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IMPACTO DE LA INTELIGENCIA ARTIFICIAL GENERATIVA EN LOS PROCESOS DE ENSEÑANZA-APRENDIZAJE Y EL DESARROLLO DE COMPETENCIAS EN EDUCACIÓN SUPERIOR: REVISIÓN SISTEMÁTICA Y METAANÁLISIS

THE IMPACT OF GENERATIVE ARTIFICIAL INTELLIGENCE ON TEACHING AND LEARNING PROCESSES AND SKILL DEVELOPMENT IN HIGHER EDUCATION: A SYSTEMATIC REVIEW AND META-ANALYSIS

Luis Emilio Cartuche Flores[1], Jerling Samantha Hurtado González[2], Pedro Arturo García Narváez[3], Andrea Elizabeth Champutiz Cuzco[4]

{lcartuche1@utmachala.edu.ec[1], jshurtado@utmachala.edu.ec[2], pedro.garcia@ikiam.edu.ec[3], andrea.champutiz@udla.ec[4]}

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RESUMEN: La inteligencia artificial generativa (IAGen) ha emergido como una de las innovaciones tecnológicas que mayor potencial transformador presenta para la educación superior en la última década, ofreciendo herramientas de producción de texto, imágenes y código a partir de instrucciones en lenguaje natural. Realizar una síntesis y análisis crítico de la evidencia científica que entre 2016 y 2026 se ha publicado sobre los efectos de la IAGen en los procesos de enseñanza-aprendizaje y en el desarrollo de competencias del alumnado universitario. Se llevó a cabo una revisión sistemática, con un enfoque de metaanálisis siguiendo las guías de PRISMA 2020, en las bases de datos Scopus, Web of Science, SciELO y ERIC. Se completó con un total de 27 fuentes publicadas en revistas de alto impacto, que incluían revisiones sistemáticas, metaanálisis y estudios empíricos. La evidencia agregada muestra un efecto positivo de la IAGen con una magnitud moderada-alta en relación con el rendimiento académico, con tamaños de los efectos que oscilan entre g = 0,57 (mediados por diseño experimental) y g = 1,14 (mediados por el diseño explícito de una disciplina). Se encontraron efectos positivos consistentes para la personalización del aprendizaje, el feedback inmediato y el desarrollo de competencias digitales, junto con efectos negativos que afectan a la integridad académica, a la dependencia cognitiva y a la brecha digital institucional. La IAGen se convierte en una herramienta pedagógica de alto potencial si es implementada junto con acompañamiento docente, marcos de ética claros y estrategias de evaluación auténtica; su implementación sin

[1]Facultad de Ciencias Agropecuarias - Universidad Técnica de Machala – Machala- Ecuador, https://orcid.org/0000-0001-7227-4092
[2]Universidad Técnica de Machala, https://orcid.org/0009-0001-5771-5854
[3]Universidad Regional Amazónica IKIAM, https://orcid.org/0000-0002-1920-0921
[4]Universidad de las Américas, https://orcid.org/0009-0000-0308-9088

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estos acompañamientos puede reducir el pensamiento crítico y la integridad académica del alumnado universitario.

Palabras clave: Inteligencia artificial, aprendizaje, educación superior, competencias, revisión sistemática

ABSTRACT: Generative artificial intelligence (GAI) has emerged over the past decade as one of the technological innovations with the greatest transformative potential for higher education, offering tools for generating text, images, and code based on natural language instructions. To conduct a synthesis and critical analysis of the scientific evidence published between 2016 and 2026 on the effects of GAI on teaching-learning processes and on the development of university students' competencies. A systematic review with a meta-analysis approach was conducted, following the PRISMA 2020 guidelines, in the Scopus, Web of Science, SciELO, and ERIC databases. A total of 27 sources published in high-impact journals were included, comprising systematic reviews, meta-analyses, and empirical studies. The aggregate evidence shows a positive effect of IAGen with a moderate-to-high magnitude on academic performance, with effect sizes ranging from g = 0.57 (mediated by experimental design) to g = 1.14 (mediated by the explicit design of a discipline). Consistent positive effects were found for personalized learning, immediate feedback, and the development of digital competencies, along with negative effects on academic integrity, cognitive dependence, and the institutional digital divide. IAGen becomes a pedagogical tool with high potential when implemented alongside faculty support, clear ethical frameworks, and authentic assessment strategies; its implementation without these supporting measures may reduce critical thinking and academic integrity among college students.

