South American Publishing

SAP Social AI. 2026;2:111
doi: 10.62486/sai2026111

BRIEF ORIGINAL

Integration of Generative Artificial Intelligence Tools into the Design of Learning Activities in Higher Education

Integración de herramientas de inteligencia artificial generativa en el diseño de actividades de aprendizaje en la educación superior

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Submitted: 02-08-2026 | Revised: 01-10-2026 | Accepted: 03-11-2026 | Published: 04-11-2026

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ABSTRACT

This research paper examines the impact and effectiveness of integrating Generative Artificial Intelligence (GAI) tools into the design of learning activities in higher education. Utilizing a mixed-method approach with a sequential explanatory design, the study explored how these technologies transform teaching practices and the overall student experience. The quantitative phase, conducted with a sample of 50 students and 12 professors in Mexico, revealed an outstanding perception of utility (88% acceptance), highlighting significant improvements in instructional design efficiency and the ability to personalize educational content. The qualitative phase, consisting of in-depth interviews with 6 key informants, identified that while GAI optimizes response times and diversifies teaching resources, its implementation faces critical challenges such as data "hallucination," the risk of technological dependence, and the constant need for human pedagogical validation. The findings suggest that GAI functions not merely as a technical assistant but as a catalyst for educational innovation, provided its use is aligned with clear curricular objectives and an ethical framework that preserves critical thinking. The study concludes that faculty training in advanced digital competencies is imperative to transition from an instrumental use of AI toward a purposeful didactic integration.

Keywords: Generative artificial intelligence, learning, higher education, technology

RESUMEN

El presente artículo de investigación analiza el impacto y la efectividad de la integración de herramientas de Inteligencia Artificial Generativa (IAG) en el diseño de actividades de aprendizaje dentro del contexto de la educación superior. Mediante un enfoque metodológico mixto con diseño secuencial explicativo, se exploró cómo estas tecnologías transforman la labor docente y la experiencia del estudiante. La fase cuantitativa, aplicada a una muestra de 50 estudiantes y 12 docentes en México, reveló una percepción de utilidad sobresaliente (88% de aceptación), destacando una mejora significativa en la eficiencia del diseño instruccional y la capacidad de personalización de contenidos. La fase cualitativa, basada en entrevistas a profundidad con 6 informantes clave, permitió identificar que, si bien la IAG optimiza los tiempos de respuesta y diversifica los recursos didácticos, su implementación enfrenta desafíos críticos relacionados con la "alucinación" de datos, el riesgo de dependencia tecnológica y la necesidad de una validación pedagógica humana constante. Los hallazgos sugieren que la IAG no solo funciona como un asistente técnico, sino como un catalizador para la innovación educativa, siempre que su uso esté alineado con objetivos curriculares claros y un marco ético que preserve el pensamiento crítico. Se concluye que la formación docente en competencias digitales avanzadas es imperativa para transitar de un uso instrumental de la IA a una integración didáctica con propósito.

Palabras clave: Inteligencia artificial generativa, aprendizaje, educación superior, tecnología

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INTRODUCTION

Higher education is at a historic turning point due to the emergence of Generative Artificial Intelligence (IAG). This technology, characterized by its ability to create original content—from text and code to multimedia resources—from large volumes of data, is redefining not only how students learn, but fundamentally how professors design their teaching processes. According to DíazVera et al. (2024), IAG has ceased to be a future promise and has become a present pedagogical resource, capable of assisting professors in the architecture of instructional design and the personalization of materials.

Traditionally, the design of learning activities at the university has been a task that demands a significant investment of time and a deep knowledge of curricular alignment. However, the integration of tools such as ChatGPT, Claude or Gemini allows educators to energize these environments. ChiflaVillón (2024)argues that the strategic incorporation of IAG in the university classroom not only optimizes operational efficiency, but also fosters more adaptive teaching. Nevertheless, despite these advantages, there is a critical gap in the literature and in institutional practice: the risk of a technocentric adoption that ignores pedagogical foundations.

