

ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION MANAGEMENT

Inteligencia artificial en la gestión de la educación superior

Inteligência artificial na gestão do ensino superior

Dr. C. Miguel Macías Loor ^{1*}, <https://orcid.org/0000-0002-5958-3541>

Lic. Marielisa Stefanía Zavala Cárdenas ², <https://orcid.org/0009-0003-0753-8241>

Mg. Jonathan Rodolfo Delgado Cedeño ³, <https://orcid.org/0000-0003-1978-9892>

Mg. María Elena Tubay Álvarez ⁴, <https://orcid.org/0000-0003-0866-4808>

Dr. C. Leopoldo Vinicio Venegas Loor ⁵, <https://orcid.org/0000-0002-3100-6320>

¹⁻⁴ Universidad Técnica de Manabí, Ecuador

⁵ Universidad Estatal del Sur de Manabí, Ecuador

*Corresponding author. email miguel.macias@utm.edu.ec

To cite this article: Macías Loor, M., Zavala Cárdenas, M. S., Delgado Cedeño, J. R., Tubay Álvarez, M. E. y Venegas Loor, L. V. (2026). Artificial intelligence in higher education management. *Maestro y Sociedad*, 23(1), 985-999. <https://maestroysociedad.uo.edu.cu>

ABSTRACT

Artificial intelligence (AI) is increasingly transforming university management and teaching processes, offering new possibilities for personalized learning and administrative efficiency in higher education. This study aims to analyze the use of AI in university administration and teaching in Ecuador, identifying its opportunities, benefits, and main challenges. A mixed-methods approach with quantitative emphasis was applied, descriptive and inferential statistics were complemented with qualitative content analysis; data were collected through a validated questionnaire administered to 146 university professors from four higher education institutions in Manabí, Ecuador. Findings reveal a growing adoption of generative AI tools and positive perceptions regarding personalized learning, feedback, and efficiency; however, limitations such as insufficient training, lack of policies, and privacy concerns persist. In conclusion, AI offers significant potential for higher education, but its effective integration requires teacher training, institutional guidelines, and ethical regulation.

Keywords: artificial intelligence, higher education, university management, generative AI

RESUMEN

La inteligencia artificial (IA) está transformando progresivamente procesos de gestión y enseñanza en educación superior, ofreciendo nuevas oportunidades para aprendizaje personalizado y eficiencia administrativa. El presente estudio tiene como objetivo analizar el uso de IA en administración y enseñanza universitaria en Ecuador, identificando sus oportunidades, beneficios y principales desafíos. Se aplicó un enfoque de métodos mixtos con énfasis cuantitativo, el análisis incluyó estadística descriptiva e inferencial y análisis de contenido cualitativo; los datos se recolectaron mediante un cuestionario validado aplicado a 146 docentes universitarios de cuatro instituciones de educación superior de la provincia de Manabí. Los resultados muestran un aumento del uso de herramientas de IA generativa y percepciones positivas sobre personalización del aprendizaje y eficiencia; sin embargo, persisten limitaciones como falta de capacitación, ausencia de políticas institucionales y preocupaciones sobre privacidad. La IA tiene potencial en educación superior, pero su integración requiere capacitación docente, lineamientos institucionales y regulación ética.

Palabras clave: inteligencia artificial, educación superior, gestión universitaria, IA generativa

RESUMO

A inteligência artificial (IA) está transformando progressivamente processos de gestão e ensino no ensino superior, oferecendo novas possibilidades para aprendizagem personalizada e eficiência administrativa. Este estudo tem como

objetivo analisar o uso da IA na administração e ensino universitário no Equador, identificando suas oportunidades, benefícios e principais desafios. Foi adotada uma abordagem de métodos mistos com ênfase quantitativa, a análise incluiu estatística descritiva, inferencial e análise de conteúdo qualitativa; os dados foram coletados por meio de um questionário validado aplicado a 146 professores universitários de quatro instituições de ensino superior da província de Manabí. Os resultados indicam crescente adoção de ferramentas de IA generativa e percepções positivas sobre personalização da aprendizagem e eficiência; entretanto, persistem limitações como falta de formação docente, ausência de políticas institucionais e preocupações com privacidade. A IA apresenta grande potencial para o ensino superior, mas sua integração exige capacitação docente, diretrizes institucionais e regulamentação ética.

Palavras-chave: inteligência artificial, ensino superior, gestão universitária, IA generativa

Received: 21/7/2025 Approved: 15/9/2025

INTRODUCTION

Artificial intelligence (AI) is significantly changing the way we teach and learn. What once seemed impossible is now a reality, as education has changed so much that each student can receive personalized attention, making learning more interesting and useful. When we talk about artificial intelligence, we are referring to things such as machine learning and the way machines understand language, which have been created to improve the experience of today's students (Albuja and Guadapule, 2022; Kong & Yang, 2024; Nazaretsky et al., 2022; Pham & Sampson, 2022).

Teachers can change the way they teach to suit each student's needs, using programs that analyze data and find patterns. Preston (2021) states that one of the biggest advantages of using artificial intelligence is that learning is tailored to each individual, leading to better results in school. By being able to adjust to how they learn and the time they need, students can use class resources and materials at their own pace (Fitzpatrick et al., 2023; Mariani et al. 2023; Parra-Sánchez, 2022; Vera, 2023). In addition, teachers' work reviewing assignments is faster and better advice is given thanks to tools such as chatbots, intelligent help, and automatic exam correction (Donmez, 2024; Fitzpatrick et al., 2023; Hernandez Nodarse et al., 2025; Kong & Yang, 2024; Preston, 2021).

However, while AI has many advantages for education, if applied carelessly or excessively, it can also pose serious problems. According to Murugan, et al. (2025); Paiva et al. (2022); Firat (2023), the main vulnerability and danger for the deployment and use of artificial intelligence in any situation is the lack of trust in these technologies, data security, and privacy. In addition, there are the potential consequences of implementing these technical systems, as well as the economic benefits of integrating artificial intelligence into higher education administration (Liu, 2010; Infante, 2023; Markauskaite et al. 2022; Murugan et al., 2025). To provide equitable and secure access to these resources to all those involved in education, it is therefore necessary to address ethical issues (Díaz, 2025).

According to Alastor and Martínez-García (2025); Bordovskaia et al. (2016); Lazar et al (2022); Polat et al. (2025); Vera (2025); the potential of artificial intelligence is important because of its ability to analyze data effectively. Besides, it allows teaching and administrative staff to streamline the decision-making process in an informed manner and with a solid data base to ensure that the teaching-learning process is meaningful. However, the gap between the speed at which technology is advancing and the level of preparedness of teachers is significant, demonstrating the need for ongoing training (Cheah et al., 2025; Pratiwi et al., 2025). This will enable them to apply their knowledge in continuing education programs and develop their digital skills by familiarizing themselves with generative tools such as Copilot, ChatGPT, Gemini, Perplexiti, among others (An et al., 2024; Dilek et al. 2025; Gairín & Alguacil, 2024).

Artificial intelligence has become a force that transforms multiple facets of our society, and its influence on higher education is increasingly noticeable and undeniable (Celik et al., 2022; Edmett et al., 2024; Ocaña-Fernández, 2019; Ratan et al. 2022). Because AI plays a crucial role in innovation at universities globally, we must investigate how this technology is transforming higher education, especially in the context of Ecuador (Lambert & Stevens, 2023; Pham & Sampson, 2022; Celik et al., 2022). AI transforms society in many ways, and its impact on higher education is clear and growing (Pham & Sampson, 2022). AI plays a crucial role in innovation at universities globally, which compels us to conduct research on how this technology is transforming higher education, especially in the context of Ecuador.

In this context of disruption, the objective of this article is to analyze how AI is used in university administration and education, highlighting its opportunities, problems, and barriers.

The idea of infusing "life" into inanimate objects such as statues or artifacts, providing them with a type of "intelligence," has its roots in ancient Greece with the creation of automaton statues. However, it was not until the mid-20th century that some American academics theorized about how computers could be programmed to perform human thought processes (Ertmer, 1999; García Villaroel, 2021; Li & Tsai, 2017; Popenici & Kerr, 2017; Putwain et al. 2015). By the late 1970s, there was already some ironic talk about how AI was capable of performing numerous tasks (Arroyo Estupiñan et al. 2025; Contreras, 2024; Cope & Ward, 2002; Ertmer et al., 2012).