Keywords: Artificial intelligence, learning, higher education, competencies, systematic review

INTRODUCTION

The introduction of artificial intelligence (AI) systems in educational contexts is not a new phenomenon since 1960, when intelligent tutoring applications were already developed that sought to adapt teaching and, at the same time, automate evaluation procedures. Notwithstanding the above, reality took a spectacular and radical turn starting in 2022 with the arrival of large-scale language models capable of original generation of text, images, audio and code from instructions formulated using natural language, thus establishing the framework of generative artificial intelligence (IAGen). In this sense, tools such as ChatGPT, Gemini, Copilot or Claude have gone from being technological curiosities to being elements of daily use in university classrooms in just three years, which has conditioned an urgent reaction from the international scientific community to address their pedagogical, ethical and cognitive implications.(1)(2)(3)

At the international level, different systematic reviews agree that IAGen has great possibilities of transforming university teaching since it optimizes the creation of

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teaching materials for different learning rates, allows the generation of immediate feedback systems and offers the possibility of accessing academic help outside of class hours. A bibliometric analysis of more than three hundred articles indexed in Scopus showed that, from 2017 to 2023, scientific production on IAGen in higher education multiplied by more than seven, with scientific publications presenting three main thematic lines: academic integrity, personalization of learning and intelligent tutoring systems. Following a similar line, an article that explored the challenges and opportunities of the IAGen from the perspective of university professors demonstrated that its pedagogical value depends, to a large extent, on the existence of clear institutional policies and their level of digital literacy.(4)(5)(6)

Going from general to specific, the most recent empirical evidence has begun to narrow down the mechanisms by which IAGen affects learning. From a review of the aspect of the responses, attitudes and behaviors of students towards these types of tools, it was found that, although the majority of students perceive a beneficial effect in the understanding of complex content, there remains a tension between the instrumental use of AI as a cognitive aid and its substitute use, a risk for the autonomous elaboration of knowledge; A systematic review study in the Latin American field of digital transformation of higher education found that one hundred and twenty-nine investigations document improvements in the personalization of teaching and the efficiency of administrative processes, but are also aware of the technological infrastructure gaps that persist between public and private institutes.(7)(8)

The construction of competencies is the other axis of the discussion. Different authors point out that the IAGen can represent a scaffolding of thinking that can promote critical thinking, problem-solving and written communication skills when it is consciously applied within a curricular design; on the contrary, the unguided use of the IAGen generates a cognitive dependency that slows down reflection and self-regulation of learning. This tension of empowerment or substitution structures the axis of the debate that is currently taking place on the inclusion of the IAGen in the field of university education.(9)(10)(11)

An element that runs through it is academic integrity. Recent studies warn that the ease with which IAGen produces coherent and structured text increases the risk of disguised plagiarism practices, and an emerging form of academic dishonesty designated by some authors as "IA-plagiarism". In the Ecuadorian environment in this case, a study that included a sample of 4, 8, 11 students from eight universities determined the existence of a statistically significant association between trust in the information generated by ChatGPT and the amount of self-reported plagiarism, in the same way that greater critical knowledge regarding the limitations of IAGen tools was associated with academic behaviors of greater responsibility. The above emphasizes that the impact of IAGen is not produced by the technology itself, but depends on the digital and ethical education one has to use it.(12)(13)

Despite the increase in primary research, the available evidence is poorly corroborated because it is divided between case studies, perception surveys and short-term trials with little integration based on the reported effect size.

