering input for teachers and administrators to develop pedagogical strategies that integrate AI in a meaningful and responsible way in the classroom.

The overall objective of this article is to analyze the perception of secondary school students in the province of Imbabura regarding the use of generative artificial intelligence in their learning process. To this end, a descriptive survey-based approach was used, which allowed for the exploration of four dimensions: the level of prior knowledge about artificial intelligence, the main ways it is used in school activities, the assessment of its contribution to learning, and the perceived limitations. Based on these findings, the study aims to provide local evidence to strengthen the national discussion on educational innovation and serve as input for teachers and administrators to develop pedagogical strategies that promote critical, meaningful, and responsible use of artificial intelligence in the classroom.

Generative artificial intelligence (GAI) can be understood as a mediating educational resource: a cultural tool that, when inserted into the joint activity of teachers, institutions, and students, reconfigures the access, organization, and production of knowledge in the classroom. In a current sociocultural approach, GAI is valuable not for its technical novelty, but for its situated didactic uses that activate processes of analysis, synthesis, and creative production, always under pedagogical mediation. Recent research in indexed journals shows that IAG applications should be framed as tools for cognition (not just as generators of products), integrating theories of activity and distributed cognition to enhance critical thinking and

meaningful learning, "learning with" technology and not just "from" technology (Fuertes-Alpiste, 2024). Likewise, it is emphasized that the emergence of IAG requires a rethinking of educational paradigms and governing its integration with solid pedagogical criteria, avoiding instrumental uses and technocentrism (García-Peñalvo, 2024). At the same time, recent educational debate highlights ethical considerations (equity, bias, educational purpose) as a condition for responsible and humanizing incorporation into schools (Flores-Vivar and García-Peñalvo, 2023).

Symbolic tools participate in psychological development and, with expert support, expand the student's zone of proximal development; IAG, used as scaffolding, can expand possibilities for expression and task resolution if its use is pedagogically regulated (Vygotsky, 1979). IAG is theoretically classified as a cultural catalyst whose educational effectiveness is defined by the quality of interaction and the situated uses that are constructed in the teaching action.

At the same time, as it is considered a resource capable of personalizing teaching and adapting to individual differences, IAG is linked to sociocultural constructivism approaches, which highlight the importance of addressing the diversity of learning trajectories and offering differentiated scaffolding (Vygotsky, 1979).

From this perspective, technological tools function as cultural mediators that strengthen self-management, analysis, and content production, which connects directly to the notion of self-regulated learning (Zimmerman, 2002). It is not only a matter of expanding the availability of information, but also of enhancing student autonomy and creativity, always under the guidance of teachers who channel these practices toward pedagogically meaningful uses. Recent research highlights that generative artificial intelligence should be understood not only as a repository of answers, but as a tool for cognition, capable of stimulating processes of synthesis, reflection, and critical construction of knowledge (Fuertes-Alpiste, 2024).

Along the same lines, García-Peñalvo (2024) emphasizes that the true value of GAI in education is realized when it is integrated into teaching strategies that promote critical thinking and self-regulation, avoiding both technological dependence and the reduction of its use to purely

instrumental ends. Thus, the student becomes an active agent in the construction of meaning, and AAI becomes a pedagogical catalyst whose effectiveness depends on teacher mediation and the pedagogical framework in which it is inserted.

However, contemporary evidence shows that the true potential of artificial intelligence in education is only realized when its incorporation is linked to reflective and sustainable pedagogical frameworks capable of balancing innovation with educational quality. In higher education, Chiappe, Sanmiguel, and Sáez Delgado (2025) emphasize that, while AI creates opportunities to redefine teaching roles and strengthen the personalization of learning, its successful integration depends on rigorous pedagogical analysis that integrates empathy, adaptability, and a vision focused on human relationships beyond technical support.

In educational contexts characterized by structural challenges and cultural diversity, IAG is linked to the theory of learning personalization, which proposes adjusting teaching processes to the characteristics, rhythms, and needs of each student. Recent research highlights that AI, by adapting to individual demands and enabling multimodal representations, can support contextualized learning, for example, in intercultural bilingual education or environmental education programs (applicable in the province of Imbabura).