In terms of education, AI-based learning technologies offer promising solutions to support educational inclusion, as is the case with intelligent tutoring systems (ITS) (Araya & Marber, 2023; Kong & Yang, 2024; Mekni, 2021; Shah, 2023). An adaptive instruction system could help improve learning outcomes by enhancing the educational experience and designing specific strategies for each student (Al Kalach, 2025; Chen et al., 2020). There are critics, however, who complain about the potential misuse of AI applications in education. Using ChatGPT, for example, to do homework without the student making a significant effort in the process (Ayyildiz & Yilmaz, 2023; Chan & Colloton, 2024; Kong & Yang, 2024; Nazaretsky et al., 2022).

Celik et al. (2022), Contreras (2024), Lambert and Stevens (2023), and Pham and Sampson (2022) mention that several studies have shown that content generated by AI applications is sometimes created based on racial and gender biases, preferring to use men over women in their content. As well as white people over members of other races, inferring professions based solely on a photograph of a face. As artificial intelligence is trained on content on the Internet, it is "fed" information (documents, videos, images) where ethnic communities, gender minorities, and women are underrepresented or have been portrayed negatively (Celik et al., 2022; Du Plooy et al., 2024; Raghuvanshi, 2025). Hence, some voices have argued that, given the great advances in artificial intelligence, it is important not to overlook the importance of marginalized groups. Particularly in the Global South, being able to create and disseminate their own discourse on the Internet (Allouch et al. 2021; Campoverde Cajas & Campoverde Castro, 2025; Kroff et al. 2024).

The purpose of incorporating artificial intelligence into higher education is to transform both teaching methods and the way students acquire knowledge (Cordón García, 2023). This is achieved by creating individualized learning programs and spaces that are tailored to the specific needs of each student, with the aim of improving the educational process. It is also crucial to be more critical of how AI replicates the contradictions of our "material world" (Celik et al., 2022; Contreras, 2024; Lambert & Stevens, 2023; Pham & Sampson, 2022).

The incorporation of AI in this field has great potential to optimize the quality and performance of learning and teaching (Maraza-Quispe et al., 2019). However, these authors indicate that it is crucial that this adoption be carried out ethically, ensuring the confidentiality of student information at all times. Gómez et al. (2020) and Ge and Hu (2020), on the other hand, point out that more than 75% of the most important universities in Latin America promote research and development of autonomous systems based on artificial intelligence. Likewise, 96% of these institutions offer university programs related to AI, and half of them have centers or laboratories specializing in this field (Gómez et al. 2020; Cisneros Zumba et al., 2025; Silva Puitiza, 2024; Umoke et al., 2025).

Teachers set standards and develop rubrics using these platforms to facilitate the assessment of activities and the management of grades. It also highlights how artificial intelligence makes learning more adaptable and efficient. AI systems can modify the complexity of exercises based on student performance and offer personalized content (Cope & Ward, 2002; Ertmer et al., 2012; Salas-Pilco et al., 2022).

Transparency in grading and fairness in feedback must be ensured to avoid bias (Ertmer et al., 2012). In other words, artificial intelligence is used as an aid, but it does not replace the role of the teacher, who reads and analyzes whether the proposed activities comply with the instructions or rubrics provided. For example, the use of anti-plagiarism tools or tools to verify that tasks have not been completed with artificial intelligence such as ChatGPT allows teachers to more quickly identify dishonesty (Holmes & Porayska-Pomsta, 2023).

In school contexts and environments with scarce resources, AI has proven to be particularly beneficial. For this reason, several studies postulate that artificial intelligence (AI) plays an important role in reducing student dropout rates and promoting self-directed learning (An et al., 2024; Firat, 2023). In the Latin American context, the personalization of learning through AI faces particular challenges related to technological infrastructure, teacher training, and equity of access (An et al., 2023; Asunda et al., 2023; Chiu, 2021).

In their systematic review, Salas-Pilco et al. (2022) discuss the use of artificial intelligence in higher education in Latin America and highlight that, although institutions are still in the early stages of exploration, innovative

projects are already emerging in countries such as Colombia and Brazil. Factors such as low investment in research and development, the absence of defined institutional policies, and the digital divide limit the transformative possibilities that these technologies could offer (Alenezi et al., 2023; Celik et al., 2022; Schiff, 2022). However, despite these challenges, a survey of teachers at public universities in Manabí shows that the use of artificial intelligence to personalize learning is viewed positively.

On the other hand, Andreoli et al. (2022) indicate that when artificial intelligence is applied, the focus should not only be on improving administrative efficiency, but also on promoting equality and inclusion in access to education. While ensuring that both privacy and ethical principles in the use of technology are respected. This implies an institutional commitment to developing digital skills in both teachers and students and incorporating digital critical thinking into curricula (Salas-Pilco et al., 2022).

While universities in developed countries are advancing comprehensive projects that combine AI with active pedagogies, problems persist in Latin America, such as resistance to change on the part of academic and administrative staff and the lack of clear institutional policies on the use of AI. A comparative analysis based on a systematic review table shows that, although there is growing progress, most projects focus on specific applications. As automated assessment and academic monitoring systems, without comprehensive support that addresses ethical and educational aspects simultaneously (Andreoli et al., 2022).

The incorporation of artificial intelligence (AI) in higher education has generated a wide-ranging debate on the ethical implications it entails and the challenges it poses. Warning against the risk of the "uberization" of academic tasks, with educators becoming insecure workers, faced with automated and uniform tasks. Conversely, the monetization of advanced learning is another pertinent issue, as the collection of information through AI could be exploited for commercial endeavors (Fitzpatrick et al., 2023; Preston, 2021). From a historical perspective, Looi (2005) already highlighted the potential of artificial intelligence to automate repetitive and monotonous tasks, although at that time its application in bureaucratic management was still in its infancy.

In recent years, this evolution has accelerated considerably, as evidenced by the significant growth in the use of AI to optimize productivity and make administration more efficient in the field of education (Murugan et al., 2025). AI is transforming academic and administrative governance in higher education by automating procedures, improving decision-making, and optimizing the use of resources (Araya & Marber, 2023; Kroff et al., 2024). However, the panel is obliged to ensure openness and consider the impact of automation, which allows time to be freed up for teaching activities. Nevertheless, it is equally critical to prevent technology from undermining the learning journey.

Socially intelligent machines can improve cooperation and interaction in educational settings, which could be used for the management of study groups and collaborative enterprises (Gweon et al., 2023). The academic vision, supported by a systematic approach that incorporates artificial intelligence, will be considered as an educational aid to connect students' vital learning. Besides, through the creation of engaging material that encourages and stimulates students to actively participate and close various domains of knowledge in line with the qualified academic field (Maraza-Quispe et al., 2019).

It is currently crucial to discuss the responsibility for crimes, accidents, and illegal actions committed by AI applications or the users of these applications. In the case of accidents, technology corporations have traditionally focused on blaming humans over machines, an approach that emphasizes human responsibility even as human action is increasingly replaced by automation (Gao et al., 2023; Remegio, 2025). The European Union has made great strides in regulating AI. In March 2024, the EU Parliament passed the Artificial Intelligence Act, whose main objective is to provide protection for the development and use of AI. This law limits the use of AI for biometric identification, particularly in law enforcement, prohibits the use of AI to commit fraud or manipulation against users. At the same time, it gives users the right to file complaints about possible abuses by corporations (Ayyildiz & Yilmaz, 2023; Contreras, 2024; Kong & Yang, 2024; Nazaretsky et al., 2022; Salas-Pilco et al., 2022; Tsai et al., 2020; Vera, 2023).

MATERIALS AND METHODS

This study adopts a mixed approach with a quantitative bias, based on the need to understand, from a descriptive and analytical perspective, how university teachers are incorporating artificial intelligence (AI) into management and teaching processes within higher education. According to Hernández et al. (2023), the

mixed approach allows for the integration of numerical data with qualitative perceptions, facilitating a deeper understanding of the phenomenon. Therefore, the qualitative part comes from the study of the participants' perceptions, while the quantitative part focuses on what is shown in the survey with specific questions.

