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VISUAL CULTURE AND SYNTHETIC TECHNOLOGIES: SELF-PERCEIVED COMPETENCIES FOR THE DIDACTIC INTEGRATION OF VISUAL GENERATIVE ARTIFICIAL INTELLIGENCE IN BASIC EDUCATION

Cultura visual y tecnologías sintéticas: Autopercepción de competencias para la integración didáctica de la Inteligencia Artificial Generativa visual en Educación Básica

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ABSTRACT

Generative artificial intelligence (GAI) poses new challenges for the critical interpretation of images in elementary education. This study assessed teachers' self-perception of their competencies to integrate GAI and identified training priorities for school visual culture. A quantitative, cross-sectional, and descriptive-comparative study was conducted with 166 master's students at the Bolivarian University of Ecuador, all of whom are practicing teachers. A total of 160 completed questionnaires—consisting of ten items grouped into five dimensions—were analyzed using descriptive statistics, the Friedman test, and Wilcoxon comparisons with Holm's adjustment. Self-perception was favorable, with means ranging from 3.834 to 3.984 and a median of 4 across the five dimensions. The overall differences were significant ($p = 0.00148$), although of small magnitude (Kendall's $W = 0.0275$). After adjustment, only the difference between technological competence and collaboration and professional development remained significant (adjusted $p = 0.01968$). Collaboration was identified as a relative training priority, and promoting students' digital literacy was among the items with the lowest level of agreement. These findings guide the design of a teaching methodology that incorporates peer review of images generated with GAI and critical analysis of representational biases. Its application in the classroom requires further evaluation.

Keywords: generative artificial intelligence, teaching competencies, self-perception, elementary education, visual culture, visual literacy, teacher professional development.

RESUMEN

La inteligencia artificial generativa (IAG) plantea nuevos desafíos para la lectura crítica de imágenes en Educación Básica. Este estudio diagnosticó la autopercepción de las competencias docentes para integrar la IAG e identificó prioridades formativas para la cultura visual escolar. Se realizó un estudio cuantitativo, transversal y descriptivo-comparativo con 166 maestrantes de la Universidad Bolivariana del Ecuador, todos docentes en ejercicio. Se analizaron 160 cuestionarios completos de diez ítems, agrupados en cinco dimensiones, mediante estadísticos descriptivos, la prueba de Friedman y comparaciones de Wilcoxon con ajuste de Holm. La autopercepción fue favorable, con medias entre 3,834 y 3,984 y una mediana de 4 en las cinco dimensiones. Las diferencias globales fueron significativas ($p = 0,00148$), aunque de magnitud reducida (W de Kendall = 0,0275). Tras el ajuste, solo se mantuvo la diferencia entre competencia tecnológica y colaboración y desarrollo profesional (p ajustado = 0,01968). La colaboración se identificó como prioridad formativa relativa, y la promoción de la alfabetización digital del alumnado estuvo entre los ítems con menor acuerdo. Estos hallazgos orientan el diseño de una metodología didáctica que incorpore la revisión colegiada de imágenes generadas con IAG y el análisis crítico de los sesgos de representación. Su aplicación en el aula requiere evaluación posterior.

Palabras clave: inteligencia artificial generativa, competencias docentes, autopercepción, Educación Básica, cultura visual, alfabetización visual, desarrollo profesional docente.

1. Introduction

In contemporary digital culture, elementary school classrooms are undergoing a profound aesthetic and communicative transformation driven by the emergence of generative artificial intelligence (GAI). Far from being limited to textual processing or instrumental computing, GAI has democratized the mass production of synthetic visual artifacts: hyperrealistic images, multimodal graphic resources, automated infographics, and interactive audiovisual narratives that circulate daily in the educational cyberspace. This technological availability redefines the ecology of children's visual perception and poses an inescapable challenge for teachers: to move from the passive consumption of predesigned illustrations toward a critical and creative visual literacy capable of guiding symbolic production in the school environment.