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Evidence of its need is given by various authors at the same time that this evidence would need to be systematized through replicable procedures that allow estimating the real magnitude of the effect of the IAGen on learning beyond the subjective assessments of teachers and students. Likewise, there is little evidence of standard institutional frameworks on the use of this type of tools, which makes it difficult to compare results between different university contexts.(14)(15)

In summary, the justification of the present review consists of: i) offering the academic community a rigorous and updated synthesis that accounts, through systematic procedures, for the scattered evidence on the effects of IAGen on university learning; ii) the convenience of identifying both the pedagogical opportunities it offers and its ethical and cognitive risks so that the results can guide the development of institutional policies and teaching actions based on evidence, and iii) the limited availability of reviews that quantitatively integrate the effect sizes reported in recent literature, which hinders the possibility of making decisions on the part of academic authorities and teaching bodies. In accordance with the above, we constructed the following justification for the present study: the objective of our review was to analyze, using a systematic meta-analysis type review, the impact of generative artificial intelligence on the teaching-learning processes and development of competencies of university students from the indexed scientific evidence that emerged between 2016 and 2026.

MATERIALS AND METHODS

The present work was developed within the framework of a bibliographic-documentary approach in its quantitative aspect, corresponding to a systematic review with part of a meta-analysis; The guidelines of the PRISMA 2020 declaration (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) were followed, an internationally recognized methodological instrument as a guarantee of transparency, replicability and the level of rigor in the processes of identification, selection, evaluation and synthesis of scientific evidence. This design option responds appropriately to the fact that it does not comment on the collection of primary data, but rather on the critical analysis and quantitative integration of the results obtained in already published indexed sources.

The reference population was composed of the indexed scientific production on generative artificial intelligence in higher education between the months of January 2016 and July 2026. After the detection, screening and eligibility evaluation phase, a final sample was established consisting of 27 sources such as systematic reviews, meta-analysis, quantitative empirical studies and normative reference documents (framework of teaching digital competencies) all published in journals indexed in Scopus, in Web of Science or in SciELO or in equivalent bases.

The search was carried out in a digital documentary environment using access to internationally recognized academic databases such as Scopus, Web of Science, SciELO, ERIC and open access institutional repositories (PubMed Central, ScienceDirect, SpringerLink, MDPI, Taylor & Francis Online). Considering that there was no field work listing information or direct intervention on human beings, this study did not require approval from a human research ethics committee.

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The interest in the variables revolved around two fundamental dimensions: (a) the impact of IAGen on academic performance and the learning process itself, ATOMIZED through the effect sizes presented (Hedges' g) in the included studies, both primary and meta-analyses; and (b) the development of competencies such as the changes recorded in critical thinking, digital competence, self-regulation of one's own learning and academic integrity. Moderating variables such as academic discipline, duration of the intervention and the methodological design of the primary studies were also extracted.

Taking into account that the sample used in the present synthesis included already published meta-analyses, a second-order synthesis (meta-analysis synthesis) was chosen, extracting the effect sizes (Hedges' g) and the 95% confidence intervals reported in each study, in such a way that an own aggregate model was not calculated or estimated, but rather the double weighting of overlapping primary studies between reviews was avoided. Regarding qualitative and descriptive studies, an inductive thematic analysis of the data was used to identify recurring categories linked to the benefits, risks, or competencies related to the use of the IAGen. The heterogeneity between studies was reviewed narratively, taking into account the differences sustained in the design of the study itself, the discipline, or the duration of the intervention reported by the authors of the studies themselves.

Table 1. Applied methodology.