The group of people studied were 146 university professors from four different higher education institutions in the Manabí region of Ecuador. Participants were chosen in a simple and non-random manner, based on whether they wanted to be part of the study, Escuela Superior Politécnica Agrícola de Manabí (ESPAM), Universidad Estatal del Sur de Manabí (UNESUM), Universidad Laica "Eloy Alfaro" de Manabí (ULEAM) and Universidad Técnica de Manabí (UTM).

Furthermore, the sample included teachers from different fields of study, such as social sciences, education, engineering, and administration, which helped to provide a broader and more accurate scene of how artificial intelligence is viewed and used at the university.

The data collection instrument used was a questionnaire, a specific tool consisting of a set of specific questions designed to gather information from the study population. Each question offered options to select from, as well as some questions that allowed for more open-ended responses in order to obtain more valuable insights. The main theoretical constructs extracted from the conceptual framework and the specific objectives of the study served as the basis for the development of the survey.

The four main parts of the questionnaire were information about the social background of the respondents, their understanding and use of AI tools, their thoughts on the benefits and problems of using AI in teaching administration. Finally, their advice and ideas for the correct and long-term use of AI in advanced education. Before its use, specialists in higher education and new technologies confirmed the validity of the instrument's content, and the necessary modifications were made.

After collecting the responses, the data from Google Forms was converted to Microsoft Excel for statistical analysis. To eliminate inconsistent or missing responses, the data was cleaned. Next, to describe the characteristics of the faculty and their opinions on artificial intelligence, a descriptive analysis was performed using frequencies, percentages, and measures of central tendency, such as the mean and standard deviation.

To identify possible correlations between factors such as teaching experience, technical skills, and perceptions about the use of AI, a simple inferential analysis was performed. In addition, a content analysis of the open-ended responses was conducted. At classifying the categories obtained according to three main dimensions: perceived benefits, institutional challenges, and suggestions for improvement. The methodological approach adopted allowed for the triangulation of quantitative and qualitative results. In addition, it was provided an in-depth understanding of the opportunities and challenges related to the implementation of artificial intelligence in the Ecuadorian context, as well as its integration into university education management.

RESULTS

There is strong evidence that a large percentage of instructors have utilized generative AI tools, such as ChatGPT and Gemini, at some point in their academic work. This is consistent with the findings of researchers such as Kong and Yang (2024), who note that these generative AI programs are becoming more prevalent in educational and administrative settings. Likewise, Celik et al.'s (2022) results, which show that automated systems are becoming more common in higher education.

Regarding educator perceptions, the respondents believed that AI could potentially enhance the quality of education through personalization, immediate feedback, and resource access based on individual needs. This is consistent with Preston's (2021) conclusions showing that intelligent systems can make minor modifications to the content and activities provided to students based on their performance and progress. Furthermore, with Nazaretsky et al.'s (2022) conclusions regarding the use of adaptive systems to improve participation and improve overall academic performance.

From a methodological point of view, the interpretation of the results is based on a quantitative approach, following the guidelines of Hernández et al. (2023), who explain the importance of descriptive analysis for identifying trends and patterns in specific populations. The survey provided data on knowledge, use, perceptions, and barriers, and its reliability was supported by internal consistency criteria recommended by these same authors. Likewise, the structure and validation of the instrument followed the proposal by Aiken (1985), who points out that expert evaluation ensures clarity and consistency in content.

The results also reflect the existence of persistent barriers, mainly related to the lack of teacher training and the absence of institutional guidelines. Many teachers said they did not feel prepared to integrate AI into teaching processes, which coincides with the findings of Cheah et al., (2025) and Pratiwi et al. (2025), who argue that teacher digital literacy is crucial for effective adoption. In addition, participants expressed concern about students' use of these tools, especially in relation to academic dishonesty or excessive dependence, issues also mentioned by Ayyildiz and Yilmaz (2023) and Chan and Colloton (2024).

Many teachers reported that their institutions do not have policies to ensure that AI is used responsibly that there are still significant differences in the level of technological infrastructure available at their institutions. The mentioned before, lines up with what Lambert & Stevens (2023), Macías Lara et al. (2023) and Kamalov et al. (2023) found in their research on technological disparities that affect higher education institutions' integration of these tools. When looking at the results overall, there are many concerns about privacy and data management as well, which is reflected in the findings of Celik et al. (2022) regarding the potential for bias or misuse of student data.

Despite these barriers, many teachers are also seeing several opportunities from using AI, such as using predictive analytics to identify students who may be struggling academically (Chen et al., 2020; Shah, 2023). As well as, automating administrative tasks and increasing institutional efficiencies (Hernández Nodarse et al., 2025; Donmez, 2024), as well as expanding their teaching methods, providing better student support and creating 24/7 access to academic resources (Vera, 2025; Yan & Liu, 2025).

Table 1: Results of the Study on the Use of AI in Higher Education

| Category/ Variable | Condensed Results | Type of Variable |
|-----------------------------------|---|------------------------------|
| Current use of AI by teachers | Frequent use of tools such as ChatGPT, Gemini, and institutional systems for planning, activity generation, and feedback. | Qualitative/ Quantitative |
| Frequency and level of use | Moderate use predominates; few teachers report intensive use. | Quantitative (ordinal) |
| Perceived benefits | Time optimization, personalized learning, immediate feedback and administrative efficiency. | Qualitative |
| Limitations and barriers | Lack of teacher training, limited infrastructure, absence of guidelines, and resistance to change. | Qualitative |
| Training and digital competencies | Insufficient training to integrate AI pedagogically; need for continuous training. | Qualitative |
| Identified opportunities | Personalization, predictive analytics, automation, and intelligent academic support. | Qualitative |
| Risks and ethical concerns | Privacy, algorithmic bias, technological dependence, and lack of transparency. | Qualitative |
| General perception of AI | Favorable but cautious view; recognition of potential and concern about lack of regulation. | Qualitative |
| Institutional preparedness | Absence of clear policies and unequal adoption across faculties. | Qualitative |
| Identified institutional needs | Ethical policies, infrastructure, digital literacy, and human oversight. | Qualitative |
| Areas where AI is most used | Lesson planning, written activities, and administrative tasks. | Quantitative/ Qualitative |
| Willingness to continue using AI | Interest in continuing use, conditioned by guidance and institutional training. | Qualitative |

Source: Own elaboration

From another perspective, Figure 1 presents the condensed results of the quantitative diagnostic conducted based on the survey administered to teachers from four higher education institutions in the province of Manabí. Overall, the data show that artificial intelligence is being progressively incorporated into the university context, although with uneven levels of use and adoption across institutions.

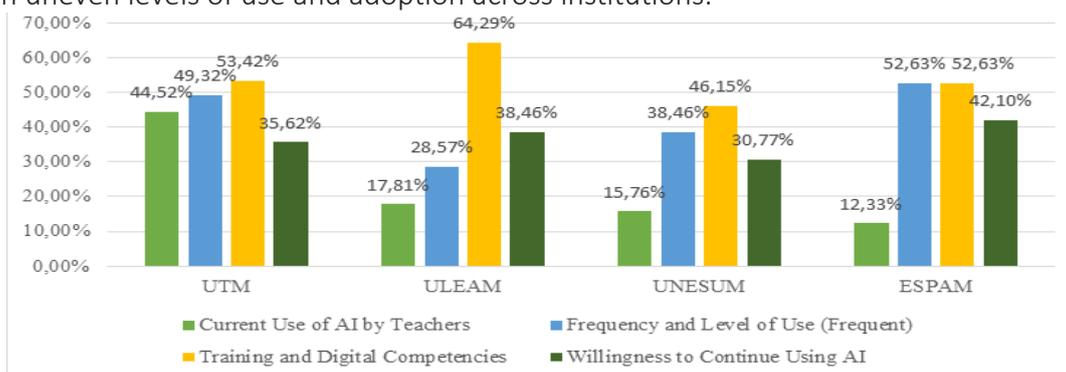


Figure 1: Quantitative results of the diagnostic on the use and perception of artificial intelligence among university teachers.