Contemporary international literature recognizes that the integration of IAG in childhood cannot be approached as a mere functional mastery of interfaces or prompts. Its pedagogical use requires educators to develop semiotic and aesthetic competencies to select, assemble, and deconstruct visual messages in accordance with curricular objectives (Kokoç et al., 2026; Tan et al., 2025). Furthermore, the algorithmic generation of images carries significant risks for visual culture: the spread of visual disinformation, the reproduction of visual stereotypes of gender or race rooted in training models (deep biases), and the threat of an aesthetic homogenization of children's imagination (Cheah et al., 2025; Ng et al., 2025).

In this context, UNESCO's Competency Framework on Artificial Intelligence for Teachers (Miao & Cukurova, 2024) and research on teacher self-efficacy (Chiu et al., 2025) underscore the need to integrate technological, methodological, and ethical knowledge. However, an analytical gap persists regarding how elementary school teachers in Latin America—especially those enrolled in graduate programs—perceive their own abilities to pedagogically mediate these new visual languages.

From the interdisciplinary perspective of Visual Culture Studies and Digital Pedagogy, this article assesses the self-perceived competencies for integrating IAG among a sample of 166 master's-level teachers at the Bolivarian University of Ecuador. The study analyzes the tension between reported instrumental skills and the demands of ethical judgment, collaborative production, and aesthetic mediation in the classroom, with the aim of establishing a teaching methodology oriented toward reflective, inclusive, and contextualized visual engagement.

The Synthetic Image as a Cultural Artifact in Basic Education

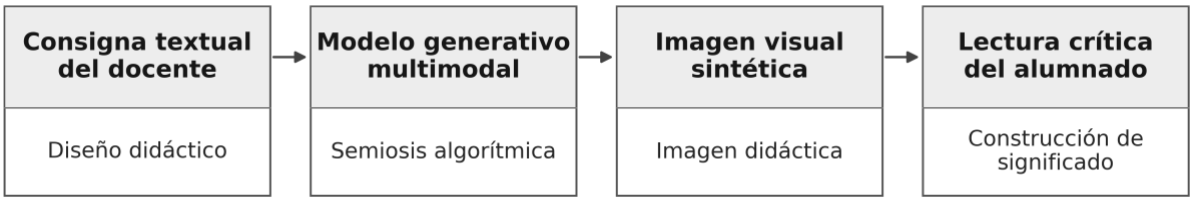
Images generated by dissemination models or transformative architectures are not mere secondary illustrations; they are cultural artifacts of cyberspace that condense preexisting discursive, ideological, and symbolic patterns found in the global data of the network. From Vilém Flusser's perspective, technical images are surfaces

produced by devices that encode and reorganize reality. Their appearance of objectivity can conceal the programming and selection operations involved in their production (Flusser, 1985/2016; Venturi, 2016).

In the generation of images from text, representation is constructed using a model that operates based on patterns learned from corpora of images and texts (Kerinska, 2026; Poltronieri & Hänska, 2020). Examining a synthetic image as a cultural artifact therefore involves asking what representations it reproduces, what elements it prioritizes, and which ones it leaves out (Musih & Fisher, 2026).

In elementary school, children's thinking is predominantly visual and narrative; therefore, the teacher's act of developing instructional materials using IAG (Dimension D1, Item I1) involves an exercise in semiotic curation. The teacher designs a textual syntax—the prompt—that translates into an iconographic representation which the student will interpret. From the perspective of Kress and van Leeuwen's visual semiotics, this translation is not neutral: the prompt selects, hierarchizes, and organizes elements such as subject, composition, style, lighting, framing, symbols, and spatial relationships, which condition the construction of meaning in the resulting image (Ghazvineh, 2024). The generation of images from text thus involves an intersemiotic translation, in which meaning is redistributed between the linguistic and visual planes, without guaranteeing a transparent correspondence between the teacher's intention and the image produced (Ghazvineh, 2024; Pektaş & Sağlam, 2025).

Figure 1.
From the Teacher's Prompt to the Critical Interpretation of AI-Generated Images



Source: research process.