PRISMA Phase	Procedure applied	Criteria / Tools
Identification	Systematic search in Scopus, Web of Science, SciELO and ERIC with the descriptors "generative artificial intelligence" AND "higher education" AND "learning" and their equivalents in Spanish.	547 records identified (2016-2026); boolean operators AND/OR; language filters (Spanish/English).
Screening	Removal of duplicates and review of titles and abstracts according to predefined inclusion and exclusion criteria.	198 duplicate records removed; 349 evaluated by title/abstract.
Eligibility	Full text reading of the preselected studies to verify thematic relevance, methodological rigor and affiliation to indexed journals.	61 articles evaluated in full text; Studies without peer review, thematic duplicates, and one retracted article were excluded.
Inclusion	Final selection of sources that met all quality and indexing criteria.	27 sources included: 8 systematic reviews/meta-analyses, 15 empirical studies and 4 normative or theoretical reference documents.
Data extraction	Standardized recording of author, year, country, design, sample size, effect size and main findings in an emptying matrix.	Structured spreadsheet; double cross-checking of the extracted data.
Synthesis	Narrative and quantitative integration (synthesis of effect sizes) organized by thematic axes: academic performance, competencies and ethical risks.	Inductive thematic analysis; comparison of effect sizes between meta-analyses.

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The table summarizes the methodological flow followed according to the PRISMA 202018 diagram, for which it was constructed from the initial identification of 547 records to the inclusion of 27 relevant sources that met the quality, indexing and thematic relevance criteria. This systematic and structured procedure made it possible to minimize selection bias and guarantee that the synthesized evidence came from publications that had been subjected to peer review, explicitly excluding an article whose retraction status was verified during the eligibility phase. It was proposed that a combination of narrative analysis and synthesis of effect sizes was the most appropriate measure given that the sample included previous meta-analyses with only partially overlapping samples, which could have led to double counting bias if a single overall aggregate effect had been estimated.

RESULTS

The results of the systematic review presented here are grouped into three axes, which include: (a) the effect of generative artificial intelligence on academic performance, the data for which were synthesized from the meta-analyses that have been included; (b) the competencies that have been affected or developed by its use; and (c) the ethical risks and challenges that already appear in the reviewed literature. All tables will be accompanied by an interpretive analysis rooted in the evidence reviewed.

Effect of the IAGen on academic performance

Before presenting the quantitative data, it is pertinent to comment that the meta-analyses in this review are characterized by the different numbers of primary studies that comprise them, as well as by the chronological and disciplinary range, which will explain the variability that appears in the effect sizes. In summary, Table 1 presents the results of a total of five meta-analyses published between 2024 and 2026 that evaluated the effect of ChatGPT and related tools on learning indicators in higher education.(16)(17)

Table 2. Synthesis of effect sizes reported in meta-analysis on the impact of generative artificial intelligence on university academic performance.

Study (year)	No. of studies / participants	Variable evaluated	Effect size (g)	Interpretation
Mo et al. (2025)(16)	66 studies / n.d.	Undergraduate learning achievement (129 effect sizes)	**g = 1.14**	Large effect
Liu, Zuo, and Lu (2025)(17)	22 studies	Overall academic performance	**g = 0.58**	Moderate effect
Study of 35 experiments (2022-2024)	35 studies / 4193 participants	Cognitive and non-cognitive skills	**g = 0.67**	Moderate effect
Perception and attitudes review (2020-2024)	99 studies	Perception and usage behavior	**Qualitative synthesis**	Prevalence of positive perception

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Review of teaching practice (2017-2023)	355 studies	Teaching and learning practices	**Qualitative synthesis**	Benefits in feedback and personalization

The content of Table 2 illustrates that there is a trend towards positive effects, reaching medium to high magnitudes with Hedges' g values ranging from 0.58 to 1.14. The heterogeneity observed from the studies could be explained by the type of course considered, the duration of the intervention more than 5 weeks and the instructional model, considered relevant moderators in the literature. It is worth noting that the meta-analysis with more integrated effect sizes reported the largest effect size, which suggests that the integration of the IAGen in the training process in a sustained and non-punctual manner causes the effect on learning to increase. However, this relationship must be interpreted with caution, given that the primary studies have significant methodological heterogeneity and, in some, absence of randomized control groups.(16)(17)

Developed competencies and modalities of pedagogical integration

A second axis of analysis focused on identifying which specific competencies of university students are favored through the pedagogical use of the IAGen, as well as the modalities of pedagogical integration that are the most frequent in the reviewed literature, , . Table 2 organizes this information based on the frequency with which each competency was reported as benefiting in the included studies.(9)(10)(18)

Table 3. University competencies associated with the pedagogical use of generative artificial intelligence and its integration modalities.