Source: Own elaboration

The current use and frequency of application of AI tools show moderate values, indicating that. Although these technologies are already part of teaching practice, their integration is not yet systematic. Regarding training and digital competencies, the results reflect heterogeneous perceptions of preparedness, suggesting the existence of training gaps that limit a more advanced use of AI. Likewise, there is a favorable disposition among teacher to continue using artificial intelligence, as well as a positive perception of its contribution to institutional efficiency and security. However, the gap between perceived preparedness and the actual use of AI highlights the need to strengthen teacher training.

As indicated by research, artificial intelligence is currently essential to facilitate the current modernization of higher education. The implementation of AI in educational environments should be viewed as an ongoing process that requires substantial preparation in the form of continual development through necessary infrastructure development, extensive training of professors (faculty staff) and careful planning. As indicated by the research conducted by Celik et al., (2022), university systems that combine the use of AI and a human-centric use of AI create greater institutional efficiencies without compromising the ethical values of those institutions. Presently, AI in Ecuador is in its infancy; however, it will dramatically change computerized assessment approaches, academic administration processes and academic communication between institutions and faculty, lecturers and teachers in the near future.

This research study has shown that the population studied - university professors in Ecuador - perceive a mainly positive impact of AI on higher education. The primary areas of interest to the professors surveyed were: (1) personalized learning for each student or group of students; (2) optimizing educational process (administrative) work flow; and (3) improving teaching quality. These results support the findings of Fitzpatrick et al. (2023) indicating that AI personalization will improve learning efficacy for students by providing the opportunity for each student to learn at his/her own pace and style. As also reported by Kong and Yang (2024), there are indications from the research presented in this study that teachers support the use of artificial intelligence (AI) to help them tailor lessons and provide immediate feedback on student learning.

While there need to be a comprehensive review of the policies, processes/management of academic and non-academic (administrative) staff and curriculum "delivery and assessment" at the tertiary level when implementing Artificial Intelligence (AI), Gairín and Alguacil (2024) have stated that the addition of such technology changes the role of all academic and non-academic staff and adds new skill requirements for staff using such technologies. Also, there need to be established parameters under which technology such as ChatGPT and Gemini can be used from the perspective of data protection, ethics, and intellectual property. All these consequences should be considered in-depth to avoid over-reliance on technology and provide equality when using AI tools.

Notwithstanding the frequency of using AI tools like ChatGPT and auto-assessment, the current training of teachers to maximize this use of AI technology has been identified in previous research (Cheah et al., 2025; Litardo et al., 2023) as inadequate. Urgent attention is needed to improve teacher training programs related to the digital and ethically responsible use of AI (Al-Zahrani, 2024; López-Vasco et al., 2025). There are obstacles to the effectiveness of AI in the classroom driven by a lack of organized teacher training, under-investment in technology infrastructure, and the resistance to change from educational institutions (Chiu, 2021). Institutions must have ethics committees in place, along with procedures for transparency, to address the ethical concerns caused by the use of personal data and the continuing presence of bias in algorithms used to implement AI in education.

The findings from this research are consistent with the previously raised warnings related to issues of data privacy, algorithmic bias, and transparency of AI systems (Díaz, 2025; Murugan et al., 2025; Polat et al., 2025). Teachers acknowledge the ability of AI to predict and prevent student dropout but are concerned about the reliability of such systems and echo the call made internationally for countries to develop robust ethical frameworks to guide the use of emerging technologies in education (Clark et al., 2025; UNESCO, 2025).

According to research, between 10%-20% of an organization's total investment (specifically investment in Information Technology) must be allocated for long-term implementation of Artificial Intelligence (AI) (Macías Loor et al., 2025). The ability of systems to maintain their longstanding operations and enhance their capacity to advance will rely heavily on this funding. The adoption of AI-based digital technologies by universities will significantly accelerate administration modernization and provide measurable improvements to user satisfaction, operational efficiencies, and resource utilization. These results demonstrate an important role for AI within the transformation and reconfiguration of higher education institutions to meet the demands of the 21st century (Macías Loor et al., 2025).

Evidence illustrates how the ongoing evolution of university management as a result of Automation Technologies, provides progressively larger margins of efficiency for institutions without taking away from the overall educational experience for students (Macias Loor et al., 2025; Sanabria-Medina & Regil-Vargas, 2024). However, some faculty perceive the current automation tools as ineffective or inaccurate for measuring complex skills, indicating a need for continued development of advanced customizable algorithms incorporating both qualitative and ethical standards (Gao et al., 2023; Ouyang et al., 2022).

There are an incredible number of options available when it comes to artificial intelligence (AI). This can include things like creating personalized learning programs, automating boring tasks, and predicting how students will perform (Dai et al., 2022). Data analysis and automated tutoring programs also help to increase the efficiency of the allocation of resources and student retention. Because of these many benefits, AI is a key partner in improving the quality and sustainability of higher education in Ecuador.

The potential for AI to be used in the management of higher educational institutions is also a major opportunity for improving administrative and academic processes, decreasing the workload of administrative staff, and improving overall educational results at higher education institutions. Sanabria-Medina and Regil-Vargas' (2024) research has revealed that automating functions that are repetitive, such as grading, enrollment management, and academic planning allow institutions to react more rapidly and accurately to the needs of education. These systems will increase efficiency (as a result of decreasing overhead expense) while allowing for data-driven administration, where decisions made by leaders will be based on predictive analytics rather than assumptions, allowing leaders to identify areas that need the most improvement and therefore appropriately allocate administrative resources (Cruz Alves, et al., 2020).

AI facilitates personalized and adaptable learning methods, developed based on the particularity of every learner. Adaptive Learning Systems with an AI feature are capable of changing both the content and the activities in the circumstance and providing immediate feedback to the learner; these systems therefore help to make the teach-learn process more effective and efficient (Tapalova & Zhiyenbayeva, 2022). Based on their research, Wang et al. (2023) also found that adaptive learning models enhance student motivation by providing the students with exciting ways to participate; they also assist educators in identifying students who may be struggling early in the semester.

In addition to the advantages mentioned above, another benefit is the ability of AI systems to automate and perfect assessments. The ability for education to automate grading (especially objective assessments) is one of the most developed examples of using AI technology; therefore, this has helped educators to use less time performing administrative tasks and more time on high-value teaching-learning activities. However, reliability in assessing subjective assessments such as critical thinking or creativity still is a challenge for the academic community as a whole.

DISCUSSION

Research conducted by Ouyang et al. (2022) has demonstrated that although AI technology can accurately process quantitative data, there remains a large degree of uncertainty surrounding AI's ability to evaluate other, more complex criteria (qualitative). Further, due to this uncertainty, it highlights the need for effective regulations surrounding both the ethics of AI systems and the methodologies used when developing and implementing these systems.

The application of AI in the workplace presents many ethical challenges, particularly in relation to the security and privacy of personal data as well as transparency in decision-making processes of AI algorithms. Protecting student data must be a top priority, and to ensure appropriate protections for student data there needs to be strict rules and regulations in place that provide students with necessary information about AI systems used in education and also give them control over the use of their personal data (Schiff, 2022). It is also necessary to ensure that algorithmic decision-making is presented in a manner that is transparent; this will help to maintain the level of trust that teachers, students, and parents have with AI systems by confirming that decisions made by these systems are both comprehensible and defensible (Clark et al., 2025).

Overall, although teachers' perceptions of the effect of AI on the quality of teaching and school administration are generally positive, the results reflect persistent concerns about ethical consequences, such as data privacy control or algorithmic biases, and convey a critical tone toward overly optimistic views of

educational automation, which can be found in part of the literature, as it shows that the assumption of AI does not necessarily imply accepting views that advocate the implementation of approaches that integrate the ethical dimension as a component that permeates any process of technological adoption and recognizes the contextual and mediated nature of educational innovation.

