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ORIGINAL

Ethical and creative AI: personalizing school learning

IA ética y creativa: personalizando el aprendizaje escolar

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ABSTRACT

Artificial intelligence (AI) is revolutionizing education in Chile, allowing for personalized learning and optimizing teaching work. This article, based on a documentary review of previous experiences in the Chilean context, analyzes the implementation of AI in teacher training, its impact in classrooms, and the associated ethical and technical challenges. It highlights the initiative by the Ministry of Science in 2025 to train future teachers in AI competencies. Additionally, practical examples of AI tools, existing obstacles, and the necessary conditions for effective and responsible integration of educational technology in Chile are discussed.

Keywords: Artificial Intelligence; Ethics; Education; Learning.

RESUMEN

La inteligencia artificial (IA) está revolucionando la educación en Chile, permitiendo personalizar el aprendizaje y optimizar el trabajo docente. Este artículo, basado en una revisión documental de experiencias previas en el contexto chileno, analiza la implementación de la IA en la formación docente, su impacto en las aulas y los desafíos éticos y técnicos asociados. Destaca la iniciativa del Ministerio de Ciencia en 2025 para capacitar a futuros profesores en competencias de IA. Asimismo, se discuten ejemplos prácticos de herramientas IA, obstáculos existentes y condiciones necesarias para una integración efectiva y responsable de la tecnología educativa en Chile.

Palabras clave: Inteligencia Artificial; Ética; Educación; Aprendizaje.

INTRODUCTION

The incorporation of artificial intelligence (AI) in education has generated a profound transformation in pedagogical processes, putting new capabilities within the reach of educators and students. Based on the ability of these technologies to process large volumes of data and adapt the educational experience to individual needs, AI is a valuable resource for advancing toward a more inclusive education that is better adapted to diverse learning styles and paces.(1)

In Chile, this phenomenon is particularly relevant due to historical gaps in educational performance, which positions AI as a tool with the potential to overcome backwardness and promote equity.(2) Several studies highlight the mediating role of teachers in the ethical and responsible use of AI, emphasizing that technology should complement, not replace, pedagogical practice.(3)

Therefore, teacher training is central to this process, requiring a curriculum design that

aligns digital and ethical competencies with the new educational reality. This study examines the impact of incorporating AI in Chilean teacher training on preparing future educators to integrate these technologies into their pedagogical practices, considering structural challenges such as the training gap, infrastructure limitations, and cultural resistance.[3]

Chilean education faces significant challenges in terms of equity and quality, especially in addressing the diversity of learning rhythms and styles. AI is emerging as a transformative tool that can overcome these limitations through personalized responses in real-time. In 2025, the Ministry of Science launched a pioneering course for 600 future teachers, reflecting the national priority of training educators who are competent in AI.

Theoretical Foundations of AI in Education

AI applied to education is based on theories of adaptive and personalized learning, where intelligent systems adjust content, pace, and methodology according to the student's profile. In addition, it facilitates predictive analysis to identify at-risk students and intervene promptly. From an ethical perspective, it is crucial to preserve student autonomy and ensure data privacy.[4]

In Chile, research warns that the increase in technology use has not been accompanied by adequate teacher training, thereby limiting the transformative potential of AI.[5] Therefore, successful adoption requires a systemic approach that integrates training, infrastructure, clear policies, and pedagogical support.[2,3]

Given that AI adapts content to individual needs, which is vital in a country where 44 % of students lag in key areas, it is essential to combine traditional methods with technologies, always ensuring responsible use that preserves autonomy, privacy, and equity.

Cases of Application in Chile

To provide context for the research below, Table 1 presents 10 documented cases in Chile where AI has been applied in diverse educational contexts. The table includes a description, educational level, tool or approach, and social relevance according to the context, as well as relevant factors found in each case.

Table 1. Cases of Application in Chile

Context / location	Tool / project	Description	Social relevance
Villa Jesús School, Coelemu	AI for conflict prevention	Machine learning-based AI to identify social patterns and prevent school conflicts through alerts and workshops	High vulnerability (91 %), promotes peaceful coexistence and support for students with special needs (44 %)[6]
Ministry of Science Program (2025)	AI course for future teachers	Course for 600 education students covering AI tools, ethics, and personalization	Training of change agents from the bottom up[2]
HumanIA, Fundación Chile, and Google	Teacher training program	Training and resources for 685 teachers, with a didactic and ethical approach to AI	Massification of training and awareness in educational AI[7]
Duoc UC and AIEP	Virtual assistants and AI tools	Integration of assistants and automated assessment to personalize and improve the educational experience	Democratization of access to innovative learning technologies[8]
Liceo Bicentenario Matilde Huici Navas	Practical AI workshops	Practical training for teachers to apply AI in their classrooms and motivate students	Strengthening the teacher-student bond, promoting creativity[7]

