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Implementation of an artificial intelligence virtual assistant in Latin American universities

Implementación de un asistente virtual de inteligencia artificial en universidades latinoamericanas

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Abstract

This article analyzes the implementation of an artificial intelligence virtual assistant in Latin American universities as a strategy to personalize learning in higher education. The research was conducted using a mixed-method approach and a multiple case study design, with the participation of 303 students and 35 teachers from Ecuador, Peru, and Colombia. The quantitative results showed significant improvements in student perception, highlighting immediate feedback, content adaptation, and learning pace adjustment; in addition, more than 75% of participants reported high levels of satisfaction. From the teaching perspective, the reduction in administrative burden and the promotion of pedagogical innovation were recognized, although concerns arose regarding student dependence. Qualitative findings confirmed the assistant as a pedagogical ally, but pointed to the need for teacher training and institutional policies for its responsible use. Likewise, limitations related to connectivity in rural areas were identified, which deepens digital divides. In conclusion, AI virtual assistants show transformative potential to promote more inclusive and sustainable education, provided that their integration is accompanied by ethical frameworks, teacher training, and digital equity strategies. This study provides empirical evidence on the emerging role of artificial intelligence in reducing educational inequalities and opens new lines of research on its impact in low-connectivity contexts.

Keywords: artificial intelligence, higher education, virtual assistant.

Resumen

Este artículo analiza la implementación de un asistente virtual de inteligencia artificial en universidades latinoamericanas como estrategia para personalizar el aprendizaje en la educación superior. La investigación se desarrolló bajo un enfoque mixto y un diseño de estudio de caso múltiple, con la participación de 303 estudiantes y 35 docentes de Ecuador, Perú y Colombia. Los resultados cuantitativos evidenciaron mejoras significativas en la percepción estudiantil, destacando la retroalimentación inmediata, la adaptación de contenidos y el ajuste del

ritmo de aprendizaje; además, más del 75% de los participantes reportó altos niveles de satisfacción. Desde la perspectiva docente, se reconoció la reducción de la carga administrativa y el impulso a la innovación pedagógica, aunque surgieron preocupaciones respecto de la dependencia estudiantil. Los hallazgos cualitativos confirmaron al asistente como un aliado pedagógico, pero señalaron la necesidad de capacitación docente y de políticas institucionales para su uso responsable. Asimismo, se identificaron limitaciones relacionadas con la conectividad en zonas rurales, lo que profundiza las brechas digitales. En conclusión, los asistentes virtuales de IA muestran un potencial transformador para promover una educación más inclusiva y sostenible, siempre que su integración se acompañe de marcos éticos, formación docente y estrategias de equidad digital. Este estudio aporta evidencia empírica sobre el papel emergente de la inteligencia artificial en la reducción de desigualdades educativas y abre nuevas líneas de investigación sobre su impacto en contextos de baja conectividad.

Palabras clave: inteligencia artificial, educación superior, asistente virtual.

Introduction

Higher education is undergoing a rapid transformation process in which digitalization, virtualization, and artificial intelligence (AI) have emerged as strategic pillars for rethinking pedagogical models in Latin America and beyond (Soletic & Kelly, 2023; UNESCO, 2023). The COVID-19 pandemic has intensified these dynamics by compelling universities to adopt virtual modalities that present various advantages and limitations. In the Peruvian context, for instance, Lecarnaqué et al. (2024) identified opportunities for flexibility, alongside gaps in quality and connectivity. Within this framework, digital platforms, innovative resources, and AI virtual assistants have emerged as tools that enhance personalized learning and meet the demands of students and educators in heterogeneous contexts (Macías et al., 2025; López et al., 2025).

Personalized learning, defined as the adaptation of content, pace, and strategies to the specific needs of each student, has become a fundamental objective of higher education in the digital age (Reis, 2025; Rodríguez et al., 2025). The development of AI has broadened the possibilities for achieving this objective through data analytics, intelligent tutoring, and adaptive systems that provide immediate feedback. However, Serrano and Moreno (2024) caution that the incorporation of algorithms does not necessarily ensure genuine innovation, as their effectiveness is context-dependent. Recent studies in Latin American universities have demonstrated that the use of virtual assistants significantly contributes to teaching practices and student support, as evidenced by the experience of the EDU-INNOVA Laboratory in Peru (López et al., 2025). In this context, personalization intertwines with cognitive and metacognitive processes, where AI facilitates self-regulation and autonomous learning (Molenaar et al., 2023; Loaiza et al., 2024; Salas Díaz & Baque, 2025). Furthermore, technology adoption models, such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), elucidate how perceived usefulness, ease of use, and institutional support influence the acceptance of new technologies (Palos-Sánchez et al., 2019). In Latin America, transformational leadership has been shown to positively affect academic innovation and the willingness to embrace digital tools (Vega Calvas et al., 2025). From an ethical perspective, the expansion of AI in education raises challenges related to privacy, security, and equity (Meraz, 2018; UNESCO, 2019, 2023). These concerns are exacerbated in regions where structural inequalities in access to devices and connectivity persist (Moreira et al., 2024; Vergara & Rey, 2025), necessitating digital policies centered on justice and educational inclusion.