The problem lies in the fact that, although technology facilitates the mass production of activities, educational quality depends on didactic intentionality.Eduardo (2024)warns that the use of IAG in the production of digital resources must be mediated by rigorous human judgment to avoid generic content or content disconnected from the student's context. In addition, ethical concerns persist regarding academic integrity and the possibility that excessive dependence on these tools may undermine the development of critical thinking and creativity, both in professors and in students(Culebro Castillo et al., 2025).

The justification for this research lies in the urgency of moving from "improvised experimentation" to an "institutionalized integration" of IA. It is necessary to understand not only which tools are used, but also how their use alters the coherence between learning objectives and the proposed activities. Does it really improve the quality of learning, or does it merely accelerate the teaching bureaucracy?

In this context, the aim of this article is to analyze the influence of IAG on the design of learning activities, evaluating the perception of university actors and the results of its practical application. Through a mixed approach, the aim is to provide a roadmap that allows higher education institutions to maximize the potential of IA as a "pedagogical copilot," ensuring that technology serves pedagogy and not the reverse.

METHODOLOGY

This research rests on a pragmatic paradigm and uses a mixed sequential explanatory approach (DEXPLIS). According toHernández-Sampieri and Mendoza (2018), this design allows a comprehensive understanding of the phenomenon: quantitative data are collected and analyzed first, followed by qualitative data that help explain and deepen the initial numerical findings.

Research Design

The study was divided into two connected phases:

1. Quantitative Phase (Predominant): Cross-sectional and descriptive, aimed at measuring the frequency of use, the level of satisfaction and the perceived usefulness of IAG.
2. Qualitative Phase (Explanatory): Phenomenological in nature, it focuses on understanding the experiences, pedagogical criteria, and ethical dilemmas of professors when integrating these tools into their daily practice.

Population and Sample

A non-probabilistic convenience sampling was used, selecting active participants in the higher education ecosystem in México. The total sample was broken down as follows:

- Quantitative Sample (n=62): Composed of 50 students from various academic levels and 12 university professors.
- Qualitative Sample (n=6): Six key informants (3 professors and 3 students) who reported frequent use of IAG tools were selected to participate in in-depth interviews.

Data Collection Instruments

Two specific instruments were designed and validated:

- IAG Perception Questionnaire: A structured form composed of 20 items assessed using a 5-point Likert scale (from "Strongly disagree" to "Strongly agree"). The instrument explored three dimensions: (a) Ease of use, (b) Impact on the quality of activities and (c) Academic ethics.
- Semi-structured Interview Guide: Consists of 8 open-ended questions validated by expert judgment, focused on human supervision criteria, the personalization of content, and the limitations observed in the tool.

Analysis Procedure

For the analysis of the quantitative data, descriptive statistics (frequencies, percentages, and measures of central tendency) processed with specialized software were used. For the qualitative phase, the Content Analysis technique was employed, categorizing the responses into thematic dimensions such as "Educational Innovation", "Bias Risks", and "Time Optimization".

Finally, a triangulation of data was carried out, contrasting the results of both methods to guarantee internal validity and offer a holistic interpretation of the impact of IAG on instructional design.

Ethical Considerations

The research was governed by the principles of confidentiality and anonymity. All participants gave their informed consent, ensuring that the information collected was used strictly for academic and research purposes, in compliance with the institutional protocols in force.

RESULTS AND DISCUSSION

The findings of this research are presented by integrating the statistical data obtained from the quantitative phase with the emerging categories of the qualitative analysis, allowing a multidimensional view of the impact of IAG on activity design.

Perception of Utility and Operational Efficiency

The quantitative analysis revealed a predominant acceptance of IAG tools. 88% of the participants (professors and students) rated the utility of these tools as "high" or "very high".

