

Artificial intelligence in higher education to promote personalized and inclusive learning: a systematic review

Inteligencia artificial en la educación superior para promover un aprendizaje personalizado e inclusivo: una revisión sistemática

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Abstract

Artificial intelligence (AI) has established itself as a fundamental pillar in the transformation of higher education, promoting more personalized, inclusive, and student-centered teaching models. Its integration allows for the adaptation of educational content, the automation of tutoring, and the anticipation of potential academic difficulties, thus promoting more equitable access to knowledge and addressing the diversity of learning styles. Furthermore, AI contributes to optimizing academic and curricular management, facilitating the overcoming of barriers related to accessibility and cultural and linguistic differences. However, its implementation faces significant challenges, including the technological gap, limited teacher training in digital skills, institutional resistance, and the absence of well-defined ethical and pedagogical frameworks. These challenges are accentuated in regions such as Latin America due to deep structural inequalities. Within this framework, this study aims to analyze the opportunities, difficulties, and future prospects arising from the incorporation of AI in higher education, with particular attention to its potential to promote personalized and inclusive learning. To this end, 21 articles were selected that met rigorous methodological criteria and addressed key aspects of the educational use of AI in countries such as Peru, Mexico, Ecuador, and Argentina, thus ensuring a representative and up-to-date review of the state of the art.

Keywords: personalized learning, educational inclusion, artificial intelligence.

Resumen

La inteligencia artificial (IA) se ha consolidado como un pilar fundamental en la transformación de la educación superior, al impulsar modelos de enseñanza más personalizados, inclusivos y centrados en las necesidades del estudiante. Su integración permite adaptar contenidos educativos, automatizar tutorías y anticipar posibles dificultades académicas, favoreciendo así un acceso más equitativo al conocimiento y atendiendo a la diversidad de estilos de aprendizaje. Además, la IA contribuye a optimizar la gestión académica y curricular, facilitando la superación de barreras relacionadas con la accesibilidad, las diferencias culturales y lingüísticas. No obstante, su implementación enfrenta desafíos importantes, entre los que destacan la brecha tecnológica, la limitada formación del profesorado en competencias digitales, la resistencia institucional y la ausencia de marcos éticos y

pedagógicos bien definidos. Estos retos se acentúan en regiones como América Latina, debido a desigualdades estructurales profundas. En este marco, el presente estudio tiene como objetivo analizar las oportunidades, dificultades y perspectivas futuras derivadas de la incorporación de la IA en la educación superior, con especial atención en su potencial para promover un aprendizaje personalizado e inclusivo. Para ello, se seleccionaron 21 artículos que cumplen con rigurosos criterios metodológicos y que abordan aspectos clave del uso educativo de la IA en países como Perú, México, Ecuador y Argentina, garantizando así una revisión representativa y actualizada del estado del arte.

Palabras clave: aprendizaje personalizado, inclusión educativa, inteligencia artificial.

Introduction

In recent decades, artificial intelligence (AI) has emerged as one of the most transformative and influential technologies across various sectors, including education, which has experienced a notable impact as this technology evolves. In the realm of higher education, AI is not only redefining pedagogical methodologies but also optimizing academic, administrative, and curricular management. This phenomenon has facilitated a transition toward more flexible, adaptive, and student-centered educational models, allowing for personalized learning trajectories that more accurately address the diversity of cognitive styles, assimilation rates, and unique needs. Furthermore, AI opens a window of opportunity to advance toward inclusive higher education by mitigating historical barriers related to geographic accessibility, sensory or cognitive disabilities, and linguistic and cultural limitations.

However, the integration of artificial intelligence in higher education presents significant complexities. Despite its disruptive potential, effective implementation faces relevant challenges such as technological and infrastructural gaps, insufficient training of educators in digital competencies, institutional resistance to change, and the lack of robust regulatory frameworks governing ethical, pedagogical, and data protection aspects. These issues are exacerbated in Latin America, where structural conditions and educational policies vary significantly between countries. In this context, it is essential to conduct a rigorous and comparative review of the opportunities, challenges, and future perspectives of AI in the university sector of countries like Peru, Mexico, Ecuador, and Argentina. This analysis will identify significant advancements, emerging practices, structural weaknesses, and strategic horizons to promote a more equitable, innovative, and inclusive higher education in the region.