However, this potential can only be realized when basic conditions are met: sufficient technological infrastructure, relevant teacher training, and ethical frameworks that prioritize educational equity and sustainability. In this regard, Chiappe, Sanmiguel, and Sáez Delgado (2025) emphasize that the integration of AI in school contexts cannot be limited to its technical dimension, but must be framed within a pedagogical and humanizing project that avoids widening the digital divide and reinforces processes of social justice. As Ortega-Rodríguez and Pericacho-Gómez (2025) warn, personalization only has a real impact when teachers guide the process, turning AI into a resource that enhances critical and autonomous learning.

The analysis of generative artificial intelligence (GAI) in the educational field must incorporate a critical and ethical perspective

that goes beyond an assessment based solely on technological novelty.

Methodology

The study was framed within a non-experimental, cross-sectional design with a quantitative-descriptive approach. It is considered non-experimental because the independent variables were not manipulated, but rather the phenomena were observed in their natural context in order to analyze them as they manifest themselves in reality (Hernández-Sampieri, Fernández-Collado, & Baptista, 2014). The cross-sectional nature of the study is due to the fact that data collection was carried out at a single point in time, which allowed us to obtain a snapshot of student perceptions during the period analyzed. As Bisquerra Alzina (2019) points out, cross-sectional studies are a valid methodological strategy for describing educational phenomena at a specific moment in time, providing useful information to guide analysis and decision-making processes. It is defined as descriptive because the central objective was to characterize and detail the attitudes, beliefs, and experiences of students regarding the use of generative artificial intelligence in the school environment, without establishing causal relationships, but rather identifying trends and patterns in the information collected.

The research is characterized as exploratory-descriptive. Its exploratory dimension responds to the fact that the phenomenon of the use of generative artificial intelligence in secondary education in the province of Imbabura is an emerging and poorly documented field, which requires initial approaches that lay the foundations for future inquiries (Hernández-Sampieri et al., 2014). At the same time, it is descriptive in nature, given that the central purpose was to identify and analyze trends related to the level of knowledge, forms of use, and the value that students place on these tools, providing a detailed overview of their perceptions without attempting to establish causal relationships (Bisquerra, 2019).

The study was developed using a quantitative method with deductive logic, as it was based on theoretical references and general background information on the use of generative artificial intelligence

in education, in order to contrast them with the data obtained from the student population of Imbabura (Hernández-Sampieri et al. 2014). An analytical-synthetic method was also applied, which allowed the students' responses to be broken down into categories and indicators and then integrated into an overall picture of their perceptions. This combination of methodological approaches facilitated the obtaining of systematic, verifiable, and generalizable results within the framework of an exploratory-descriptive design.

The data collection technique used was a structured survey, administered digitally using a questionnaire designed in Google Forms. This instrument included closed-ended multiple-choice questions and Likert-type scale questions, aimed at investigating key aspects related to:

- Level of knowledge about generative artificial intelligence
- Ways of using it in schools
- Perception of its usefulness and reliability
- Limitations or concerns associated with its educational application

The questionnaire underwent a content validation process by expert judgment, who evaluated the relevance, clarity, and consistency of the items (Hernández-Sampieri et al. 2014). Likewise, before starting the survey, an informed consent section was included, in which the nature and objectives of the study were explained to the participants, guaranteeing the voluntary nature, anonymity, and confidentiality of the responses, in accordance with the ethical principles of educational research (American Educational Research Association [AERA], 2011).

The reliability of the instrument was verified by calculating Cronbach's alpha internal consistency coefficient, which was greater than 0.80, a level considered adequate in social and educational research, as it ensures the stability and homogeneity of the responses (George and Mallery, 2003).

The study population consisted of secondary school students from public, private, and charter schools in the province of Imbabura. It was a heterogeneous universe, characterized by the coexistence of urban and rural contexts, as well as cultural diversity that includes mestizo

and indigenous communities, which gives relevance to the analysis of perceptions of emerging technologies in education.

The sample consisted of 318 students, aged between 11 and 17. The selection procedure was a non-probabilistic, intentional sampling, justified by the access and availability of educational institutions to participate in the data collection (Hernández-Sampieri et al. 2014). This methodological criterion allowed only those centers with basic digital connectivity and whose administrators expressed openness to the study to be included.