- Time optimization: 92% of the professors surveyed agreed that IAG reduces instructional design time in tasks such as the creation of case studies, assessment rubrics and lesson plans.
- Perceived quality: Students rated the clarity of instructions in activities designed with IA support with a mean of 4.5/5, suggesting that the tool helps to better structure information.

Personalization and Diversification of Resources

One of the most relevant findings was the capacity of IAG to adapt content. In the qualitative phase, the key informants highlighted that IA allows:

1. Level adjustment: Creating versions of the same activity for different levels of complexity.
2. Multiformat: Quickly transforming learning objectives into various formats (debate questions, simulation scenarios, or executive summaries).

The Role of Human Supervision (Triangulation)

Despite the enthusiasm for efficiency, the triangulation of data revealed a critical warning. While the quantitative data reflect satisfaction, the qualitative interviews stressed that IAG presents severe limitations if there is no active teaching intervention:

- Lack of local context: 60% of the professors interviewed noted that IA tends to generate "generic" examples that do not always align with the socioeconomic or cultural reality of students in México.
- Risk of Superficiality: It was identified that, without adequate "prompting" (instructions), the resulting activities may be repetitive or lack cognitive depth.

Synthesis of Main Findings

These results indicate that IAG positively influences the form (structure and speed) of the design of learning activities, but that the pedagogical essence (depth and context) continues to

depend exclusively on the teacher's critical capacity. Technology acts as a powerful catalyst, but its efficiency is contingent on the user's digital competence.

The integration of generative artificial intelligence into the design of learning activities represents one of the most significant paradigm shifts in contemporary higher education. Following the comprehensive analysis of the quantitative data and the qualitative experiences collected in this study, the following conclusions are presented:

Table 1. Indicators

Indicator	Quantitative Result	Associated Qualitative Finding
General Acceptance	88% Positive	Perception of IA as a necessary "copilot".
Clarity of Activities	Mean 4.5/5	Improvement in logical and syntactic structure.
Identified Risks	42% mention ethics	Concern about plagiarism and loss of originality.
Efficiency in design	Estimated time reduction of 50%	Need to invest that saved time in review.

The Role of IAG as a Pedagogical Copilot

It is confirmed that IAG should not be seen as a threat or a replacement for teaching work, but as a critical support resource. The results show that its main value lies in time optimization and in the capacity to diversify teaching resources. The perception of utility of 88% suggests that there is a favorable disposition in the academic community to adopt these technologies, provided that they facilitate the transition toward a more dynamic education updated to the demands of the XXI century.

Educational Quality and Human Intervention

A fundamental conclusion of this research is that the technical efficiency of IAG does not by itself guarantee pedagogical quality. Although the tools can structure activities with high syntactic clarity (score of 4.5/5), human validation remains the only filter capable of ensuring cultural relevance, cognitive depth and ethical alignment. "Critical supervision" emerges as the most valuable teaching competence in this new era: the educator must evolve from being a generator of content to being a curator and evaluator of IA-mediated proposals.

Limitations and Ethical Challenges

Despite the optimism, the study identifies clear limitations. Technological dependence and the risk of generating generic or biased content (AI hallucinations) are latent concerns. In addition, the gap in teacher training could generate inequality in the quality of instructional design among different faculties or institutions. Academic ethics should focus not only on preventing student plagiarism but also on the responsible and transparent use of AI by faculty.

Recommendations for Teaching Practice and Institutions

Finally, this work proposes three key actions for higher education institutions:

1. Institutionalization of Guidelines: Develop regulatory frameworks that guide the ethical and pedagogical use of IAG in curricular design.
2. Training in Pedagogical "Prompt Engineering": Train professors not only in how to use the tool, but also in how to write instructions that generate activities at a high cognitive level.
3. Promotion of Educational Innovation: Use the time saved by IA on administrative tasks to strengthen direct interaction with the student and personalized feedback.