Figure 1 situates this translation within a broader didactic process. The teacher's prompt guides the generation of the synthetic visual artifact, which becomes the object of analysis when the teacher incorporates it into a critical reading activity. In this activity, students interpret what the image represents and examine how its composition and omissions influence the meaning they construct.

The Ethical Perspective: Deconstructing Visual Stereotypes

As Paula-Veloz (2026) points out, the reconfiguration of teacher identity in the face of AI-generated imagery demands an active stance toward automated narratives. Ethical and critical competence (Dimension D5) takes on an urgent visual dimension: teachers

must be able to detect how algorithms visually represent professions, bodies, families, or geographies in a hegemonic or reductionist manner (Ng , et al., 2021). Educating children in digital literacy (Item I5) involves teaching them not to assume that synthetic images are a neutral reflection of reality, but rather an artificial construct susceptible to biases, manipulations, and ethical limitations.

This ethical perspective can be applied through the comparative analysis of images generated using similar prompts. Bianchi et al. (2023) documented that the text-to-image models analyzed could amplify gender and racial stereotypes in the representation of professions, even when the prompts omitted those characteristics. In the school setting, Vartiainen et al. (2025) observed that, after participating in guided workshops, fourth- and seventh-grade students improved their explanations of the potential role of training data in algorithmic bias. These findings allow us to link teachers' ethical judgment in selecting visual materials (D5) to their role in fostering students' digital literacy (I5). By comparing who is depicted, which roles are repeated, and who is excluded from the representation, students can distinguish between the patterns they observe and the hypotheses they formulate about their origins.

2. Methodology

The research was conducted using a quantitative approach, with a descriptive scope and a non-experimental cross-sectional design. It focused on assessing the self-perception of competencies for integrating generative artificial intelligence among master's students in Basic Education, through the analysis of five competency dimensions. Additionally, analyses of internal consistency, correlations among the items within each dimension, and inferential comparisons of related measures were conducted to examine the characteristics and differences in the scores obtained.

The study population consisted of 166 master's students in the Master's Program in Basic Education at the Bolivarian University of Ecuador. A census approach was used, without sample selection. After data cleaning, the analytical sample comprised 160 participants with complete responses.

A structured questionnaire consisting of ten items was used to collect data, designed to assess the self-perceived competencies of master's students in Basic Education regarding the integration of generative artificial intelligence (GAI) into their teaching practice.

The conceptual foundation of the instrument was based primarily on UNESCO's Competency Framework for Teachers in Artificial Intelligence (Miao and Cukurova, 2024), which addresses competencies related to the fundamentals and applications of AI, pedagogical integration, ethics, a human-centered approach, and teacher professional development. Likewise, the study by Acosta-Enriquez et al. (2025) was considered as methodological background, particularly their approach to teachers' competencies and knowledge regarding technology integration.

Based on the content of the items, a theoretical framework was proposed comprising five dimensions: technological competence, didactic-pedagogical competence, facilitating learning with AI-based tools, collaboration and professional development, and ethical and critical competence. Each dimension consisted of two items, assessed using a five-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (5).

The content validity of the questionnaire was examined through the judgment of seven experts, who evaluated the ten items according to the criteria of clarity, relevance, and adequacy. Based on their assessments, an Aiken's V coefficient of 0.81 was obtained, providing favorable evidence of content validity. Internal consistency was also examined using Cronbach's alpha, and Spearman's correlations were calculated between the two items in each dimension, using the 160 completed questionnaires. These procedures helped to supplement the psychometric evidence for the instrument, without assuming that they alone confirm its factor structure.

Table 1 presents the operationalization of the variable "self-perceived competencies for integrating generative artificial intelligence," organized into five dimensions, along with their respective indicators and items. This structure allows for establishing the correspondence between the conceptual components of the variable and the aspects assessed by the questionnaire.