In constructing the sample, an effort was made to ensure diverse representation in terms of gender, type of institution, and geographic location (urban and rural), with the aim of obtaining a broader and more balanced view of student perceptions. Although it was not a statistically representative sample, its intentional configuration was relevant for an exploratory-descriptive study, as it offered an initial overview of an emerging phenomenon in the local context.

Data collection was carried out between February and May 2025, after coordination with administrators and teachers from the participating institutions. In the first phase, institutional permissions were obtained and the educational community was informed about the objectives of the study and the conditions for participation. Subsequently, the link to the digital questionnaire (Google Forms) was disseminated at times previously established with each institution, ensuring homogeneous conditions for all students surveyed.

Compliance with the ethical principles of educational research was ensured at all times: participation was voluntary, the confidentiality and anonymity of responses was guaranteed, and an informed consent section was included at the beginning of the questionnaire. In the case of underage students, prior authorization was obtained from their legal representatives, in accordance with the recommendations of the American Educational Research Association (AERA, 2011).

Once the data collection phase was complete, the data were exported and organized into spreadsheets for initial cleaning, eliminating incomplete or inconsistent responses. The analysis was

performed with the support of statistical software, applying descriptive statistics (frequencies, percentages, and measures of central tendency) in order to characterize trends in the level of knowledge, forms of use, and student perceptions of generative artificial intelligence. This analytical procedure allowed us to establish a detailed and systematic overview of the phenomenon under study.

Results

The results of the question "Have you heard of artificial intelligence (AI)?" asked to a sample of 318 secondary school students in Imbabura. This first finding allows us to gauge the initial level of familiarity that adolescents have with AI, a key aspect for understanding the context in which their perceptions and practices of use in the school environment are shaped.

The data show that 86.5% of students say they have heard of AI, compared to 13.5% who say they are not familiar with it. This result shows that the concept has achieved high social and media visibility among adolescents, which is consistent with recent studies that highlight the growing presence of AI in the youth imagination, both through digital media and everyday experiences with technological applications (Alfaro-Salas and Días Porras, 2024).

However, knowing the term does not necessarily equate to understanding its scope and limitations. As UNESCO (2023) warns, the rapid expansion of AI in education requires moving beyond a superficial view and promoting critical digital literacy processes aimed at questioning the reliability of the information generated by these tools, as well as encouraging their ethical and responsible use.

This result also raises a pedagogical question: if most students already recognize the existence of AI, how present is teacher mediation in the construction of that knowledge? The research by Salas Acuña and Amador Solano (2023) emphasizes that student enthusiasm for technology is often accompanied by spontaneous and utilitarian practices, which reinforces the need for systematic pedagogical support that transforms recognition of the term into meaningful appropriation.

Although most adolescents in Imbabura have already heard of AI, this data should be interpreted not as a point of arrival, but as a pedagogical opportunity. The challenge lies in converting that initial familiarity into deep and critical knowledge, capable of articulating with teaching-learning processes and guiding students toward a reflective and humanizing use of technology.

The results show that 54.1% of students say that their teachers have talked about AI, while 45.9% say they have not received any information from their teachers on the subject. This relative closeness between the two proportions reflects an ambivalent situation: although more than half of adolescents recognize some kind of institutional reference to the subject, there is still a significant number who have not received systematic guidance.

Compared to the high overall exposure to the term AI (Figure 1), these data suggest that schools have not yet managed to position themselves as the main space for technological mediation, leaving much of the initial knowledge to come from digital media, social networks, or peer interactions. This finding coincides with that of Dellepiane and Guidi (2023), who note that the integration of AI into Latin American education is progressing unevenly, especially due to the lack of teacher training programs that allow technology to be approached from a pedagogical rather than a merely informative perspective.

Teacher mediation is crucial for transforming student interest into meaningful learning. Current research emphasizes that the educational value of artificial intelligence does not depend on its technical features, but on how teachers critically incorporate it into classroom dynamics, guiding students' interpretation and promoting digital and ethical skills. In this context, Ortega-Rodríguez and Pericacho-Gómez (2025) highlight that the perceived usefulness of AI by university students increases when there is teacher support that guides its use toward educational purposes, confirming that the absence of such mediation—as occurs in almost half of the cases in this research—poses a risk of keeping AI on a spontaneous, utilitarian, and uncritical level, reinforcing the gap between recognition of the term and its true pedagogical appropriation.