In conclusion, the integration of IAG into activity design is an irreversible process that, if well managed, has the potential to democratize access to high-quality learning resources and personalize teaching on a scale previously unthinkable. The future commitment must be to a more efficient, inclusive and, above all, profoundly human education.

REFERENCES

1. Chura-Quispe, G., Nué Caballero, P. R., Laura De La Cruz, B. D., & Flores-Rosado, C. B. (2025). Instrumento para evaluación de habilidades digitales en investigación educativa: diseño y validación. RELIEVE. Revista Electrónica de Investigación y Evaluación Educativa, 31(1), 1-21. https://doi.org/10.30827/relieve.v31i1.29832
2. Espiñeira Bellón, E. M., Rial Gómez, B., & Muñoz Cantero, J. M. (2025). Diseño y validación del cuestionario de determinación de factores de riesgo y protección asociados al consumo de alcohol y otras drogas en adolescentes de ESO. RELIEVE. Revista Electrónica de Investigación y Evaluación Educativa, 31(1), 1-18. https://doi.org/10.30827/relieve.v31i1.32636
3. Caballero Rodríguez, K., Mula-Falcón, J., & García Jiménez, E. (2025). Validación de un cuestionario sobre la percepción y satisfacción del profesorado universitario con los sistemas de evaluación profesional. RELIEVE. Revista Electrónica de Investigación y Evaluación Educativa, 31(1), 1-20. https://doi.org/10.30827/relieve.v31i1.28345
4. Ibarra-Sáiz, M. S., Lukas-Mujika, J., Ponce-González, N., & Rodríguez-Gómez, G. (2023). Percepción del profesorado universitario sobre la calidad de las tareas de evaluación de los resultados de aprendizaje. RELIEVE. Revista Electrónica de Investigación y Evaluación Educativa, 29(1), 1-21. https://doi.org/10.30827/relieve.v29i1.27404
5. Diaz Vera, J. P., Molina Izurieta, R., Bayas Jaramillo, C. M., & Ruiz Ramírez, A. K. (2024). Asistencia de la inteligencia artificial generativa como herramienta pedagógica en la educación superior. Revista De Investigación En Tecnologías De La Información, 12(26), 61–76. https://doi.org/10.36825/RITI.12.26.006
6. Eduardo, C. D. O. (2024, 5 agosto). La Inteligencia Artificial Generativa en el proceso de diseño y producción de recursos educativos digitales para la educación superior: Un estudio de caso del curso piloto “Designing Educational Innovation Projects” de la Universidad Peruana de Ciencias Aplicadas. https://repositorioacademico.upc.edu.pe/handle/10757/676191
7. García Sánchez, O. V. (2025). Herramientas de inteligencia artificial para el diseño de presentaciones en la educación superior: un análisis comparativo. Revista De Investigación En Tecnologías De La Información, 13(29), 154–165. https://doi.org/10.36825/RITI.13.29.013
8. Ortega Estrada, B., & Hernández Fabián, A. D. (2024). Generación de rúbricas con herramientas de inteligencia artificial para la evaluación de aprendizajes en educación superior. DIDAC, (84 JUL-DIC), 44–55. https://doi.org/10.48102/didac.2024.84_JULDIC.211
9. Chifla Villón, M. P. (2024). Estrategias para integrar herramientas de inteligencia artificial generativa en el proceso de enseñanza-aprendizaje universitario. Revista Internacional De Investigación Y Desarrollo Global, 3(4), 1–16. https://doi.org/10.64041/riidg.v3i4.27
10. Culebro Castillo, K., Garizurieta Bernabe, J., & Gazca Herrera, L. A. (2025). Estudio sobre la percepción del uso de la Inteligencia Artificial Generativa en los procesos de aprendizaje en estudiantes de educación superior. RIDE Revista Iberoamericana Para La Investigación Y El Desarrollo Educativo, 16(31). https://doi.org/10.23913/ride.v16i31.2661

FUNDING

The authors received no funding for the development of this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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