Table 2: Systematic comparison with the literature.

| Study | Context | AI adoption Teachers | Comparison with Manabí (15-44% use, 57-73% efficiency) |
|--------------------------------|------------------------------|--|--|
| Celik et al. (2022) | Global (systematic review) | Fragmented: lack of confidence/ training | Matches: 46-64% basic skills vs. moderate use |
| Nazaretsky et al. (2022) | Europe (experimental) | Confidence >70% post-ethics training | Superior: Manabí 89% ESPAMMFL preparation without systematic support |
| Pratiwi et al. (2025) | Indonesia (Global South) | Dependence without ongoing training | Similar: Conditional use of training, cautious perception |
| Albuja and Guadalupe (2022) | Ecuador (top universities) | Initial: exploratory | Further progress: Manabí 44% UTM vs initial stages despite limited resources |
| Macías Lara et al. (2023) | Ecuador (infrastructure) | Connectivity/policy gaps | Coincides: Heterogeneity UTM 44% vs. ULEAM 18% |
| Chan and Colloton (2024) | Global (ChatGPT) | Transformational >60% production | Contrast: Manabí specific (planning) vs. drastic |
| Donmez (2024) | Asia (AI feedback) | Systematic >80% optimization | Lower: Manabí 64-76% administrative but instrumental |
| Kamalov et al. (2023) | Middle East | Infrastructure limits adoption | Similar: Administrative opportunities despite gaps |
| Albuja (2022) | Ecuador (AI transformation) | Emerging policies | Agrees: Lack of institutional guidelines (Table 16.2) |
| Acevedo Carrillo et al. (2026) | Latin America | Uneven: 20-50% adoption | Within range: Manabí reflects regional heterogeneity |
| Acosta and Finol (2024) | Ecuador (university) | Administrative potential 60-75% | Equal: 64-76% Manabí perceives administrative efficiency |
| Guamán Chávez (2025) | Ecuador (academic integrity) | Ethical concerns 65% | Agrees: Privacy/recurring biases (Table 16.2) |
| Jiménez-Ramírez et al. (2024) | Spain (usage guidelines) | Guided: 55-70% institutional | Potential: Manabí needs similar policies to systematize |
| Icaza Ronquillo et al. (2024) | Global (learning) | >65% advanced personalization | Limited: Manabí instrumental, not adaptive |
| De Obesso et al. (2023) | Latin America | Key teacher training (52%) | Central: Gap of 53-64% between skills and use |
| Bonilla Valarezo et al. (2025) | Ecuador (higher education) | Moderate: 30-45% frequency | Similar: 28-52% Manabí confirms national trend |

Source: Own elaboration

Finally, implementing AI effectively in education will require an investment of resources in the training of both teachers and administrative staff for the successful use of AI-based technologies. As indicated in the research of Al-Zahrani and Alasmari (2024), this training will help ensure that stakeholders possess the advanced skills and ethical knowledge necessary for the responsible use of AI technologies consistent with the values of their educational institutions.

Educational and professional growth through continued education are important components of using AI responsibly from an ethical/societal perspective in education.

In the same way, all actors involved in education (private business, public institutions, and all of education) must work together to develop policies, regulations that are tailored to social realities, and implementation strategies that take into account the realities of the context. Robust regulatory frameworks and ethical governance (as suggested by UNESCO and the OECD) should be a priority for all countries around the world at the local, national, and international level to ensure that AI can be used equitably, safely, for the betterment of society (UNESCO, 2021; Valencia & Figueroa, 2023).

In conclusion, this research supports the need to integrate AI into higher education, as it clearly reflects how global trends influence education itself, which must incorporate more technology, becoming more academically-driven, and become more adaptable (Chan & Colloton, 2024; Nivela Cornejo & Segundo Vicente, 2024). However, combining AI into higher education must occur with a clear regulatory framework that

defines how to utilize AI in a manner that supports equity, inclusivity, and recognizes diversity, as per the recommendations provided by Valencia and Figueroa (2023), Gallent-Torres et al. (2023).

CONCLUSIONS

According to research, Ecuadorian higher education is undergoing a revolution thanks to artificial intelligence. Teachers like its ability to make data-driven decisions, optimize administrative management, and personalize teaching. However, its large-scale adoption is hampered by structural and training limitations.

Artificial intelligence represents a key opportunity for innovation and modernization in Ecuadorian higher education, as demonstrated by the growing use and acceptance of technological tools by teachers. However, the results of this study suggest that its implementation requires teacher training, appropriate investment in infrastructure, and the creation of institutional policies that ensure transparent, ethical, and accessible use. Teaching and administrative staff identify specific benefits in personalizing education, reducing administrative burdens, and optimizing teaching; however, they also identify significant challenges related to trust, preparedness, and ethical issues. These ambivalences indicate that the application of artificial intelligence must be a gradual and planned process, in which technology complements the human pedagogical function without replacing it.

A limitation of this research is that it only examines higher education facilities in Manabí, which might influence how well the conclusions can be applied to all universities. Future research will build on this understanding by comparing AI's effects on academic achievement and administrative efficacy among other postsecondary institutions across the nation and over time. In conclusion, artificial intelligence has the potential to be an essential catalyst for digital transformation in higher education. It is provided that it is combined with an ethical, human, and strategic perspective that balances technological innovation with social inclusion and academic quality.

BIBLIOGRAPHIC REFERENCES

Aiken, L. R. (1985). Three coefficients for analyzing the reliability and validity of ratings. *Educational and Psychological Measurement*, 45(1), 131–142. <https://doi.org/10.1177/0013164485451012>

Al Kalach, N. (2025). AI-Driven Customer Relationship Management: Enhancing Salesforce Efficiency Through Predictive Analytics. *International Journal of Advance Industrial Engineering*, 13(01), 22-35. E-ISSN 2320-5539. <https://ijaie.com/index.php/ijaie/article/view/103/92>

Alastor, E. y Martínez-García, I. (2025). Competencias Digitales e Inteligencia Artificial en el Prácticum: un marco conceptual para la formación de agentes educativos. *Revista Prácticum*, 10(1), 66-84. <https://doi.org/10.24310/rep.10.1.2025.21780>

Albuja, B. y Guadalupe, J. (2022). Áreas de estudio y aplicación de inteligencia artificial en las universidades mejor puntuadas del Ecuador. *Revista Científica y Tecnológica UPSE*, 9(2), 58–74. <https://doi.org/10.26423/rctu.v9i2.705>

Alenezi, M., Wardat, S., & Akour, M. (2023). The Need of Integrating Digital Education in Higher Education: Challenges and Opportunities. *Sustainability*, 15(6), 4782. <https://doi.org/10.3390/su15064782>

Allouch, M., Azaria, A., & Azoulay, R. (2021). Conversational Agents: Goals, Technologies, Vision and Challenges. *Sensors*, 21(24), 8448. <https://doi.org/10.3390/s21248448>

Al-Zahrani, A.M., & Alasmari, T.M. (2024). Exploring the impact of artificial intelligence on higher education: The dynamics of ethical, social, and educational implications. *Humanit Soc SciCommun* 11, 912. <https://doi.org/10.1057/s41599-024-03432-4>

An, Q., Yang, J., Xu, X., Zhang, Y., & Zhang, H. (2024). Decoding AI Ethics from a User's Lens in Education: A Systematic Review. *Heliyon*, 10(20), e39357. <https://doi.org/10.1016/j.heliyon.2024.e39357>

An, X., Chai, C., Li, Y., Zhou, Y., Shen X., Zheng, C., & Chen, M. (2023). Modeling English teachers' behavioral intention to use artificial intelligence in middle schools. *Educ Inf Technol* 28, 5187–5208. <https://doi.org/10.1007/s10639-022-11286-z>

Andreoli, S., Batista, A., Fuksman, B., Gladkoff, L., Martínez, K., y Perillo, L. (2022). Inteligencia artificial y educación. Un marco para el análisis y la creación de experiencias en el nivel superior. <https://doi.org/10.13140/RG.2.2.12073.20326>

Araya, D., & Marber, P. (Eds.). (2023). *Augmented Education in the Global Age: Artificial Intelligence and the Future of Learning and Work* (1st ed.). Routledge. <https://doi.org/10.4324/9781003230762>