Competence / dimension	Pedagogical integration modality	Relative frequency in the literature
Teacher and student digital competence	Training in prompt engineering, critical use of AI tools and algorithmic literacy.	High
Feedback and formative assessment	Automated generation of personalized feedback and adaptive rubrics.	High
Critical thinking and analysis	Cross-checking AI-generated answers, contrasting with primary sources.	Medium-high
Self-regulated learning	Use of conversational assistants as scaffolding for task planning.	Medium
Written communication and academic writing	Support in text structuring and style correction, with subsequent teaching review.	Medium-high
Academic integrity and ethics	Establishment of declared use and citation policies for AI tools.	High (as risk to be mitigated)

The results in Table 3 show us that digital competence and formative feedback are the dimensions that are most documented as benefiting from the IAGen, which coincides with what was mentioned in studies that highlight its ability to generate personalized comments on a massive scale without increasing the teaching load proportionally. Self-regulation of learning, on the other hand, shows an intermediate frequency, thus indicating that its development depends to a greater extent on the instructional design than on the autonomous use of the tool by the student 9. Likewise, academic integrity

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appears transversally in the literature, not as a competence from which the IAGen generates a direct benefit, but as a dimension that requires explicit pedagogical intervention to avoid its deterioration.(18)(12)(13)

Risks, challenges and implementation conditions

Finally, the main dangers and institutional requirements were systematized that, according to the evidence reviewed, determine whether the IAGen functions as an enhancer or an impediment to university learning, ,. Table 4 shows these results and the approximate proportion of studies that show them.(11)(15) (19)

Table 4. Risks and institutional conditions associated with the implementation of generative artificial intelligence in higher education.

Identified risk/challenge	Associated institutional condition	Prevalence in the reviewed studies
Covert plagiarism and academic dishonesty	Absence of clear institutional policies for the declared use of AI.	Very high
Cognitive dependence and decreased reflective effort	Lack of redesign of evaluation tasks towards authentic formats.	High
Institutional digital divide	Inequality in access to connectivity and payment tools between universities.	Medium-high
Insufficient teacher training in AI	Limited offer of continuous training on digital skills.	High
Biases and errors in generated content (hallucinations)	Lack of information cross-verification strategies.	Medium

Examination of Table 4 shows that the dangers identified are not attributable to the technology itself, but rather that there are no institutional requirements that guide its responsible use. Academic dishonesty and insufficient teaching preparation are the challenges that appear most frequently in the reviewed literature, in line with the evidence, previously discussed in the introduction, which showed that uncritically trusting the information generated by AI results in higher levels of self-reported plagiarism. In summary, the three resulting axes suggest that the impact of the IAGen on university learning is conditional: its pedagogical potential is present when teaching support is provided, explicit institutional policies are established and evaluation strategies are redesigned, while its absence tends to enhance the identified dangers.(13)(20)

DISCUSSION

The results of the present review corroborate, in general terms, the trend evidenced by the most current international literature: generative artificial intelligence shows a moderate-high positive effect on university academic performance. The highest effect size provided in this synthesis (g = 1.14) corresponds to those described by studies addressing the use of ChatGPT in a problem-based learning context where the tool acted as a fully available tutor. Even so, this result is discrepant with the more modest effect sizes found in meta-analyses with smaller samples, which denotes that the magnitude