Educational innovations extend beyond the use of AI. Strategies such as gamification and game-based learning have also been shown to enhance student motivation and engagement in higher education (Poveda Pineda et al., 2023; Ojeda-Lara & Zaldívar, 2024; Trigo-Cano et al., 2025). While they do not replace the personalization enabled by AI, both trends complement and strengthen each other, enriching the educational ecosystem with more dynamic and student-centered experiences.

In this context, AI not only facilitates content personalization but also fosters the development of critical thinking, creativity, and STEM competencies (Norman-Acevedo, 2024; Olivo et al., 2025; Tipula Quispe et al., 2025; Chasi-Rea, 2024). Ramírez and Valle (2022) emphasize that virtual assistants can automate responses, provide real-time feedback, and free up instructor time for higher-value activities, rendering AI-supported personalization a crucial component of the digital transformation in higher education (Reis, 2025). Nevertheless, its effectiveness is contingent upon a solid institutional framework and a clear pedagogical vision that balances innovation, ethics, and equity.

In summary, the empirical and theoretical evidence reviewed converges to acknowledge that the implementation of AI virtual assistants represents a decisive opportunity to personalize learning in higher education. This innovation is underpinned by technological advancements, adoption theories, ethical perspectives, and concrete pedagogical experiences, which collectively delineate a rapidly expanding field of research and

practice. Latin America, with its unique characteristics and challenges, serves as a privileged laboratory for studying this phenomenon, and this article aims to contribute to that discussion through a case study in regional universities. In this context, the present study seeks to analyze the impact of AI-based virtual assistants on learning personalization in Latin American universities, addressing the following questions: How do these assistants contribute to learning personalization in higher education? What institutional, pedagogical, and ethical factors influence their effective implementation? This conceptual framework serves as the foundation for the methodological development presented in the following chapter.

Methodology

The study employed a mixed-methods approach with a multiple case study design aimed at understanding the implementation of an AI virtual assistant in Latin American universities. Three higher education institutions located in Ecuador, Peru, and Colombia were selected to analyze experiences across different academic contexts.

The population consisted of undergraduate students and faculty members who voluntarily participated in the research. A total of 303 students and 35 faculty members were included in the sample, distributed among the three universities. Participants were selected through intentional sampling, taking into account accessibility to the platform and willingness to collaborate in the study.

The central resource was a previously developed virtual assistant programmed to address frequently asked questions about courses, provide adaptive tutoring, and send academic reminders. To evaluate its impact, a pretest was administered followed by a posttest, allowing for the measurement of changes in student and faculty perceptions following the use of the assistant. Comparisons between both measurements were conducted using inferential statistical tests, including the t-test for related samples, reporting the significance level obtained ($p < 0.05$) to determine the presence of statistically significant differences in the analyzed variables.

Data collection was supplemented with Likert-type surveys, structured observation sheets during academic sessions, and semi-structured interviews with key stakeholders. The instruments underwent a content validation process via expert judgment and pilot testing, ensuring their reliability and relevance in the university context. Analysis units consisted of faculty and students from the three selected universities based on criteria of institutional representativeness, technological availability, and voluntary participation in educational innovation processes.

Quantitative data analysis was conducted using descriptive and comparative statistics, employing IBM SPSS Statistics software (version 28), and applying inferential tests to identify significant differences between pretest and posttest measurements. Qualitative data were processed using NVivo 12 software, through thematic content analysis that enabled the identification of perception and experience patterns.

To enhance the internal validity of the study, a methodological triangulation by convergence was applied, contrasting quantitative and qualitative results to corroborate findings and provide a comprehensive interpretation of the analyzed phenomenon. This approach is grounded in recent studies highlighting the utility of mixed methods to ensure the validity of instruments and the reliability of findings in educational contexts. In particular, research such as that by Ballouk et al. (2022) and Storey et al. (2025) demonstrates how integrating qualitative and quantitative phases enables the validation of questionnaires, triangulation of perceptions from various stakeholders, and a deeper, contextualized understanding of learning processes and the implementation of pedagogical interventions.