Table 1.
Operationalization of Variables

Dimension	Indicators	Items	Item Statement
Technological Competence	Tool Selection	I1	I select and use Generative Artificial Intelligence tools to develop instructional materials
	Understanding Capabilities and Limitations	I2	I understand the features, capabilities, and limitations of Generative Artificial Intelligence tools before incorporating them into my teaching practice.
Teaching and Pedagogical Competence	Curriculum Design	I3	I use Generative Artificial Intelligence tools to design and enhance learning activities aligned with curriculum objectives and student needs.
	Integration of Teaching Strategies	I4	I integrate Generative Artificial Intelligence tools into various teaching strategies to support student learning.
Facilitating Learning	Digital literacy	I5	I use Generative Artificial Intelligence tools to promote students' digital literacy.
	Guidance on Responsible Use	I6	I guide students in the responsible, safe, and effective use of Generative Artificial Intelligence tools to support learning.

Collaboration and Professional Development	Resource Creation and Sharing	I7	I create and share teaching resources developed with Generative Artificial Intelligence tools in professional teaching communities and networks.
	Collaboration and Updates	I8	I use Generative Artificial Intelligence tools to strengthen collaboration with other teachers and support my ongoing professional development.
Ethical and Critical Competence	Integrity and Copyright	I9	I apply principles related to copyright, academic integrity, and plagiarism prevention when using Generative Artificial Intelligence tools.
	Risks and Biases	I10	I identify and manage the risks associated with the use of Generative Artificial Intelligence tools, such as misinformation, biases, misuse, and technological dependence.

Note: Developed independently, drawing on conceptual frameworks from Miao and Cukurova (2024) and methodological inspiration from Acosta-Enriquez et al. (2025).

Data Processing and Statistical Analysis

During database cleaning, eight missing values were identified, distributed among six participants. Listwise deletion was applied, resulting in a final analytical sample of 160 participants, equivalent to 96.4% of the initial records. All descriptive, internal consistency, and inferential analyses were performed on this same dataset.

Scores for each dimension were calculated as the average of its two items. Internal consistency was examined using Cronbach's alpha, and the association among the items within each dimension was assessed using Spearman's correlation. Differences among the five dimensions were analyzed using the nonparametric Friedman test, followed by pairwise comparisons using the signed-rank Wilcoxon test with Holm's correction for multiple comparisons. A significance level of 0.05 was set, and Kendall's W coefficient was calculated as a measure of effect size.

3. Results

Descriptive Results and Internal Consistency

The mean scores for the five dimensions ranged from 3.834, corresponding to collaboration and professional development, to 3.984, corresponding to technological competence. All dimensions had a median of 4.0. The overall internal consistency of the questionnaire was high ($\alpha = 0.951$), while the coefficients per dimension ranged from 0.813 to 0.904, as shown in Table 2.

Table 2.

Descriptive Results by Dimension

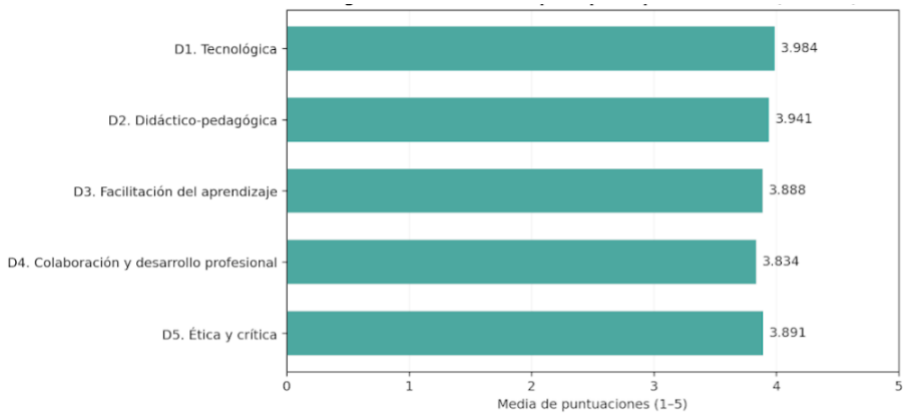
DIMENSION	ITEMS	N	MEAN	MEDIAN	A
D1. Technological Competence	I1–I2	160	3,984	4.0	0.813
D2. Teaching and Pedagogical Competence	I3–I4	160	3.941	4.0	0.904
D3. Facilitating Learning with IAG	I5–I6	160	3.888	4.0	0.870
D4. Collaboration and Professional Development	I7–I8	160	3.834	4.0	0.849
D5. Ethical and Critical Competence	I9–I10	160	3.891	4.0	0.865

Note: The scores for each dimension correspond to the average of its two items. All statistics were calculated using the 160 completed questionnaires. α = Cronbach's alpha.