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of the impact is more related to the number of integrated studies, the disciplinary variety of the sample and the methodological quality of the primary designs, rather than with a generic effect independent only of the technology.(21)(16)(1)(17)

Regarding the development of competences, the results of this review agree with previous studies that indicate that digital competence and formative feedback are the dimensions most frequently favored through the IAGen, but they differ in part in relation to research that concludes that critical thinking is systematically nourished by the use of these tools itself. The evidence reviewed here suggests, however, that this is rather a conditional relationship in which critical thinking is fueled by the use of the IAGen as a starting point for the verification and contrast of information, but converges in the fact that it is not fueled by it, but is weakened when the tool is used as the sole and undisputed source of answers. This distinction is consistent with the approach in which IAGen can act as an "amplifier" of previous pedagogical provisions, rather than as a determining cause in itself.(18)(9)(12)(14)(4)

The outcome in relation to academic integrity deserves detailed discussion. The findings of the present review are consistent with the study carried out in Ecuadorian universities that already warned of the existence of a positive association between trust in the information that had been generated from AI and self-reported levels of plagiarism^13, as well as with those studies that already warned about the existence of other forms of academic dishonesty that were not detectable through traditional plagiarism detection systems, . However, unlike different positions that attribute this phenomenon exclusively to culture (technology), the use of the evidence analyzed in this article suggests that the determining element is the absence of explicit institutional policies on the use of these tools. This last aspect coincides with research that indicates that media and information literacy, rather than restricted access to technology, is the most effective strategy when it comes to preventing practices of improper use of IAGen, .(12)(14)(15)(22)(13)(23)

Regarding regional differences, the evidence analyzed on Latin America shows a pattern that is partially different from that shown by studies carried out in North American, European and Asian contexts. Thus, while international literature tends to influence the cognitive effect of the IAGen, in the face of this pattern, the Latin American studies reviewed emphasize, both actively and passively, the institutional digital divide as a structural condition, which precedes any discussion on pedagogical effectiveness. This difference does nothing more than suggest that the conclusions obtained in contexts of high connectivity cannot be directly extrapolated to institutions with more limited technological resources, at the same time that it reinforces the need for teacher training in digital skills to do so before the curricular implementation of these tools.(8)(10)(24)

Finally, it should be said that most of the primary studies that make up the reviewed meta-analyses have a short, quasi-experimental design, which restricts the possibility of establishing powerful causal relationships and evaluating the sustainability of the observed effects in the medium and long term. This limitation, also recognized by other authors, is a line of research to be built: longitudinal studies are necessary that examine whether the positive effects collected in interventions of a few weeks are sustainable throughout an academic program or research that delves into the differential effect of

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the IAGen depending on the socioeconomic level and the training discipline of the students.(16)(17)(25)(26)

CONCLUSIONS

The evidence synthesized in this systematic review allows us to affirm that generative artificial intelligence produces a positive effect, of a moderately high to high magnitude, on the academic performance of higher education students, with effect sizes ranging between 0.57 and 1.14 depending on the discipline, the duration of the intervention and the methodological design of the primary studies analyzed. This finding responds directly to the previously formulated objective, since it is proven that the impact that these tools have on learning has been empirically proven and that it would not only be a subjective perception of the teaching or the students.

As a result of the reflections on the development of the different types of competencies, it is proposed that, to the extent that generative artificial intelligence works in the classroom associated with an intentional pedagogical design, it will favor digital competence, formative feedback and, conditionally, critical thinking and written communication. In the absence of this design, however, cognitive dependence tends to be generated, affecting the autonomous elaboration of knowledge. In this sense, technology, without a doubt, is the effect of Classroom Design and, therefore, of educational technology, showing that the effect of technology is not simple, but rather it is mandatory that we highlight the fact that the impact of technology has to do decisively with the institutional and didactic conditions in which the sessions are carried out. Obviously, the last conclusion refers to the fact that academic integrity appears as the most pressing and transversal challenge of those that have been detected in the reviewed literature, in contexts where institutional regulatory gaps persist.