- Arroyo Estupiñan, S., Gómez Rodríguez, C. E., Pinales Castillo, M. del C., & Moreira Palacios, D. F. (2025). Fomento del pensamiento crítico en la Educación Superior a través de enfoques metodológicos innovadores con inteligencia artificial. *Revista Científica De Innovación Educativa Y Sociedad Actual "ALCON"*, 5(3), 287–295. <https://doi.org/10.62305/alcon.v5i3.593>
- Asunda, P., Faezipour, M., Tolemy, J., & Engel, M. (2023). Embracing Computational Thinking as an Impetus for Artificial Intelligence in Integrated STEM Disciplines through Engineering and Technology Education. *Journal of Technology Education*, 34(2), 43–63. <https://doi.org/10.21061/jte.v34i2.a.3>
- Ayyildiz, P., & Yilmaz, A. (2023). A New Chapter is Being Written About Writing Instruction: Instructional Leadership at K-12 Levels in The Age of Artificial Intelligence (AI). *Educational Policy Analysis and Strategic Research*, 18(4), 82–101. <https://doi.org/10.29329/epasr.2023.631.4>
- Bordovskaia, N., Darinskaya, L., & Zhebrovskaia, O. (2016). Didactic tools' of selection in the use of active and interactive training methods. *Procedia- Social and Behavioral Sciences*, 217, 26–33. <https://doi.org/10.1016/j.sbspro.2016.02.009>
- Campoverde Cajas, E. A., & Campoverde Castro, M. del P. (2025). Desafíos y Oportunidades de la Inteligencia Artificial en la Educación Superior Ecuatoriana. *Ciencia Latina Revista Científica Multidisciplinar*, 9(3), 2684–2704. https://doi.org/10.37811/cl_rcm.v9i3.17896
- Celik, I., Dindar, M., Muukkonen, H., & Järvelä, S. (2022). The Promises and Challenges of Artificial Intelligence for Teachers: a Systematic Review of Research. *TechTrends* 66, 616–630. <https://doi.org/10.1007/s11528-022-00715-y>
- Chan, C. K. Y., & Colloton, T. (2024). *Generative AI in Higher Education: The ChatGPT Effect*. Routledge. <https://doi.org/10.4324/9781003459026>
- Cheah, Y. H., Lu, J., & Kim, J. (2025). Integrating generative artificial intelligence in K-12 education: Examining teachers' preparedness, practices, and barriers. *Computers and Education Artificial Intelligence*, 100363. <https://doi.org/10.1016/j.caeai.2025.100363>
- Chen, L., Chen, P., y Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access*, 8, 75264–75278. <https://doi.org/10.1109/ACCESS.2020.2988510>
- Chicaiza, R. M., Camacho Castillo, L. A., Ghose, G., Castro Magayanes, I. E., & Gallo Fonseca, V. T. (2023). Aplicaciones de Chat GPT como inteligencia artificial para el aprendizaje de idioma inglés: avances, desafíos y perspectivas futuras. *LATAM Revista Latinoamericana De Ciencias Sociales Y Humanidades*, 4(2), 2610–2628. <https://doi.org/10.56712/latam.v4i2.781>
- Chiu, T.K.F. A Holistic Approach to the Design of Artificial Intelligence (AI) Education for K-12 Schools. *TechTrends* 65, 796–807 (2021). <https://doi.org/10.1007/s11528-021-00637-1>
- Cisneros Zumba, N. B., Valladares Cisneros, M. G., Venegas Quintana, O., & Chala Jaramillo, F. J. (2025). Uso de inteligencia artificial en la gestión académica y administrativa para el fortalecimiento institucional en la educación superior: evolución e innovación digital. *Revista Social Fronteriza*, 5(2), e–691. [https://doi.org/10.59814/resofro.2025.5\(2\)691](https://doi.org/10.59814/resofro.2025.5(2)691)
- Clark, J., Barton, B., Albarqouni, L., Byambasuren, O., Jowsey, T., Keogh, J., Liang, T., Moro, C., O'Neill, H., & Jones, M. (2025). Generative artificial intelligence use in evidence synthesis: A systematic review. *Research Synthesis Methods*, 16(4), 601–619. <https://doi.org/10.1017/rsm.2025.16>
- Contreras, P. (2024). Convergencia internacional y caminos propios: regulación de la inteligencia artificial en américa latina. *Actualidad Jurídica Iberoamericana* (21), 148–493. ISSN: 2386-4567. https://revista-aji.com/wp-content/uploads/2024/07/AJI21_Art17.pdf
- Cope, Ch., & Ward., P. (2002). Integrating learning technology into classrooms: The importance of teachers' perceptions. *Journal of Educational Technology & Society*, 5(1), 67–74. <http://www.jstor.org/stable/jeductechsoci.5.1.67>
- Cordón García, O. (2023). Inteligencia Artificial en Educación Superior: Oportunidades y Riesgos. *RiiTE Revista interuniversitaria de investigación en Tecnología Educativa*, (15), 16–27. <https://doi.org/10.6018/riite.591581>
- Cruz Alves, N., Von Wangenheim, C.G., Hauck, J.C., & Borgatto, A. (2020). A Large-scale Evaluation of a Rubric for the Automatic Assessment of Algorithms and Programming Concepts. In *Proceedings of the 51st ACM Technical Symposium on Computer Science Education (SIGCSE '20)*. Association for Computing Machinery, New York, NY, USA, 556–562. <https://doi.org/10.1145/3328778.3366840>
- Dai, Y., Liu, A., Qin, J., Guo, Y., Jong, MS., Chai, C. y Lin, Z. (2022). Collaborative construction of artificial intelligence curriculum in primary schools. *Journal of Engineering Education*, 112 (1), 23–42. <https://doi.org/10.1002/jee.20503>
- Díaz, A. A. (2025). Inteligencia artificial y evaluación en contextos universitarios: una revisión de los últimos avances. *Educación y Futuro: Revista de Investigación Aplicada y Experiencias Educativas*, (52), 67–83. <https://doi.org/10.5281/zenodo.15174010>
- Dilek, M., Baran, E., & Aleman, E. (2025). AI Literacy in Teacher Education: Empowering Educators Through Critical Co-

Discovery. *Journal of Teacher Education*, 76(3), 294-311. <https://doi.org/10.1177/00224871251325083>

Donmez, M. (2024). AI-based feedback tools in education: A comprehensive bibliometric analysis study. *International Journal of Assessment Tools in Education*, 11(4), 622–646. <https://doi.org/10.21449/ijate.1467476>

Du Plooy, E., Casteleijn, D., & Franzsen, D. (2024). Personalized adaptive learning in higher education: A scoping review of key characteristics and impact on academic performance and engagement. *Heliyon*, 10(21), e39630. <https://doi.org/10.1016/j.heliyon.2024.e39630>

Edmett, A., Ichaporia, N., Crompton, H., y Crichton, R. (2024). *Artificial intelligence and English language teaching: Preparing for the future* (Second edition). British Council. <https://doi.org/10.57884/78EA-3C69>

Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *ETR&D* 47, 47–61. <https://doi.org/10.1007/BF02299597>

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education*, 59(2), 423–435. <https://doi.org/10.1016/j.compedu.2012.02.001>

Firat, M. (2023). Integrating AI Applications into Learning Management Systems to Enhance e-Learning. *Instructional Technology and Lifelong Learning*, 4 (1), 1-14. <https://doi.org/10.52911/itall.1244453>

Fitzpatrick, D., Fox, A. & Weinstein, B. (2023). *The AI Classroom: The Ultimate Guide to Artificial Intelligence in Education*. TeacherGoals Publishing. ISBN: 978-1-959419-11-2

Gairín, J., y Alguacil, L. (2024). La gestión de la inteligencia artificial en los contextos universitarios Iberoamericanos. EDO-Serveis- Universitat Autònoma de Barcelona. https://ddd.uab.cat/pub/lilibres/2024/300143/Serie_Testimonios_IA_DEF_21_.pdf

Gallent-Torres, C., Zapata-González, A., & Ortego-Hernando, J. L. (2023). El impacto de la inteligencia artificial generativa en educación superior: una mirada desde la ética y la integridad académica. *RELIEVE. Revista Electrónica de Investigación y Evaluación Educativa*, 29(2), 1-21. <https://doi.org/10.30827/relieve.v29i2.29134>

Gao, W., Wei, J., Li, Y., Wang, D., & Fang, L. (2023). Motivations for social network site use and users' well-being: mediation of perceived social support, positive self-presentation and honest self-presentation. *Aslib Journal of Information Management*, 75(1), 171–191. <https://doi.org/10.1108/AJIM-08-2021-0224>

García Villarroel, J. J. (2021). Implicancia de la inteligencia artificial en las aulas virtuales para la educación superior. *Orbis Tertius - UPAL*, 5(10), 31–52. ISSN: 2709-8001. file:///C:/Users/DELL/Downloads/IMPLICANCIA_DE_LA_INTELIGENCIA_ARTIFICIAL_EN_LAS_A.pdf

Ge, Z., & Hu, Y. (2020). Innovative Application of Artificial Intelligence (AI) in the Management of Higher Education and Teaching. *Journal of Intelligent y Fuzzy Systems*, 38(3), 1–10. https://ui.adsabs.harvard.edu/link_gateway/2020JPhCS1533c2089G/doi:10.1088/1742-6596/1533/3/032089

Gweon, H., Fan, J., & Kim, B. (2023). Socially intelligent machines that learn from humans and help humans learn. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 381(2251). <https://doi.org/10.1098/rsta.2022.0048>

Hernández Nodarse, M., Fonseca Torres, W., Ponce de León, D., Villarroel Henríquez, V., & López, A. R. (2025). Ethics, generative artificial intelligence, and educational assessment: An analysis of university students' perceptions. *Salud, Ciencia Y Tecnología*, 5, 2359. <https://doi.org/10.56294/saludcyt20252359>

Hernández, R., Fernández, C., y Baptista, P. (2023). *Metodología de la Investigación* (7ma ed.). McGraw-Hill.