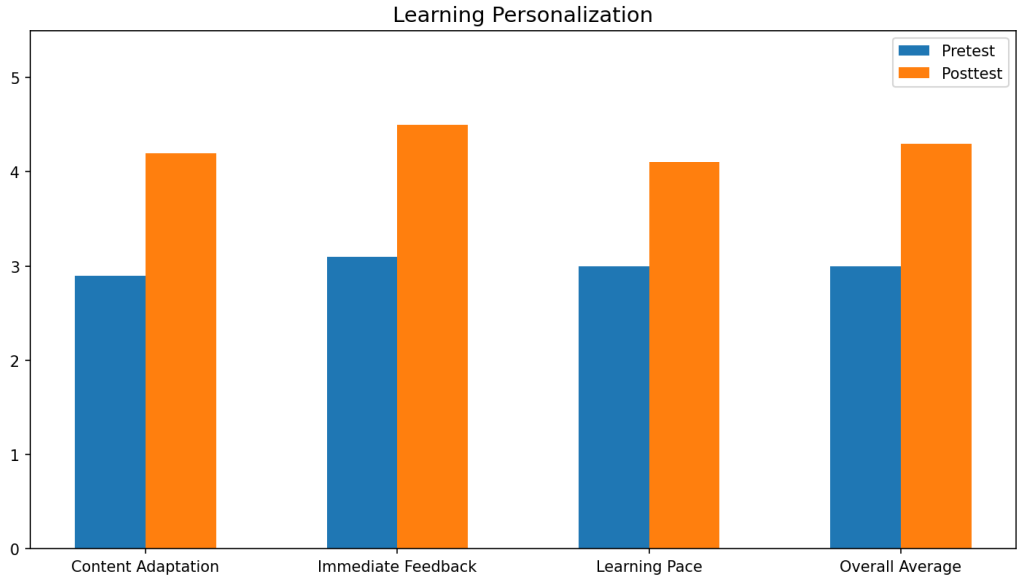
Results and discussion

The implementation of the AI virtual assistant in Latin American universities generated both quantitative and qualitative evidence that sheds light on its impact on learning personalization. Through surveys, interviews, and observations, insights from students and faculty provided a comprehensive view of the benefits, limitations, and challenges associated with this tool. The main findings are presented below, organized into tables, followed by an interpretive analysis.

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Figure 1

Average student perception of learning personalization (Likert 1–5, N=303)



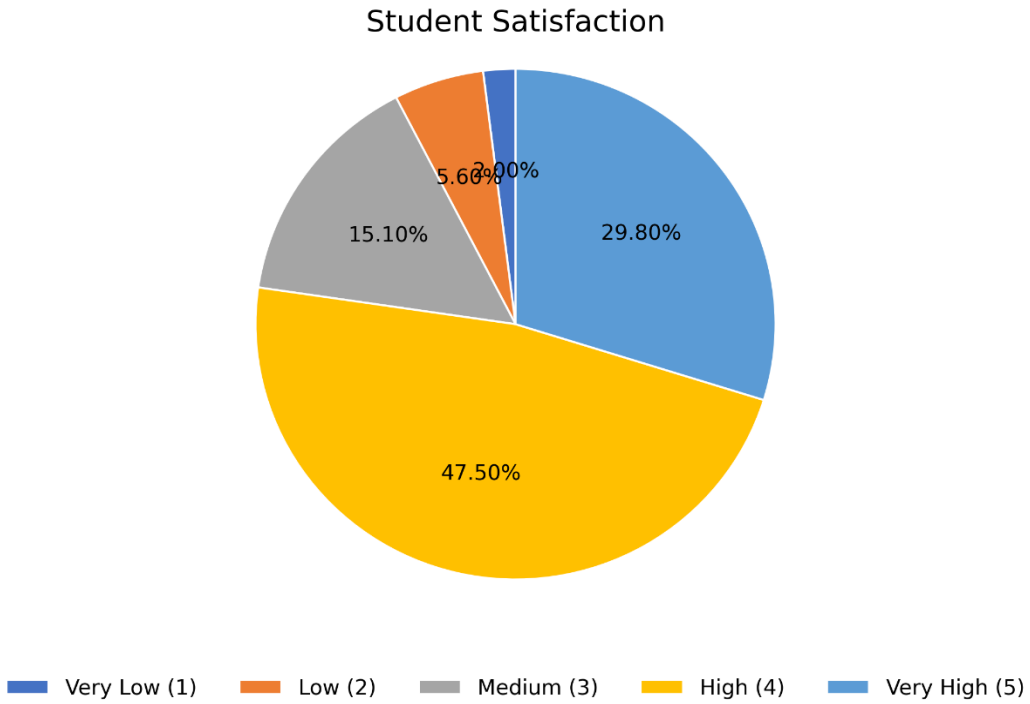
Note. Comparison of means on a Likert scale (1–5) between pretest and posttest.