The evidence from Latin America and the Ecuadorian evidence, in particular, reveal that uncritical trust in the information generated by these tools is associated with a concern in terms of self-reported plagiarism, while critical knowledge about instrumental limitations acts as a protective factor, a fact that accounts for the need to include digital and ethical literacy as the central axis of the design of any curricular integration strategy. This leads us to propose that higher education institutions develop explicit policies in relation to the declared use of generative artificial intelligence, that they strengthen the training processes of teachers in digital skills, that they reformulate the evaluation strategies towards authentic formats that value the process of knowledge construction and not just the final product. Similarly, it is necessary to raise the need to promote longitudinal research that allows contrasting the sustainability of the described effects and that explores their differential behavior depending on the academic discipline affected and the socioeconomic context of the students, all with a view to generating evidence that supports sustained curricular and institutional decisions.

REFERENCES

1. Ogunleye B, Zakariyyah KI, Ajao O, Olayinka O, Sharma H. A Systematic Review of Generative AI for Teaching and Learning Practice. Educ Sci (Basel). 2024 Jun 13;14(6):636. doi:10.3390/educsci14060636
2. Zhu C SMLJLTWM. How to harness the potential of ChatGPT in education? Knowledge Management & E-Learning: An International Journal. 2023 Jun 10;133–52. doi:10.34105/j.kmel.2023.15.008
3. Kasneci E, Sessler K, Küchemann S, Bannert M, Dementieva D, Fischer F, et al. ChatGPT for good? On opportunities and challenges of large language models for education. Learn Individ Differ. 2023 Apr;103:102274. doi:10.1016/j.lindif.2023.102274
4. Tlili A, Shehata B, Adarkwah MA, Bozkurt A, Hickey DT, Huang R, et al. What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. Smart Learning Environments. 2023 Feb 22;10(1):15. doi:10.1186/s40561-023-00237-x
5. Bahroun Z, Anane C, Ahmed V, Zacca A. Transforming Education: A Comprehensive Review of Generative Artificial Intelligence in Educational Settings through Bibliometric and Content Analysis. Sustainability. 2023 Aug 29;15(17):12983. doi:10.3390/su151712983
6. Michel-Villarreal R, Vilalta-Perdomo E, Salinas-Navarro DE, Thierry-Aguilera R, Gerardou FS. Challenges and Opportunities of Generative AI for Higher Education as Explained by ChatGPT. Educ Sci (Basel). 2023 Aug 23;13(9):856. doi:10.3390/educsci13090856
7. Wu F, Dang Y, Li M. A Systematic Review of Responses, Attitudes, and Utilization Behaviors on Generative AI for Teaching and Learning in Higher Education. Behavioral Sciences. 2025 Apr 4;15(4):467. doi:10.3390/bs15040467
8. Quiroz Martinez MR. Inteligencia Artificial Generativa (IA Gen) en la Transformación Digital de la Educación Superior una Revisión Sistemática de Literatura. Ciencia Latina Revista Científica Multidisciplinar. 2025 May 7;9(2):6339–78. doi:10.37811/cl_rcm.v9i2.17370
9. Ali D, Fatemi Y, Boskabadi E, Nikfar M, Ugwuoke J, Ali H. ChatGPT in Teaching and Learning: A Systematic Review. Educ Sci (Basel). 2024 Jun 14;14(6):643. doi:10.3390/educsci14060643
10. Ng DTK, Leung JKL, Su J, Ng RCW, Chu SKW. Teachers' AI digital competencies and twenty-first century skills in the post-pandemic world. Educational technology research and development. 2023 Feb 21;71(1):137–61. doi:10.1007/s11423-023-10203-6
11. Yusuf A, Pervin N, Román-González M. Generative AI and the future of higher education: a threat to academic integrity or reformation? Evidence from multicultural perspectives. International Journal of Educational Technology in Higher Education. 2024 Mar 25;21(1):21. doi:10.1186/s41239-024-00453-6
12. Cotton DRE, Cotton PA, Shipway JR. Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. Innovations in Education and Teaching International. 2024 Mar 3;61(2):228–39. doi:10.1080/14703297.2023.2190148
13. Torres-Diaz JC, Duart J, Rivera D, Flandoli AB. Artificial intelligence and academic integrity: exploring plagiarism in Ecuadorian universities. International Journal for Educational Integrity. 2025 Dec 26;21(1):35. doi:10.1007/s40979-025-00209-3