Figure 2 complements the results in Table 2 by graphically representing the mean scores for the five dimensions evaluated. A relatively homogeneous distribution is observed, with values close to four points on the five-category scale, indicating a predominantly favorable self-perception of the competencies required to integrate IAG.

Figure 2

Mean self-perception scores by dimension



Note: The scores correspond to the average of the two items in each dimension, expressed on a scale of 1 to 5.

Figure 2 presents the percentage distribution of responses from master's students in Basic Education on the ten items grouped into five dimensions of competencies for integrating generative artificial intelligence (GAI). The results show a predominance of favorable responses, although with variations among the assessed aspects.

In the technological competency (D1), 81.3% of the responses to the item related to the selection and use of GAI tools to develop instructional materials fell into the " gree" categories, while understanding of their functionalities, capabilities, and limitations reached 84.4%. These results reflect a positive self-perception regarding the use of these technologies.

Didactic-pedagogical competence (D2) also showed a favorable trend. 83.1% of the responses fell into the "agree" categories for the item related to the use of IAG to design and enhance learning activities, while 82.5% expressed a positive assessment of their integration into various teaching strategies. These results suggest a favorable perception of the possibilities for the pedagogical incorporation of these tools.

In the learning facilitation dimension (D3), descriptive differences were observed among the items. The use of IAG to promote students' digital literacy achieved a 74.4% agreement rate, compared to the 83.1% recorded for guidance on their responsible, safe, and effective use. This difference highlights the promotion of digital literacy as an aspect that warrants attention in teacher training.

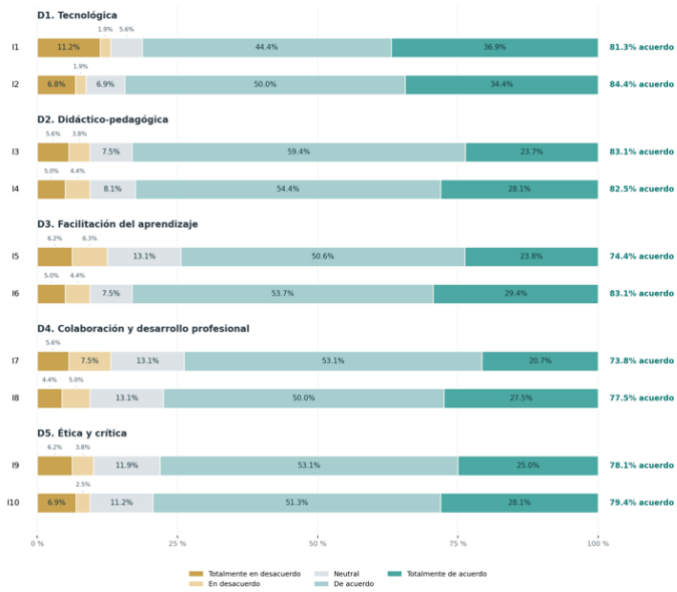
Meanwhile, the collaboration and professional development dimension (D4) showed agreement rates of 73.8% for the creation and sharing of instructional resources and 77.5% for strengthening professional collaboration through IAG. These results—particularly the lower agreement rate recorded for the creation and exchange of teaching resources (73.8%)—suggest opportunities to promote collaborative work experiences and ongoing professional development.

Finally, regarding ethical and critical competence (D5), 78.1% of the responses fell into the agreement categories for the item related to the application of principles regarding copyright, academic integrity, and plagiarism prevention, while 79.4% reflected a favorable perception regarding the identification and management of risks associated with the use of IAG. Although positive responses predominate, the results support the need to continue strengthening teachers' ethical and critical training.