Artificial intelligence represents a strategic tool for transforming higher education into a more personalized, inclusive, and student-centered experience. Nevertheless, its implementation in Latin America remains limited by multiple barriers that hinder its full utilization. Among the most pressing challenges are inequality in access to technological infrastructure, the absence of coherent public policies, inadequate teacher training in the pedagogical use of emerging technologies, and the weak integration of AI into academic curricula. Additionally, ethical and legal tensions related to the handling of sensitive data require specialized attention from educational institutions. The gap between the transformative potential of AI and its realization in the Latin American university environment raises growing concerns regarding equity, quality, and sustainability of educational practices in the digital age.

Although there are institutional efforts, the adoption of AI-based technologies in universities remains in an early and fragmented phase. In Peru, for example, budget constraints, inequality in access to connectivity—especially in rural and Andean areas—and the limited incorporation of AI into public higher education policies hinder its implementation. Bajov et al. (2025) indicate that the lack of coherent national planning regarding digital transformation restricts the development of a favorable environment for technological innovation. While some private universities have begun to utilize intelligent systems in evaluation and academic management processes, the educational ecosystem lacks a coordinated national strategy to drive inclusive and personalized innovation.

In Mexico, despite advancements in autonomous and technological institutions that have implemented AI-based solutions to support teaching, automated tutoring, and learning analytics, a marked gap persists between public and private universities in technological resources and institutional capabilities. According to Cotán et al. (2024), this disparity deepens due to the absence of a specific national educational policy on artificial intelligence, which limits the scalability of these initiatives and their impact in vulnerable contexts or areas with low connectivity, where adaptive and inclusive learning is most needed.

In Ecuador, although there is a growing effort to modernize higher education through state-driven digital technologies, structural obstacles remain, such as the concentration of advancements in urban universities, limited teacher training in educational artificial intelligence, and a lack of comprehensive mechanisms to assess the impact of these tools. Sánchez et al. (2024) highlight that despite political commitment to foster innovation, an institutional

culture oriented toward personalizing learning through AI has not yet been established across all regions of the country.

In Argentina, innovative academic projects focused on educational data analysis, automated feedback, and adaptive virtual environments have developed. However, these advancements are mainly concentrated in urban research institutions, with limited transfer to peripheral or less-funded educational sectors. García & Borja (2024) warn that recurring economic difficulties and the lack of a robust national plan to integrate AI into higher education restrict the continuity of these initiatives, underscoring the urgent need for sustained policies that ensure technological equity and inclusion throughout the university system.

The evolution of artificial intelligence in education has been driven by the need to optimize teaching and learning processes through intelligent and adaptive technologies. Initially, these tools focused on automating operational tasks; however, their development has expanded their functionality to complex areas such as content personalization, virtual support, and dynamic feedback. Guzmán (2025) notes that educational AI represents a structural shift in pedagogical practices, enabling detailed and continuous monitoring of student progress, as well as the early identification of specific needs.

In Latin America, the integration of AI in higher education has progressed unevenly, conditioned by institutional capacities, technological infrastructure, and the commitment of educational authorities. While some countries have developed policies to promote its incorporation, others still face barriers related to connectivity, investment in equipment, and specialized teacher training. Corzo et al. (2025) argue that the success of university AI implementation largely depends on strengthening these structural conditions and fostering an institutional culture oriented toward pedagogical innovation.

In Mexico, several technological and autonomous universities have launched pilot projects based on AI, focusing on predicting academic performance and making data-driven decisions. These examples illustrate AI's potential to support academic and administrative processes, although they pose challenges regarding inter-institutional coordination and sustainability. Sivira (2025) indicates that despite promising results, it is essential to consolidate coordinated strategies that expand the coverage and impact of these initiatives, ensuring In Ecuador, initiatives by the Ministry of Higher Education have promoted the digitalization of academic processes as part of a technological modernization strategy, although the use of AI remains in its infancy. Cedeño et al. (2024) emphasize the urgency of designing a coherent national policy to guide the progressive and equitable incorporation of these technologies throughout the territory.

In Argentina, universities with high technological capacity have led the design of algorithms for automated feedback and learning pattern analysis in virtual environments. Echeverría et al. (2024) clarify that while these experiences have shown positive results, their reach is limited to urban centers, without a sustained extension to rural areas or those with less infrastructure.