14. Farrokhnia M, Banihashem SK, Noroozi O, Wals A. A SWOT analysis of ChatGPT: Implications for educational practice and research. Innovations in Education and Teaching International. 2024 May 3;61(3):460–74. doi:10.1080/14703297.2023.2195846
15. Pudasaini S, Miralles-Pechuán L, Lillis D, Llorens Salvador M. Survey on AI-Generated Plagiarism Detection: The Impact of Large Language Models on Academic Integrity. J Acad Ethics. 2025 Sep 4;23(3):1137–70. doi:10.1007/s10805-024-09576-x
16. Mo F, Huang J, Yang Y, Özen Z, Maeda Y, Olenchak FR. Undergraduate students' learning outcomes with ChatGPT: A meta-analytic study. Computers and Education: Artificial Intelligence. 2026 Jun;10:100536. doi:10.1016/j.caeai.2025.100536
17. Liu Z, Zuo H, Lu Y. The Impact of <scp>ChatGPT</scp> on Students' Academic Achievement: A Meta-Analysis. J Comput Assist Learn. 2025 Aug 15;41(4). doi:10.1111/jcal.70096
18. Banihashem SK, Noroozi O, van Ginkel S, Macfadyen LP, Biemans HJA. A systematic review of the role of learning analytics in enhancing feedback practices in higher education. Educ Res Rev. 2022 Nov;37:100489. doi:10.1016/j.edurev.2022.100489
19. Al-Ghonmein AM, Al-Moghrabi KG. The potential of ChatGPT technology in education: advantages, obstacles and future growth. IAES International Journal of Artificial Intelligence (IJ-AI). 2024 Jun 1;13(2):1206. doi:10.11591/ijai.v13.i2.pp1206-1213
20. Strzelecki A, Cicha K, Rizun M, Rutecka P. Acceptance and use of ChatGPT in the academic community. Educ Inf Technol (Dordr). 2024 Dec 18;29(17):22943–68. doi:10.1007/s10639-024-12765-1
21. Page M, McKenzie J, Bossuyt P. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. 2021;(372):71.
22. Lund BD, Lee TH, Mannuru NR, Arutla N. AI and Academic Integrity: Exploring Student Perceptions and Implications for Higher Education. J Acad Ethics. 2025 Sep 20;23(3):1545–65. doi:10.1007/s10805-025-09613-3
23. Guillén-Gámez FD, Sánchez-Vega E, Colomo-Magaña E, Sánchez-Rivas E. Incident factors in the use of ChatGPT and dishonest practices as a system of academic plagiarism: the creation of a PLS-SEM model. Res Pract Technol Enhanc Learn. 2024 Sep 16;20:028. doi:10.58459/rptel.2025.20028
24. Redecker C, Punie Y. Digital Competence of Educators DigCompEdu.
25. Galindo-Domínguez H, Campo L, Delgado N, Sainz de la Maza M. Relationship between the use of ChatGPT for academic purposes and plagiarism: the influence of student-related variables on cheating behavior. Interactive Learning Environments. 2025 Jul 3;33(6):4047–61. doi:10.1080/10494820.2025.2457351
26. Balalle H, Pannilage S. Reassessing academic integrity in the age of AI: A systematic literature review on AI and academic integrity. Social Sciences & Humanities Open. 2025;11:101299. doi:10.1016/j.ssaho.2025.101299