Overall, the findings show a predominantly favorable self-perception of the assessed competencies. However, the lower percentages of agreement observed in digital literacy, resource creation and sharing, and professional collaboration highlight areas requiring attention to inform a teaching methodology aimed at the pedagogical integration of OER in K-12 education.

Figure 3.

Percentage distribution of self-perceived competencies for integrating IAG, by item



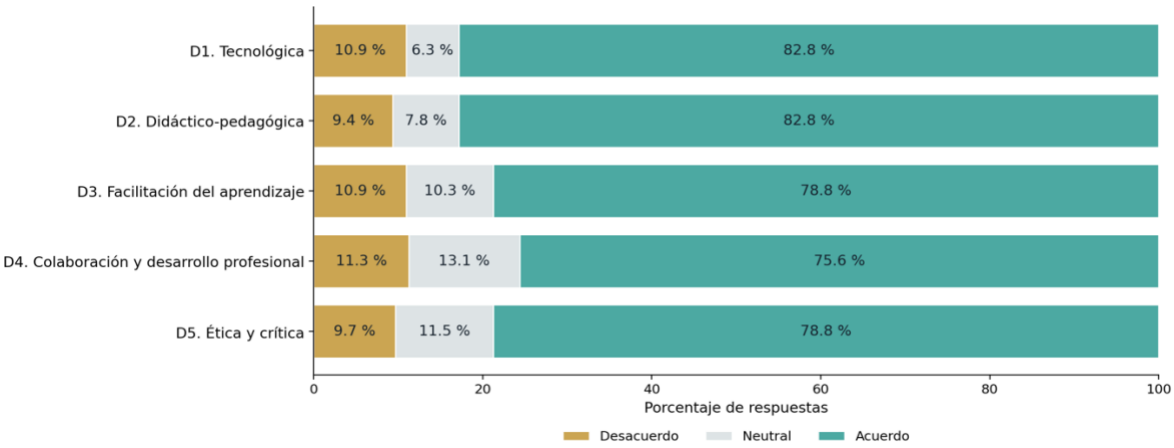
Note. The percentages were calculated based on the 160 completed questionnaires. Each bar represents the distribution of responses across the five categories of the Likert scale. The total agreement percentage corresponds to the sum of the "Agree" and "Strongly Agree" categories.

Figure 3 shows a predominance of "Agree" and "Strongly Agree" responses across all ten items. In the technological competency (D1), these categories accounted for 80.6% in the selection and use of tools and 83.7% in understanding their possibilities and limitations. In didactic-pedagogical competence (D2), they reached 82.8% in the design of activities and 82.3% in integration into teaching strategies.

In learning facilitation (D3), agreement was lower regarding the promotion of digital literacy (74.7%) than regarding guidance on responsible and safe use (83.0%). In collaboration and professional development (D4), the percentages were 74.1% for the creation and sharing of resources and 77.7% for collaboration and professional development. In ethical and critical competence (D5), agreement reached 78.3% regarding academic integrity and copyright, and 79.4% regarding risk identification and management.

Figure 4.

Percentage distribution of self-perceived competencies for integrating generative artificial intelligence, by dimension



Note. The percentages were calculated based on the responses of the 160 participants to the two items in each dimension (320 responses per dimension). The categories "Disagree" and "Agree" group the two negative and two positive options on the Likert scale, respectively, while "Neutral" corresponds to the middle category.

Figure 4 presents the percentage distribution of responses from master's students in Basic Education, grouped into three categories: disagreement, neutrality, and agreement, corresponding to the five dimensions of competencies for integrating generative artificial intelligence (GAI).

The results show a predominance of favorable responses across all dimensions, with agreement rates exceeding 75%. The highest proportions were recorded in the didactic-pedagogical and technological competencies, both at 82.8%, reflecting a positive self-perception regarding the use of GAI tools and their incorporation into the design of teaching activities and strategies.