Teacher mediation with regard to AI in Imbabura is in its infancy and fragmentary. Although there are isolated efforts, they do not seem sufficient to guarantee solid support. This scenario reinforces the need to design institutional teacher training strategies and educational policies that integrate AI in a critical and coherent manner with learning objectives, avoiding its improvised use or dependence on the individual initiative of each teacher.

The analysis of the ways in which generative artificial intelligence (GAI) is used in schools allows us to identify not only the level of interaction of students with these tools, but also the educational purposes for which they use them in their daily lives. Recent literature indicates that adolescents tend to use AI mainly for practical and immediate support tasks, such as searching for information, translating texts, or solving exercises, which shows a tendency toward instrumental uses rather than critical reflection or deep knowledge construction processes (Dellepiane and Guidi, 2023; Salas Acuña and Amador Solano, 2023).

In the Ecuadorian context, where the formal incorporation of AI into school curricula is still in its infancy, it is relevant to analyze the extent to which secondary school students in Imbabura are using these technologies in their school activities. This section focuses on describing these practices, with the aim of assessing whether they respond to school-oriented pedagogical strategies or whether, on the contrary, they reflect autonomous and spontaneous use, conditioned by access to devices and connectivity.

The data show that the most common form of school use of artificial intelligence among secondary school students in Imbabura is searching for information (67.6%), followed by translating texts (54.1%), solving exercises (40.6%), creating images (27.0%), and, to a lesser extent, other activities (13.5%).

This pattern reflects a trend toward instrumental and immediate support uses, aimed primarily at facilitating routine school tasks, rather than processes of critical reflection or deep knowledge construction. Recent research confirms this orientation: AI is perceived by students as a practical resource for obtaining quick answers or improving the presentation of work, although it is not

always integrated into meaningful learning dynamics (Dellepiane and Guidi, 2023; Alfaro-Salas and Días Porras, 2024).

The fact that information search leads the ways in which AI is used coincides with recent findings on youth digital skills, where the first approach to technology tends to focus on accessing data quickly and functionally. Ortega-Rodríguez and Pericacho-Gómez (2025) point out that, in this scenario, AI tends to be perceived as an immediate support resource, but with the risk of being limited to instrumental practices if it is not articulated with pedagogical strategies. Similarly, Carrillo Murcia et al. (2025) warn that without critical teacher mediation, the use of AI can reinforce copy-and-paste dynamics, rather than promoting processes of analysis, reflection, and knowledge construction.

In contrast, creative use, such as image generation (27%), appears at a secondary level, revealing that adolescents have not yet fully explored the expressive and multimodal potential of these tools. This opens up a field of pedagogical opportunity: promoting activities that go beyond simply consulting information and that encourage creative production, complex problem solving, and personalized learning.

Conclusions

This study analyzed students' perceptions of the use of generative artificial intelligence (GAI) in educational institutions in the province of Imbabura, based on an exploratory-descriptive quantitative design and a sample of 318 adolescents between the ages of 11 and 17. The findings show that, although students are highly familiar with the concept of AI, its application in schools is mainly focused on instrumental tasks such as information search, text translation, and exercise solving. Teacher mediation is limited, which prevents its use from being directed toward creative, expressive, or deep learning practices.

The results show a positive assessment of the usefulness of AI, accompanied by an incipient critical awareness of its reliability. Most students recognize that the tools can make mistakes, although there is still a sector that maintains uncritical confidence in the results. This

duality reveals that student perception combines enthusiasm with skepticism, confirming that technological appropriation depends largely on pedagogical mediation and critical digital literacy promoted by the school.

In terms of pedagogy and educational policy, the research highlights the need to strengthen teacher training programs and design institutional strategies that channel student interest toward an ethical, reflective, and humanizing use of AI. The main contribution of this work lies in offering an empirical and contextualized diagnosis that, in addition to highlighting the tensions present in the province of Imbabura, contributes to the scientific discussion on the integration of emerging technologies in Latin America. This study thus constitutes a solid basis for future research seeking to deepen the link between student perception, teacher mediation, and educational transformation in the digital age.

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