International organizations such as UNESCO actively promote AI in education, recognizing it as a means to strengthen equity, inclusion, and quality of learning. According to UNESCO (2024), it is essential to establish robust regulatory frameworks, invest in specialized teacher training, and guarantee universal access to digital technologies to advance towards a just and sustainable implementation in Latin America.

AI in education is based on systems capable of learning from large datasets to provide responses tailored to individual needs. Ramírez et al. (2024) indicate that intelligent tutoring systems can adjust content to the specific competencies of each student, enhancing their motivation and academic performance.

Personalized learning through AI enables the design of unique educational pathways, suitable for each student's cognitive style and pace. Holmes et al. (2019) highlight that this capability increases retention and fosters deeper, more meaningful learning experiences.

Educational inclusion is strengthened by the use of AI as it improves accessibility for students with disabilities. Sánchez et al. (2023) underscore that technologies such as voice recognition, automatic subtitling, and semantic text analysis are essential to ensure an inclusive and equitable education.

Learning analytics, based on AI algorithms, facilitates the anticipation of academic difficulties and supports evidence-based pedagogical decisions. Siemens & Long (2011) assert that predictive analytics is a key tool for current educational management.

The ethical and responsible use of AI demands strict regulation regarding the collection and handling of student data. Ojeda et al. (2023) emphasize that this regulation must prioritize transparency, privacy, and equity in algorithmic processes.

The effective adoption of AI technologies faces resistance from educators. Rodríguez (2025) argues that pedagogical appropriation requires continuous training and robust institutional support.

For Latin America, AI should be conceived as part of a comprehensive educational strategy. Alves et al. (2022) maintain that technological introduction should be accompanied by curricular and organizational transformations to achieve a real impact.

It is crucial to clarify that AI does not replace teachers but rather complements and enriches their work. UNESCO (2021) posits that the teacher is redefined as a facilitator, mentor, and designer of experiences enhanced by intelligent systems.

Considering all of the above, the objective of this study is to examine the opportunities, challenges, and future perspectives posed by the integration of AI in higher education, focusing particularly on its capacity to facilitate personalized and inclusive learning.

The analysis of technological advancement in higher education shows a growing integration of AI as a key tool for transforming teaching and learning. However, the implementation presents notable differences in scope, application, and outcomes, raising questions about its effectiveness and real impact. Therefore, it is essential to ask: What is the current state of AI integration in higher education, and what opportunities, challenges, and emerging perspectives arise to promote a more personalized and inclusive learning experience?

Methodology

The implementation of AI-based solutions in higher education was analyzed through a systematic review and a mixed-methods approach, aiming to assess their impact on learning personalization and inclusion. According to Bolaño-García and Duarte-Acosta (2024), the integration of these intelligent technologies significantly influences the optimization of educational processes, facilitating content adaptation, automated tutoring, and predictive analysis of student performance.