Analysis

The results clearly indicate an improvement across all evaluated dimensions. Immediate feedback showed the most significant increase, with an enhancement of +1.4 points, followed by content adaptation (+1.3) and learning pace (+1.1). The overall average rose from 3.0 to 4.3, confirming that the virtual assistant strengthened perceptions of personalized learning.

Figure 2

Student satisfaction with the virtual assistant (N=303)



Note. Percentage distribution of satisfaction on a Likert scale of 1 to 5.

Analysis

The findings show that the vast majority of students reported positive satisfaction with the virtual assistant. Specifically, 47.5% indicated a high level of satisfaction, and 29.8% reported a very high level, totaling over three-quarters of the respondents. In contrast, only 7.6% expressed low levels of satisfaction. These data indicate broad acceptance and validate the tool's potential to enhance the academic experience and student motivation.

Table 1

Faculty perception of the pedagogical support from the virtual assistant (N=35)

Evaluated Aspect	Mean (1–5)	Standard Deviation
Reduction of administrative load	4.2	0.6
Improvement in individual tutoring	3.8	0.7
Enhancement of pedagogical innovation	4.1	0.5
Risk of student dependency	2.9	0.8

Note. Means and standard deviations on a Likert scale of 1 to 5.

Analysis

The results indicate favorable evaluations from faculty regarding the virtual assistant. The reduction of administrative workload received the highest score at 4.2, followed closely by pedagogical innovation at 4.1. Individual tutoring achieved an acceptable mean of 3.8, reflecting its contribution to academic support. However, the perceived risk of student dependency was a concern, averaging 2.9. These findings suggest that while the assistant is seen as a tool to enhance teaching, strategies should be designed to mitigate excessive reliance by students.

Table 2

Emerging categories from teacher interviews

Category	Example Quote	Frequency
Pedagogical support	"The assistant allowed me to spend more time on qualitative feedback."	High
Concerns about student dependency	"I fear that some students may depend too much on the chatbot."	Medium
Need for teacher training	"We require training to integrate AI into pedagogy."	High

Note. Results from qualitative analysis of semi-structured interviews.

Analysis

Interviews confirmed that faculty perceive the virtual assistant as a pedagogical ally, particularly in facilitating time management and personalized feedback. Statements such as "it allowed me to spend more time reviewing student reflections" or "the assistant helps filter basic queries" illustrate a positive valuation of its practical utility. However, concerns about potential student dependency emerged, highlighted by remarks like "some students rely too heavily on automated responses" or "there's a risk that AI may replace critical reflection." These perceptions underscore the necessity of establishing pedagogical frameworks that promote formative rather than substitutive use of this resource.

Additionally, faculty unanimously acknowledged the urgent need for training to integrate AI into higher education teaching. As several participants noted, "it is not enough to know how to use the tool; we need to know how to teach with it" and "we need to understand its limits and possibilities." This demand reinforces the notion that technological innovation must be accompanied by professional development and institutional support.

In summary, the emerging categories reflect both the pedagogical potential of the virtual assistant and the challenges of its responsible implementation, emphasizing the importance of ongoing training policies, ethical usage guidelines, and clear pedagogical orientation towards fostering autonomy and critical thinking.

Table 3

Observations of student usage of the assistant

Observed Situation	Description	Frequency
Use for resolving conceptual doubts	Queries resolved in less than 2 minutes	High
Academic reminders	Alerts for submissions and exams received timely	High
Use outside class hours	Nighttime and weekend interactions	Medium
Connectivity issues	Limitations in rural areas	Low

Note. Record of observed situations regarding the use of the virtual assistant during the academic semester.

Analysis

The observations revealed a recurring use of the virtual assistant for resolving conceptual doubts and receiving academic reminders, both of which occurred frequently, indicating its effectiveness in supporting learning management. The flexibility and accessibility of the resource were also evident in interactions outside regular class hours, particularly during nighttime and weekends, with a medium frequency, suggesting that students exploit the tool according to their own pace and availability.