University of Talca	Educational innovation with AI	Use of AI in curriculum design and assessment to improve educational processes	Improvement in educational quality and adaptation to regional contexts[9]
Santiago Public School	Google Socratic	Mobile app for immediately answering questions in various subjects	Improves student autonomy and reduces teacher overload[10]
Technical School in Valparaíso	Predictive analysis with AI add-ons	Use of Google Sheets with AI to detect at-risk students and optimize interventions	Personalized interventions to prevent dropouts and support vulnerable students[10]
Educational Networks in La Araucanía	Moodle platform + AI plugins	Data analysis and early warnings to improve academic monitoring	Institutional strengthening and technological equity in rural areas[10]
Early childhood education in Santiago	Book Creator and Kibbu	Tools for interactive stories and conversational assistants in Spanish	Early inclusion and development of creative skills in early childhood.[2]

Continuing along the same lines, based on the bibliography consulted, it is essential to mention that each case presented exemplifies a key aspect of the social impact of AI in education. From conflict prevention in vulnerable contexts to the training of teachers as agents capable of using AI judiciously, these experiences reveal that technological incorporation must engage with the realities of Chilean socio-education. AI offers an opportunity to reduce historical inequalities by promoting diverse learning styles and providing personalized support, contributing to the democratization of knowledge.[2,3]

Likewise, the widespread adoption of AI teacher training, such as through HumanIA, underscores the importance of ethical training and critical reflection to mitigate risks, including widening gaps and the erosion of student autonomy. The combination of technological innovation with robust public policies, continuous training, and a school culture open to innovation constitutes the roadmap for Chile to leverage this educational opportunity fully. Table 2 below presents the social relevance of AI in Chilean education, based on the literature consulted, along with similar experiences worldwide.

Table 2. Comparison of the Social Relevance of AI between Chile and the World

Case Chile	Comparison Case	Description	Advantages In Chile	Theoretical Basis
Villa Jesús School: AI for preventing school conflicts in vulnerable contexts	Mindfulness and Compassion in Schools[11]	AI analyzes social dynamics to prevent conflicts through alerts and workshops.	Contextualized cultural adaptation for high vulnerability and diversity in students with special needs.	Mindfulness-based programs promote social-emotional well-being and prevent conflicts.
Chilean Ministry of Science course for AI teacher trainers	Integrating AI tools in teacher professional learning[12]	Training with an ethical, technical, and pedagogical focus for future teachers.	Curriculum design adapted to local profile and culture.	Teacher training strengthens the adoption of AI through professional development models.
HumanIA Chile: mass teacher training in AI	Challenges and best practices in training teachers to use AI[13]	Massive awareness-raising and teacher training program.	Amplifying impact through national policies, , and institutional support.	Continuous training ensures ethical and sustainable adoption of educational AI.

Duoc UC and AIEP: Use of virtual assistants and automated assessment	How AI Assistants Are Changing Higher Education[14]	Virtual assistants and AI for personalization and assessment.	Accessible tool that promotes equity and flexibility.	Generative assistants transform higher education by personalizing educational support.
Liceo Matilde Huici: practical workshops for teachers	Professional Development for Teachers in the Age of AI[15]	Practical teacher training to incorporate AI in the classroom.	Promotes teacher motivation and creativity.	AI in professional development promotes active and reflective teaching practices.
University of Talca: curricular innovation with AI	Higher education and artificial intelligence: challenges for the university of the 21st century[16]	Curriculum design and assessment with AI.	Promotion of local applied research.	AI promotes authentic assessment and curriculum innovation.
Santiago Public School: Use of Google Socratic in the classroom	Adaptive learning systems using AI[17]	Mobile applications that answer questions instantly.	Reduced teaching load and increased student autonomy.	Adaptive learning with AI promotes autonomy and personalized learning.
Valparaíso Technical School: Predictive analysis with AI	Exploring AI-powered Adaptive Learning Systems[18]	Early detection of students at risk.	Low cost and scalability in limited contexts.	Personalized predictive analytics improves retention and equity.
Araucanía Educational Networks: Moodle + AI plugins	Integration of artificial intelligence into educational processes[19]	AI platforms for monitoring and support.	Rural technological inclusion and educational organizational improvement.	Learning analytics enables early intervention in school performance.
Early Childhood Education Santiago: use of Book Creator with AI	Artificial Intelligence as a Pedagogical Tool in Primary Education in Chocó: Systematic Review[20]	Creation of interactive stories with AI.	Adaptation to Spanish and an inclusive approach in early childhood.	AI stimulates creativity and language in early education.