Meanwhile, the dimensions of learning facilitation and ethical and critical competence each achieved 78.8% favorable responses. Although these results maintain a positive trend, the neutral and unfavorable responses suggest the need to strengthen

competencies related to student guidance, the responsible use of GAI, and the identification of risks associated with these technologies.
The "collaboration and professional development" dimension showed the lowest percentage of agreement (75.6%) and the highest proportion of neutral responses (13.1%). This result highlights an area requiring attention in teacher training, particularly regarding the collaborative creation of educational resources, the exchange of experiences, and the use of IAG for ongoing professional development.
Overall, the results show a predominantly favorable self-perception of the assessed competencies, although with descriptive differences across dimensions. These findings serve as a reference for developing a teaching methodology that consolidates existing competencies and addresses the identified training needs, especially in collaboration and professional development.

Table 3 shows the Spearman correlations between the items across the five dimensions, all of which were positive and statistically significant ($p < 0.001$), with coefficients ranging from 0.592 to 0.804. The strongest association was found in the didactic-pedagogical competency ($\rho = 0.804$), while the weakest was in the technological competency ($\rho = 0.592$). These results provide evidence of an association among the items comprising each dimension and complement the internal consistency coefficients, although they do not, on their own, establish the factorial validity of the proposed structure.

Table 3.

Correlations Among Items in the Competency Dimensions for Integrating IAG

DIMENSION	ITEMS	N	SPEARMAN'S RHO	P
D1. Technological	I1–I2	160	0.592	< 0.001
D2. Didactic-pedagogical	I3–I4	160	0.804	< 0.001
D3. Facilitation of Learning	I5–I6	160	0.734	< 0.001
D4. Collaboration and Professional Development	I7–I8	160	0.731	< 0.001
D5. Ethics and Criticism	I9–I10	160	0.723	< 0.001

Note: The coefficients correspond to Spearman's correlations between the two items in each dimension, calculated based on the 160 completed questionnaires.

Inferential Comparison of Dimensions

The Friedman test revealed statistically significant differences among the scores of the five dimensions, $\chi^2(4) = 17.602$; $p = 0.00148$, although with a small effect size (Kendall's $W = 0.0275$). After applying the Holm correction to the ten pairwise comparisons using the Wilcoxon test, only one statistically significant difference was identified between technological competence s (D1) and collaboration and professional development (D4), with an adjusted p-value of 0.01968 (Table 4). These results indicate differences in self-reported scores, without implying causal effects or differences in demonstrated competencies.

Comparison	unadjusted p	Adjusted p (Holm)
D1 vs. D2	0.12129	0.72773
D1 vs. D3	0.02911	0.23292
D1 vs. D4	0.00197	0.01968
D1 vs. D5	0.07794	0.54556
D2 vs. D3	0.29815	1.00000
D2 vs. D4	0.01468	0.13210
D2 vs. D5	0.36468	1.00000
D3 vs. D4	0.16006	0.80028
D3 vs. D5	0.95106	1.00000
D4 vs. D5	0.30286	1.00000

Note: Comparisons among the five dimensions were performed using the Wilcoxon signed-rank test for paired samples (n = 160). Adjusted p-values were obtained using the Holm procedure to account for multiple comparisons. Adjusted p-values less than 0.05 were considered statistically significant.

Implications for Teaching Methodology

The results of the diagnostic assessment provide guidelines for designing a teaching methodology aimed at the pedagogical integration of IAG into basic education. In particular, the lower percentages of agreement on items related to the creation and sharing of instructional resources, professional collaboration, and the promotion of digital literacy suggest prioritizing training activities linked to these competencies.

From this perspective, the methodology could incorporate four components: training in the selection and critical evaluation of IAG tools; the design of instructional activities aligned with curriculum objectives; collaborative work through the creation, review, and exchange of educational resources; and ethical guidance for the responsible use of these technologies. These components constitute guidelines derived from the assessment and should be further developed and evaluated to determine their relevance and effectiveness.