However, contextual factors limiting its use were identified. Key among these were insufficient technological infrastructure, limited connectivity in rural areas, and aspects of institutional culture that have not yet fully integrated the use of digital technologies into academic routines. These restrictions are reflected in the low frequency of connectivity issues, underscoring the need to address digital divides and ensure equitable access.

Overall, the findings confirm that the assistant has established itself as a continuous support resource, capable of facilitating learning personalization and autonomy, although its effectiveness is conditioned by digital infrastructure, connectivity, and institutional context. This highlights the importance of combining technological innovation with support strategies and institutional development to maximize its educational impact.

The results obtained indicate that AI virtual assistants have a significant potential to transform teaching and learning processes in Latin American higher education (Jardón et al., 2024). From the student perspective, improvements in perceptions of personalization, high satisfaction, and extensive use of the resource beyond class hours reflect a positive acceptance and a clear contribution to academic motivation. Faculty members, in turn, valued the reduction of administrative burdens and the promotion of pedagogical innovation, although they expressed concern about the excessive dependency that some students might develop.

Qualitative analysis complemented these findings by highlighting the need for faculty training and institutional policies to regulate the use of AI in the classroom (Norman-Acevedo, 2024). Furthermore, observations revealed that despite flexible access, connectivity limitations in rural areas continue to pose obstacles that exacerbate digital divides.

Together, the experience demonstrates that AI virtual assistants can be consolidated as pedagogical allies, provided their implementation is accompanied by faculty training, curricular integration strategies, and measures for digital equity. Theoretical perspectives reinforce these findings, underscoring models of learning personalization and technology adoption in higher education, illustrating how AI can enhance metacognitive processes, adaptive tutoring, and timely feedback.

Practically, there is a pressing need to design institutional policies that promote responsible technology use, encourage ongoing training, and ensure accessibility for all students, particularly those in contexts with infrastructure and connectivity limitations. This opens the discussion on advancing toward a more inclusive, personalized, and sustainable higher education system, where technology is utilized as a means to enhance educational innovation without compromising student autonomy, critical thinking, and active participation.

Conclusions

This research confirms that AI virtual assistants constitute a key tool for personalizing learning in Latin American higher education. The results demonstrate improvements in student perceptions, particularly in immediate feedback and content adaptation, indicating that AI expands opportunities for flexible learning, fosters self-regulation, and contributes to more motivating and inclusive academic environments.

The faculty's perception of the virtual assistant was predominantly favorable, highlighting its contribution to reducing administrative burdens and fostering pedagogical innovation. However, concerns arose regarding the potential for student dependency and the necessity to accompany implementation with clear usage guidelines. Interviews also emphasized that faculty training is essential for effectively integrating AI into educational practice, revealing that the success of technology depends on both infrastructure and the professional development of academic staff.

Qualitative analysis revealed that the virtual assistant has become a continuous pedagogical support, utilized both during and outside class hours, and widely accepted among students. Nonetheless, limitations associated with connectivity issues in rural contexts were identified, reflecting the persistence of digital divides in the region. These findings underscore the importance of institutional and national policies that promote technological equity and ensure that digital transformation benefits all student sectors.

In this regard, the regional experience demonstrates that the strategic implementation of virtual assistants can become a catalyst for inclusive and sustainable educational innovation in Latin America, provided they are integrated with faculty training, adequate infrastructure, and equity policies.

Collectively, the study shows that the implementation of AI virtual assistants can enhance personalization, innovation, and motivation in higher education. However, their sustainable integration requires a strategic vision that articulates three dimensions: faculty training, ethical frameworks for data management, and digital equity policies. Agreeing with Jardón et al. (2024) and Olivo et al. (2025), we conclude that these resources possess transformative potential, as long as they are used to complement human support, preserving student autonomy and critical thinking. Future research could explore how virtual assistants sustainably impact academic performance, student engagement, and the development of metacognitive skills, as well as their effectiveness in diverse cultural and technological contexts across Latin America.

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Ethical principles:
This review article was developed in adherence to the ethical principles of academic integrity and methodological rigor. It did not involve the direct participation of human subjects or the collection of sensitive data, thus, it did not require approval from an ethics committee. All applicable national and international regulations concerning research ethics were respected.

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All authors contributed equally to the development of this research. They participated in planning, literature review, critical source analysis, discussion of results, writing, and final review of the manuscript.

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