Holmes, W., & Porayska-Pomsta, K. (2023). The ethics of artificial intelligence in education. Practices, challenges, and debates. Routledge. <https://hrcak.srce.hr/en/file/439501>

Infante, A. (2023). Percepción de los docents sobre la inteligencia artificial en la educación superior. *Scripta Mundi*, 2(1), 45–56. <https://doi.org/10.53591/scmu.v2i1.59>

Kamalov, F., Calonge, D. S., & Gurrib, I. (2023). New Era of Artificial Intelligence in Education: Towards a Sustainable Multifaceted Revolution. *Sustainability*, 15(16). 12451. <https://arxiv.org/abs/2305.18303>

Kong, S.-C. & Yang, Y. (2024). A Human-Centered Learning and Teaching Framework Using Generative Artificial Intelligence for Self-Regulated Learning Development Through Domain Knowledge Learning in K–12 Settings. *IEEE Transactions on Learning Technologies*, 17, 1562-1573. <https://doi.org/10.1109/TLT.2024.3392830>

Kroff, F. J., Coria, D. F., & Ferrada, C. A. (2024). Inteligencia Artificial en la educación universitaria: Innovaciones, desafíos y oportunidades. *Revista Espacios*, 45(5), 120-135. DOI: <https://www.revistaespacios.com/a24v45n05/24450509.html>

Lambert, J., & Stevens, M. (2023). ChatGPT and Generative AI Technology: A Mixed Bag of Concerns and New

Opportunities. *Computers in the Schools*, 41(4), 559–583. <https://doi.org/10.1080/07380569.2023.2256710>

Lazar K., Veljko, A. y Majrija, K. (2022). Artificial intelligence in education: A review. *Technics and Informatics in Education – TIE 2022*, (223-228). DOI: 10.46793/TIE22.223K.

Li, L., & Tsai, C. (2017). Accessing online learning material: Quantitative behavior patterns and their effects on motivation and learning performance. *Computers & Education*, 114, 286–297. <https://doi.org/10.1016/j.compedu.2017.07.007>

Litardo, J. T., Wong, C. R., Ruiz, S. M., & Benites, K. P. (2023). Retos y oportunidades docente en la implementación de la inteligencia artificial en la educación superior ecuatoriana. *South Florida Journal of Development*, 4(2), 867–889. <https://doi.org/10.46932/sfjdv4n2-020>

Liu, S. (2010). Factors related to pedagogical beliefs of teachers and technology integration. *Computers & Education*, 56(4), 1012–1022. <https://doi.org/10.1016/j.compedu.2010.12.001>

Looi, CK (Ed.). (2005). *Inteligencia artificial en la educación: apoyo al aprendizaje mediante tecnología inteligente y socialmente informada* (Vol. 125). los Press.

López-Vasco, F. E., Angulo-Álvarez, M. R., y Sosa-Zúñiga, D. I. (2025). Formación Docente en IA Generativa: Impacto Ético y Retos en Educación Superior. *Alteridad*, 20(2), 166-177. <https://doi.org/10.17163/alt.v20n2.2025.01>

Macías Lara, R. A., Solorzano Criollo, L. R., Choez Calderón, C. J., y Blandón Matamba, B. E. (2023). La inteligencia artificial; análisis del presente y futuro en la educación superior. *Revista Científica Multidisciplinar G-Nerando*, 4(1). <https://revista.gnerando.org/revista/index.php/RCMG/article/view/98>

Macías Loor, M. Á., Macías Loor, M. A., Medranda Medranda, J. A., Macías Navarrete, M. L., y Valencia Cedeño, S. J. (2025). La inteligencia artificial y su aplicación en la gestión de la educación superior. En S. Sánchez Lavanda (Ed.), *Innovación y retos en la educación superior: La integración de la tecnología y la gerencia estratégica* (pp. 115–138). Editorial Grupo Compás. <https://isbnecuador.com/catalogo.php?mode=detalle&nt=106653>

Maraza-Quispe, B., Oviedo, O., Cisneros-Chávez, B., Cuentas-Toledo, M., Cuadros-Paz, L., Fernandez- Gambarini, W., Quispe-Flores, L., y Cayturo-Silva, N. (2019). Model to Personalize the Teaching-Learning Process in Virtual Environments Using Case-Based Reasoning. *ACM International Conference Proceeding Series*, 105–110. <https://doi.org/10.1145/3369255.3369264>

Mariani, M., Hashemi, N., & Wirtz, J. (2023). Artificial intelligence empowered conversational agents: A systematic literature review and research agenda. *Journal of Business Research*, 161, 113838. <https://doi.org/10.1016/j.jbusres.2023.113838>

Markauskaite, L., Marrone, R., Poquet, O., Knight, S., Martínez-Maldonado, R., Howard, S., Tondeur, J., De Laat, M., Shum, S. B., Gašević, D., & Siemens, G. (2022). Rethinking the entwinement between artificial intelligence and human learning: What capabilities do learners need for a world with AI? *Computers and Education Artificial Intelligence*, 3, 100056. <https://doi.org/10.1016/j.caeai.2022.100056>

Medina Romero, M. (2024). Aplicaciones de la Inteligencia Artificial para la investigación y la innovación en la educación superior. *Revista Social Fronteriza*, 4(4), e44336. [https://doi.org/10.59814/resofro.2024.4\(4\)336](https://doi.org/10.59814/resofro.2024.4(4)336)

Mekni, M. (2021) An Artificial Intelligence Based Virtual Assistant Using Conversational Agents. *Journal of Software Engineering and Applications*, 14, 455-473. <https://doi.org/10.4236/jsea.2021.149027>

Murugan, T., Periasamy, K., & Abirami, A.M. (Eds.). (2025). *Adopting Artificial Intelligence Tools in Higher Education: Teaching and Learning* (1st ed.). CRC Press. <https://doi.org/10.1201/9781003469315>

Naranjo Ríos, A. G., Jácome López, A. R., y Quezada Contreras, D. F. (2025). Uso de Chatbots en la enseñanza de Educación Superior ecuatoriana: una revisión sistemática de los modelos de estudios. *ASCE*, 4(3), 2431–2453. <https://doi.org/10.70577/ASCE/2431.2453/2025>

Nazaretsky, T., Ariely, M., Cukurova, M. & Alexandron, G. (2022). Teachers' trust in AI-powered educational technology and a professional development program to improve it. *British Journal of Educational Technology*, 53(4), 914-931. <https://doi.org/10.1111/bjet.13232>

Nivela Cornejo, M. A., & Segundo Vicente, E. D. (2024). Inteligencia Artificial en la Educación Superior: Innovación, Desafíos y Perspectivas para el Futuro. *Código Científico Revista De Investigación*, 5(2), 1242–1266. <https://www.revistacodigocientifico.itslosandes.net/index.php/1/article/view/625/1379>

Ocaña-Fernández, Y., Valenzuela-Fernández, L. A., y Garro-Aburto, L. L. (2019). Inteligencia artificial y sus implicaciones en la educación superior. *Propósitos Y Representaciones*, 7(2), 536–568. <https://doi.org/10.20511/pyr2019.v7n2.274>