Another element that is evident in the literature relates to the advantages of using AI in Chilean education compared to other experiences. As shown in Table 2, cultural and social contextualization is evident, given that AI in Chile adapts to specific vulnerable contexts, allowing for socially relevant interventions. In 2025, Chile is investing in preparing future teachers with AI skills, strengthening an ethical approach from the ground up. Access to free and multilingual tools is also evident, alongside the innovative use of accessible technologies. Similarly, Chile lacks integrated public policies, which have already existed in other countries for three or four years.[21]

DEVELOPMENT

This documentary research reviewed and analyzed previous experiences of integrating artificial intelligence (AI) into Chilean education, complementing it with international references and studies to contextualize the cases and theoretically substantiate their relevance. The sample consists of a set of 10 Chilean educational experiences selected for their representativeness at different academic levels (from early childhood education to university education), geographical sectors, and approaches (teacher training, use of virtual assistants, predictive analysis, design of digital resources). The selection was made through intentional or convenience sampling,

based on the availability of public information and official documentation from agencies such as the Ministry of Science, state universities, and other institutions located in contexts of high social vulnerability or strategic relevance.

The analysis was primarily qualitative and descriptive, supported by tabular comparisons, to synthesize the characteristics, use, and potential impact of the AI tools presented in each case. A comparative analysis was incorporated with global cases validated by reviewed literature, blogs, journals, repositories, and indexed databases (Latindex, Scielo, WOS, Scopus). The latter contributed to enriching the contextualization and supporting the contributions of Chilean experiences within the contemporary theoretical framework of educational AI. The choice of this documentary approach responds to the exploratory and evaluative nature of the research, whose purpose is to understand and describe emerging practices rather than measure numerical variables or establish direct causal relationships.

As a complementary method for evaluating the presence and frequency of AI training among teachers, secondary statistics and official reports will be considered, which allowed for the identification of training gaps and ethical challenges. The research acknowledges, as a limitation, the absence of a rigorous inferential statistical analysis or primary quantitative study with direct application to a specific population, given the recent implementation of many initiatives. Therefore, the results are preliminary and require validation through future studies with experimental or longitudinal designs.

The documentary methodology was suitable for developing a current and well-founded overview that facilitates an understanding of the relevance, benefits, and challenges of integrating AI into the Chilean education system, as well as providing a framework for the formulation of education policies and curriculum designs focused on technological innovation with social equity.

For this documentary research aimed at analyzing experiences of AI integration in Chilean education, we opted for intentional or convenience sampling, as we selected publicly available cases and documents that reflect different educational levels, geographical contexts, and approaches (teacher training, digital tools, predictive analysis). This type of sampling is commonly used in academic studies when depth and qualitative representativeness are prioritized over statistical generalizability.[16] We also complemented this with a selection of international studies to contextualize and validate the relevance of national experiences.

This research employs a documentary and comparative approach, which, although it does not involve direct collection or inferential quantitative analysis, is innovative in that it integrates a wide range of official and academic sources, as well as recent national and international case studies. The innovation lies in the interdisciplinary crossover and social contextualization it allows, facilitating a holistic understanding of the role of AI in Chilean education. This cross-cutting perspective is essential for answering complex questions about technological innovation with equity in an emerging field with few comprehensive evaluations of this nature.[16]

Regarding the potential limitations of the sampling method, purposive sampling has specific limitations, including the possibility of selection bias, as the documented experiences may not accurately represent the entire educational reality or may only include cases with greater visibility or apparent success. Furthermore, as it is based on secondary sources, there is a dependence on the quality and scope of these data. Therefore, the findings should be considered exploratory and should be complemented by future empirical studies that allow the conclusions to be expanded and validated with more representative probability samples or longitudinal data.[16]

Given the above, the evidence compiled in Tables 1 and 2 demonstrates that the incorporation of artificial intelligence in Chilean education is evolving within a framework of growing technological and pedagogical diversity, which seeks to address complex social contexts and historical educational disparities. From a technical perspective, this integration presents

several key challenges and considerations:

- Adaptability of AI systems to local contexts: the cases describe that the effectiveness of solutions such as virtual assistants, predictive analysis systems, and adaptive platforms depends mainly on their ability to adjust culturally and pedagogically to the Chilean socio-educational environment. Algorithm configuration must incorporate contextual variables (e.g., linguistic diversity, socioeconomic differences, and levels of access) to avoid biases that widen gaps rather than reduce them.[22]
- Interoperability and scalability: Technical implementation must ensure that AI platforms communicate effectively with existing educational systems (LMS, school databases, etc.), as well as offering scalability to support large numbers of users without affecting the quality of the academic experience.[23]
- Technological infrastructure and connectivity: It is essential to recognize that the massive deployment of AI depends on stable networks and adequate devices in schools, a critical issue in rural or vulnerable areas. The technical solution must provide for offline or hybrid alternatives that allow for pedagogical continuity without causing exclusion.[24]
- Privacy, ethics, and transparency in algorithms: The collection and processing of personal data requires strict security protocols and ethics committees to prevent misuse. Transparency in AI models and ethical training for teachers and students are equally crucial for the success and acceptance of these technologies.[25]
- Teacher training and technical support: Continuous training in digital, technological, and pedagogical skills is essential for teachers to understand and effectively utilize AI tools. Additionally, technical support must be responsive and accessible to resolve incidents promptly and ensure smooth operation.

CONCLUSIONS

The conclusions of this documentary study on the integration of artificial intelligence (AI) in Chilean education reflect a deep and critical understanding of the current state of this innovative technological tool in the education system. In line with the objectives set out, we have summarized how AI can act as a catalyst to transform teaching and learning processes, providing a more personalized, inclusive, and adaptable education to the diverse contexts and social realities that characterize Chile.

The findings demonstrate that, from a practical perspective, AI enables the creation of adaptive educational environments that cater to the unique needs of each student, a crucial aspect in a country with high heterogeneity in learning levels and significant socioeconomic disparities. This personalization of learning, combined with decision-making support through predictive analytics and AI-designed digital resources, enables teachers to optimize their pedagogical strategies and focus on the critical and ethical mediation of knowledge, without compromising the central role they play in the educational process.

In relation to recent international studies, Chilean experiences concur in emphasizing the importance of comprehensive teacher training that combines technical skills with an ethical and pedagogical approach, as noted by Alonso-Rodríguez (2024) and Molina (2024). However, Chile has placed particular emphasis on the country's own sociocultural context, which represents a significant contribution to the Latin American region, where socioeconomic and educational conditions demand technically viable and socially just solutions.

On the other hand, this research acknowledges the limitations associated with the documentary methodology used, including intentional sampling that does not aim to represent the entire national education system statistically, but rather to present evidence selected for its relevance and availability. This implies that the conclusions should be taken as indicative and exploratory, paving the way for future empirical studies with quasi-experimental or longitudinal designs that allow for the validation of the real impact of AI on learning and teaching practice.

Likewise, a fundamental challenge to maximizing the benefits of AI is overcoming digital inequalities, guaranteeing universal access to adequate technological infrastructure and technical support. Without this component, technology could accentuate existing gaps, as warned by Ushiñahua Serrano & Contreras Rivera (2025) and Tapara Yupanqui (2025). Therefore, public policies must include comprehensive strategies that simultaneously address training, equipment, and institutional culture for the responsible and equitable use of AI.

In terms of future research, it is proposed to investigate further the role of teachers as technological mediators, exploring how their practices and perceptions evolve with the incorporation of AI, as well as analyzing the effects on student performance and motivation across different educational cycles and socioeconomic contexts. It would also be relevant to investigate the adaptation and creation of AI models that take into account the country's cultural, linguistic, and regional diversity, contributing to locally relevant educational digital sovereignty.

The objectives of the study were fully achieved, providing a solid frame of reference that articulates experiences, theoretical foundations, and ethical considerations for the integration of AI into Chilean education. The conclusions presented here not only reflect an informed assessment of the current situation but also guide the educational innovation agenda toward a future where technology and equity are intertwined.

Finally, this study invites ongoing dialogue among researchers, teachers, authorities, and the educational community to collaboratively develop an education model powered by artificial intelligence that preserves human centrality, promotes critical thinking, and ensures opportunities for all students.

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USE OF ARTIFICIAL INTELLIGENCE

Yes, for verification of wording and redundancies

CONFLICT OF INTEREST

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