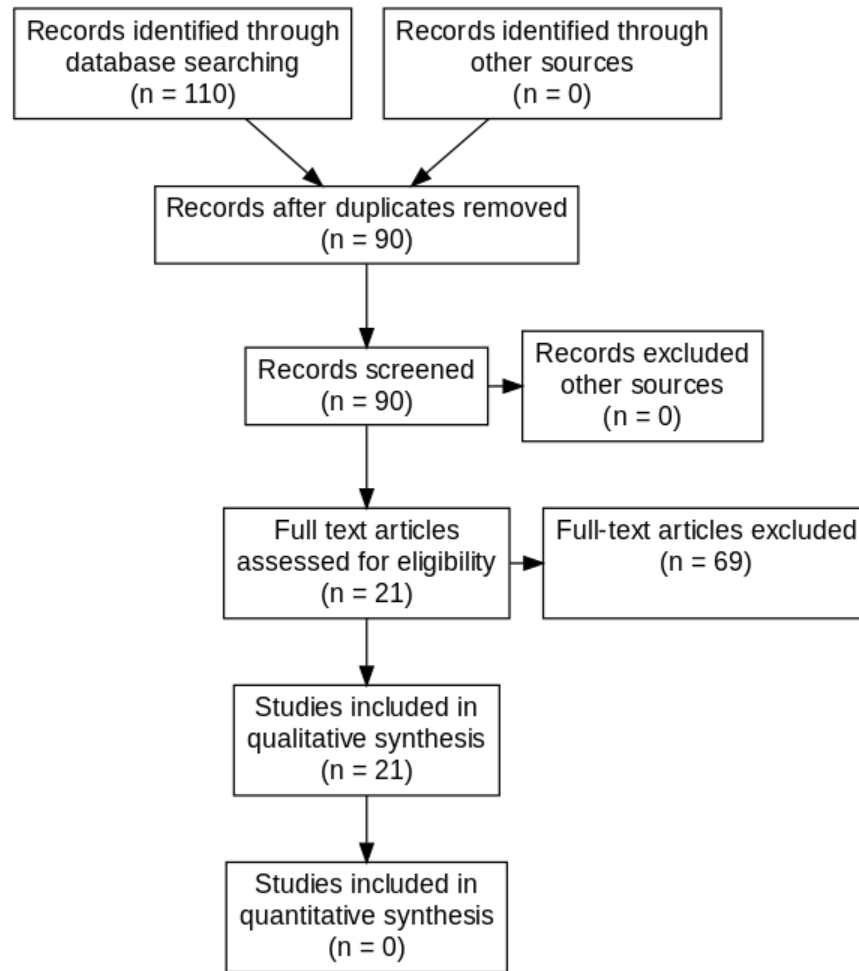
In the initial stages, rigorous inclusion and exclusion criteria were applied to select relevant studies that provided empirical evidence on the implementation of artificial intelligence in university contexts. Recent research describing successful cases, barriers, and proposals for fostering personalized and inclusive learning was prioritized. Out of a total of 110 records identified in academic databases, 90 documents were analyzed after removing duplicates, ensuring a comprehensive and representative review of the state of the art.

To ensure quality and relevance, 21 articles that met strict methodological criteria and addressed key aspects such as the adaptability of AI systems, equity in technological access, and the development of digital competencies in students and teachers were selected. Of these, 12 were qualitatively analyzed to explore implementation strategies and organizational difficulties, while 9 underwent quantitative analysis, focused on measuring the effectiveness and outcomes achieved in AI-supported educational processes.

Additionally, 69 studies that did not meet the thematic focus or lacked clear evidence regarding the impact of AI on personalized and inclusive learning were discarded, ensuring the rigor and focus of the analysis. This process allowed for the identification of emerging trends, best practices, and priority areas for future research and educational policies that promote the responsible and effective adoption of artificial intelligence in higher education. their permanence and equity within the university system.

In Peru, despite programs for digital educational innovation, the explicit integration of AI-based technologies remains limited. López-Regalado et al. (2024) report that the main advancements are in private universities in Lima, while public institutions face budgetary and connectivity restrictions, accentuating inequalities in access to technologically advanced higher education.

Figure 1
PRISMA method



Results

The rigorous and systematic analysis of the reviewed literature allowed for the identification of key findings that reflect the current state and emerging dynamics in the implementation of artificial intelligence in higher education in Latin America. Through a meticulous examination of recent studies, institutional reports, and specialized theoretical frameworks, fundamental aspects influencing the incorporation of intelligent technologies in universities across the region were delineated.

These findings were organized around recurring themes, evidencing both the advancements achieved and the persistent tensions. Among the most relevant categories are: the level of technological adoption and the degree of institutional maturity; structural and contextual barriers hindering effective integration; innovative experiences developed in specific contexts that have successfully articulated student-centered pedagogical solutions; and the ethical, legal, and training implications related to the use of data and algorithms in educational processes.

This analysis deepened the understanding of regional heterogeneity, as well as the existing gaps between public and private institutions, urban and rural areas, and different models of technological governance—centralized or decentralized. In the following sections, the results are presented in thematic tables that clearly and comparatively organize the main contributions identified in the literature, structured according to the defined analytical axes and the studied countries.