Ouyang, F., Jiao, P., McLaren, B.M., & Alavi, A.H. (Eds.). (2022). *Artificial Intelligence in STEM Education: The Paradigmatic Shifts in Research, Education, and Technology* (1st ed.). CRC Press. <https://doi.org/10.1201/9781003181187>

- Paiva, J. C., Leal, J. P., & Figueira, Á. (2022). Automated assessment in computer science education: A state-of-the-art review. *ACM Transactions on Computing Education (TOCE)*, 22(3), 1-40. <https://doi.org/10.1145/3513140>
- Pajares, M. F. (1992). Teachers' Beliefs and Educational Research: Cleaning Up a Messy Construct. *Review of Educational Research*, 62(3), 307-332. <https://doi.org/10.3102/00346543062003307> (Original work published 1992)
- Parra-Sánchez, J. S. (2022). Potencialidades de la Inteligencia Artificial en Educación Superior: Un Enfoque desde la Personalización. *Revista Docentes 2.0*, 14(1), 19–27. <https://doi.org/10.37843/rted.v14i1.296>
- Pham, S. T., & Sampson, P. M. (2022). The development of artificial intelligence in education: A review in context. *Journal of Computer Assisted Learning*, 38(5), 1408-1421. <https://doi.org/10.1111/jcal.12687>
- Polat, M., Karataş, İ. H., & Varol, N. (2025). Ethical Artificial Intelligence (AI) in Educational Leadership: Literature Review and Bibliometric Analysis. *Leadership and Policy in Schools*, 24(1), 46–76. <https://doi.org/10.1080/15700763.2024.2412204>
- Popenici, S.A.D., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *RPTTEL* 12, 22. <https://doi.org/10.1186/s41039-017-0062-8>
- Pratiwi, H., Riwanda, A., Hasruddin, H., Sujarwo, S., & Syamsudin, A. (2025). Transforming learning or creating dependency? Teachers' perspectives and barriers to AI integration in education. *Journal of Pedagogical Research*, 9(2), 127-142. <https://doi.org/10.33902/JPR.202531677>
- Preston, J. (2021). Artificial intelligence in the capitalist university: Academic labour, commodification, and value (p. 182). Taylor & Francis. DOI <https://doi.org/10.4324/9781003081654>
- Putwain, D. W., Nicholson, L. J., Nakhla, G., Reece, M., Porter, B., & Liversidge, A. (2015). Fear appeals prior to a high-stakes examination can have a positive or negative impact on engagement depending on how the message is appraised. *Contemporary Educational Psychology*, 44–45, 21–31. <https://doi.org/10.1016/j.cedpsych.2015.12.001>
- Raghuvanshi, A. (2025). AI and predictive analytics in higher education: A salesforce approach. *World Journal of Advanced Research and Reviews*, 26(02), 3047-3053. <https://doi.org/10.30574/wjarr.2025.26.2.1958>
- Ratan, R., Ucha, C., Lei, Y., Lim, C., Triwibowo, W., Yelon, S., Sheahan, A., Lamb, B., Deni, B., & Chen, V. H. H. (2022). How do social presence and active learning in synchronous and asynchronous online classes relate to students' perceived course gains? *Computers & Education*, 191, 104621. <https://doi.org/10.1016/j.compedu.2022.104621>
- Rehman, N. A. (2024). Empowering Education with AI: The Rise of Chatbots in Educational Institutions. *IEEE*. <https://doi.org/10.1109/ICCD464887.2024.10867399>
- Remegio, A.N. (2025). Predictive Analytics in Higher Education: A Systematic Literature Review of Machine Learning Models for Forecasting Academic Performance and Ethical Integration. 2025 14th International Conference on Educational and Information Technology (ICEIT), 213-218. <https://ieeexplore.ieee.org/document/10976097>
- Salas-Pilco, S. Z., Yang, Y., & Zhang, Z. (2022). Student Engagement in Online Learning in Latin American Higher Education during the COVID-19 Pandemic: A Systematic Review. *British Journal of Educational Technology*, 53(3), 593-619.
- Sanabria Medina, G. y Regil-Vargas, L. (2024). Inteligencia artificial para la recomendación de recursos en educación en línea. *Apertura*, 16(2), 6-21. <http://doi.org/10.32870/Ap.v16n2.2542>
- Schiff, D. (2022). Education for AI, not AI for Education: The Role of Education and Ethics in National AI Policy Strategies. *International Journal of Artificial Intelligence in Education*, 32(1), 527–563. <https://link.springer.com/article/10.1007/s40593-021-00270-2>
- Shah, P. (2023). *AI and the Future of Education: Teaching in the Age of Artificial Intelligence*. John Wiley & Sons. ISBN 9781394219261
- Silva Puitiza, R. (2024). Influencia de la infraestructura educativa en el rendimiento académico de los estudiantes del Instituto Superior Tecnológico Bolívar, La Libertad, 2024. Universidad César Vallejo. https://repositorio.ucv.edu.pe/bitstream/handle/20.500.12692/150895/Silva_PRL-SD.pdf?isAllowed=ysequence=1
- Tapalova, E., y Zhiyenbayeva, A. (2022). AI-driven personalization in higher education: A review. *International Journal of Educational Technology in Higher Education*, 19(1), 1–20. <https://files.eric.ed.gov/fulltext/EJ1373006.pdf>
- Tsai, SC., Chen, CH., Shiao, YT., Ciou, JS., Wu, TN. (2020). Precision education with statistical learning and deep learning: a case study in Taiwan. *Int J Educ Technol High Educ*, 17, (12). <https://doi.org/10.1186/s41239-020-00186-2>
- Umoke, C. C., Nwangbo, S. O., & Onwe, O. A. (2025). The Governance of AI in Education: Developing Ethical Policy Frameworks for Adaptive Learning Technologies. *International Journal of Applied Science and Mathematical Theory*, 11(2). <https://www.iiardjournals.org/get/IJASMT/VOL.%2011%20NO.%202%202025/The%20Governance%20of%20AI%20in%20Education%2071-88.pdf>

UNESCO. (2021). AI and education. Guidance for policy-makers. DOI: <https://doi.org/10.54675/PCSP7350>

Valencia, A. y Figueroa, R. (2023). Incidencia de la Inteligencia Artificial en la Educación. *Educatio Siglo XXI*, 41(3), 235-264. <https://doi.org/10.6018/educatio.555681>

Vera, D. (2025). Impacto de la inteligencia artificial en la calidad de vida académica de los estudiantes universitarios: oportunidades y desafíos. Universidad Politécnica Salesiana. <https://dspace.ups.edu.ec/bitstream/123456789/31534/1/UPS-GT006768.pdf>

Vera, F. (2023). Integración de la Inteligencia Artificial en la Educación superior: Desafíos y oportunidades. *Transformar*, 4(1), 17–34. <https://www.revistatransformar.cl/index.php/transformar/article/view/84>

Wang, Y., Liu, X., & Zhang, J. (2023). AI-enhanced adaptive learning systems: A meta-analysis. *Computers y Education*, 192, 104624. <https://journals.sagepub.com/doi/abs/10.1177/07356331241240459>

Yan, Y., & Liu, H. (2025). Ethical framework for AI education based on large language models. *Educ Inf Technol* 30, 10891–10909. <https://doi.org/10.1007/s10639-024-13241-6>

Conflict of interest

The authors declare that they have no conflicts of interest.

Declaration of responsibility of authorship

We, Miguel Macías Loor, Marielisa Stefanía Zavala Cárdenas, Jonathan Rodolfo Delgado Cedeño, María Elena Tubay Álvarez and Leopoldo Vinicio Venegas Loor, authors of the indicated manuscript, DECLARE that we have contributed directly to its intellectual content, as well as to the genesis and analysis of its data; therefore, we are in a position to be made publicly responsible for it and accept that our name appears in the list of authors in the indicated order. And that the ethical requirements of the aforementioned publication have been met, having consulted the Declaration of Ethics and Malpractice in the publication. Miguel Macías Loor, Marielisa Stefanía Zavala Cárdenas, Jonathan Rodolfo Delgado Cedeño, María Elena Tubay Álvarez and Leopoldo Vinicio Venegas Loor: research, collection, interpretation and analysis of data, drafting of the manuscript, preparation of the abstract and preparation of the conclusions.