Discussion

In the 160 completed questionnaires from the 166 participating master's students, self-perceived competencies for integrating IAG were predominantly favorable. The means ranged from 3.834 to 3.984, with a median of 4 across the five dimensions. The TAICS scale by Chiu et al. (2025) provides a framework for interpreting teacher self-efficacy as a multidimensional construct. This profile can also be interpreted in light of Wang et al. (2023), who conceive of teacher readiness to use AI as a set of components that includes knowledge, skills, pedagogical vision, and ethical considerations. In K-12 education, Cheah et al. (2025) examined readiness, practices, and barriers to adoption, and Kim (2025) found an association between familiarity with AI-based learning and perceived readiness. Ajaka et al. (2026), drawing on an expanded model of technology acceptance, provide a framework for analyzing how teachers' perceptions and implementation conditions influence adoption. In the

present study, favorable ratings reflect the master's students' stated confidence in the assessed competencies.

Technological competence (D1, M = 3.984) scored higher than collaboration and professional development (D4, M = 3.834). This was the only pairwise difference that remained significant after Holm's adjustment (adjusted p = 0.01968), in the context of a small overall effect (Kendall's W = 0.0275). The difference positions collaborative design and peer review of resources as relative priorities for professional development. The reviews by Celik et al. (2022) and Chiu et al. (2023) document opportunities and challenges of educational AI in planning, teaching, and assessment. In the Latin American context, Betti Galasso (2026) situates the development of competencies for integrating AI-generated images within a scenario of unequal access to educational technologies and resources. In Basic Education, these contributions provide a foundation for a peer review that assesses both the curricular relevance of the generated images and the representation of students' cultural environment.

In the area of learning facilitation (D3), 83.1% agreed with their ability to guide students in the responsible, safe, and effective use of AI-generated images, and 74.4% agreed with their ability to use them to promote digital literacy. This descriptive difference helps identify a training priority. Ng et al. (2023) frame teachers' digital competencies in AI in relation to 21st-century skills. Meanwhile, the MAILS self-report scale distinguishes facets of AI literacy and incorporates psychological competencies (Carolus et al., 2023). These contributions help clarify the scope of item I5. Applied to visual culture, promoting digital literacy involves teaching students to explain how a synthetic image was produced, compare what it shows with reliable sources, and identify possible biases in representation.

Celik's (2023) Intelligent-TPACK framework links technological and pedagogical knowledge with ethical judgment regarding AI outcomes. In the present study, 78.1% agreed with their ability to apply principles of academic integrity, copyright, and plagiarism prevention (I9). Cotton et al. (2024) address the challenges posed by ChatGPT to academic integrity in higher education. In the training of master's students, this background informs a practice applicable to working with synthetic images: documenting the use of AI-generated images, explaining selection and editing decisions, and verifying the relevance of the representations to the Ecuadorian cultural context. These actions can be integrated into a proposal for critical visual pedagogy that combines material design, peer review, and the interpretation of images in the classroom.

The research was conducted within a single graduate program, which limits the generalizability of the results. Furthermore, the cross-sectional design and the self- , self-reported nature of the instrument allow for the description of self-perceived competencies but do not verify their effective application in teaching practice. Although the questionnaire showed favorable evidence of content validity and internal consistency, its five-dimension structure—with two items per dimension—requires additional validation studies.

4. Conclusions

The assessment identified a predominantly favorable self-perception of competencies for integrating IAG among the 166 participating master's students, all of whom were elementary school teachers. The means ranged from 3.861 to 3.964, and the median was 4 across the five dimensions. The results describe self-reported capabilities and practices, without verifying teaching performance.

Technological competence had the highest mean, while collaboration and professional development had the lowest. The overall differences were statistically significant, though of modest magnitude. Only the comparison between these two dimensions remained significant after Holm's adjustment. Therefore, collaboration constitutes a relative priority for professional development within the reported profile.

The findings guide the design of a teaching methodology that links the critical selection of tools, curriculum planning, digital literacy for elementary school students, ethical judgment, and collegial work. The proposal includes the shared creation of resources, content verification, and peer review among teachers. These guidelines require further evaluation to establish their relevance and effectiveness.

The contribution consists of providing contextualized evidence for the training of teacher candidates and priorities for a subsequent design phase. The observed internal consistency supports the coherence of the responses but does not replace validation of the instrument. Further studies should examine the structure of the measure and compare self-perception with evidence of professional performance.

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