Table 1*Barriers to the implementation of artificial intelligence in higher education in Latin America*

Identified Barrier	Description
Inequality in Technological Infrastructure	Gaps between urban and rural areas in access to connectivity and equipment
Lack of Teacher Training	Teachers with limited knowledge of the pedagogical use of AI
Weak Curricular Integration	Little articulation of AI in curricula and study programs
Absence of Public Policies	Lack of coherent national strategies to promote digital transformation
Ethical and Legal Tensions	Risks in handling students' sensitive data

The main structural obstacles that have limited the full utilization of artificial intelligence in Latin American universities were identified. These barriers have negatively affected efforts aimed at building a more equitable, inclusive, and sustainable higher education system, highlighting significant deficiencies in technological infrastructure, the absence of effective public policies, and insufficient specialized teacher training.

Table 2*Advances and limitations in selected countries*

Country	Observed Advances	Persistent Limitations
Peru	Private universities with AI pilots in academic management	Absence of national policy and budgetary gaps
Mexico	Autonomous institutions applying AI in learning analytics	Inequality between public and private institutions; lack of specific regulation
Ecuador	State-driven digital initiatives	Advances concentrated in urban areas; weak teacher training
Argentina	Algorithms in feedback and data analysis in urban universities	Limited expansion to rural sectors; absence of sustained policies

A comparison of national dynamics related to the incorporation of artificial intelligence revealed significant disparities between urban and rural environments, as well as between public and private institutions.

Table 3*Potential of artificial intelligence in higher education*

Application of AI	Expected impact on higher education
Personalized Learning	Adapting content to the pace, style, and needs of students
Educational Inclusion	Greater accessibility for individuals with disabilities
Learning Analytics	Early identification of academic difficulties
Automated Tutoring	Real-time educational support
Adaptive Assessment	Individualized feedback based on performance

Key opportunities that artificial intelligence offers to transform the university experience, steering it towards a more student-centered model, were highlighted.

Table 4*Critical factors for effective AI implementation in universities*

Key Factor	Role in the AI Integration Process
Continuous Teacher Training	Ensures solid pedagogical appropriation of emerging technologies
Investment in Infrastructure	Allows for overcoming existing technological gaps

National Public Policies	Provides a coherent roadmap to drive educational innovation
Institutional Culture Oriented to Innovation	Fosters sustainability and appropriation of intelligent tools
Ethical and Regulatory Framework	Ensures responsible use of data and equity in algorithms

These factors emerged as fundamental pillars to ensure the success of strategies aimed at incorporating artificial intelligence in higher education.

Table 5
Recommendations for an inclusive and sustainable integration of AI

Recommendation	Justification
Develop a National Educational AI Strategy	Directs institutional and public efforts towards common goals
Promote Public-Private Partnerships	Facilitates technological transfer and shared innovation
Prioritize Rural and Vulnerable Regions	Reduces the digital divide and promotes educational equity
Evaluate Impact with Clear Metrics	Allows for adjusting implementation strategies and ensuring effectiveness
Strengthen Ethical and Data Protection Frameworks	Safeguards student rights and ensures algorithmic fairness

Concrete lines of action were proposed to facilitate progress toward a more just, efficient, and student-centered educational ecosystem, driven by the strategic use of artificial intelligence.

Discussion

The implementation of artificial intelligence in Latin American higher education has shown heterogeneous advancements, reflecting both the transformative potential of this technology and the deep structural inequalities that hinder its widespread adoption. As highlighted by Bajov et al. (2025) and Noblecilla et al. (2025), the lack of coherent planning regarding university digital transformation in Peru has limited the development of conducive ecosystems for inclusive innovation. This phenomenon is mirrored in other countries in the region, where AI incorporation has often been fragmented and frequently restricted to pilot experiences led by private or autonomous institutions.

In Mexico, Cotán et al. (2024) warn of a significant gap between public and private universities, a disparity that deepens in the absence of a specific national educational policy on artificial intelligence. This regulatory deficiency complicates the scaling of successful initiatives, particularly in regions with low connectivity, where an adaptive and inclusive approach is urgently needed. Similarly, Sánchez et al. (2024) emphasize that although Ecuador has a favorable political framework for educational innovation, there remains a need to consolidate an institutional culture oriented toward the pedagogical use of AI, especially outside major urban centers.

Argentina's situation is also fragmented. Despite the execution of relevant academic projects, García et al. (2024) and Bellomo (2023) stress that economic limitations and the absence of a robust national plan to integrate AI in higher education have hindered both the continuity and expansion of these initiatives. These circumstances illustrate that, without sustained policies and adequate infrastructure, the impact of AI remains restricted to privileged contexts, thereby exacerbating inequities in access to quality and modern education.

From a structural perspective, Guzmán (2025) underscores that educational AI entails a profound transformation of pedagogical practices by enabling data-driven learning personalization. However, as explained by Corzo et al. (2025), success in its implementation depends on strengthening institutional capacities, investing in technological infrastructure, and specialized teacher training. In this regard, Sivira (2025) notes that while preliminary results from pilot projects in Mexico are promising, it is essential to consolidate inter-institutional strategies that ensure long-term sustainability.

In Peru, research by López-Regalado et al. (2024) shows that the most significant advancements in AI are concentrated in private universities in Lima, while public institutions lag due to resource and connectivity limitations. A similar situation is observed in Ecuador, where Cedeño et al. (2024) highlight the urgency of implementing a coherent national policy to guide the gradual and equitable incorporation of intelligent technologies throughout the country.

Echeverría et al. (2024) note that in Argentina, although some universities have led the development of algorithms for feedback and learning pattern analysis, their impact has primarily been confined to urban centers with greater technological capacity. This technological exclusion raises serious questions about the equity of the educational system, in line with warnings from international organizations like UNESCO (2024), which advocate for robust regulatory frameworks and inclusive strategies to ensure a fair and equitable implementation of AI.

Despite the growing interest and recorded advancements in the integration of artificial intelligence in Latin American higher education, relevant challenges related to equity, teacher training, and technological infrastructure persist. Ruiz-Ruiz et al. (2025) emphasize that to achieve effective educational transformation, it is crucial to develop models that not only enhance technical quality but also promote an inclusive and culturally diverse educational ecosystem. Similarly, Barcia et al. (2025) highlight the need to confront resistance to change and ethical concerns arising from AI adoption, proposing comprehensive training that encompasses technical, pedagogical, and ethical competencies. These approaches agree that the sustainability of AI in higher education requires clear policies, ongoing training, and a solid infrastructure that ensures equitable access for all educational actors.

From a theoretical perspective, Ramírez et al. (2024) and Holmes et al. (2019) concur that artificial intelligence offers unprecedented opportunities to shape personalized and meaningful educational pathways. However, as Sánchez et al. (2023) and Ojeda et al. (2023) warn, its application must be governed by rigorous ethical principles, particularly concerning data protection and algorithmic equity.

Ultimately, the success of AI in higher education depends not only on technology but also on a profound pedagogical and organizational transformation within institutions. Rodríguez (2025) underscores the importance of continuous teacher training, while Alves et al. (2022) stress that all innovations must be integrated into a coherent and comprehensive educational strategy. In this sense, UNESCO (2021) reaffirms that artificial intelligence does not replace the teacher but rather redefines their role as a facilitator and mentor in an enriched digital environment.

Conclusions

The integration of artificial intelligence in higher education represents a strategic opportunity to transform teaching and learning processes, directing them towards more personalized, inclusive, and student-centered models. With its capabilities to adapt content, anticipate academic difficulties, provide immediate feedback, and facilitate access to accessible virtual environments, AI opens new possibilities to address student diversity and enhance educational quality.

However, the analysis reveals that the implementation of these technologies in Latin America faces significant structural challenges. Gaps in technological infrastructure, insufficient teacher training, the absence of coordinated public policies, and budgetary constraints—particularly in public institutions and rural areas—hinder equitable and sustainable adoption. These issues are compounded by ethical and legal tensions that require clear, robust, and transparent regulatory frameworks.

Despite these obstacles, significant advancements are observed in technological and autonomous universities that have developed innovative initiatives supported by intelligent systems. Nonetheless, the reach of these experiences remains limited without the consolidation of national strategies that foster an institutional culture oriented toward pedagogical innovation and digital transformation.

Looking to the future, strengthening AI in higher education will require not only technological investment but also a comprehensive vision that articulates coherent public policies, specialized teacher training, and systematic evaluation of the impact of these tools. Additionally, it will be essential for Latin American countries to prioritize equity as a central axis of educational technological development, ensuring that all students, regardless of their background or context, can benefit from the advantages offered by artificial intelligence.

In conclusion, AI should not be viewed as an end in itself but as a means to ensure a more just, adaptable, and quality education, in which the role of the teacher remains fundamental as a facilitator of enriched learning through technology.

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