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Generative artificial intelligence and creativity in photography education: innovations for artistic and critical development

Inteligencia artificial generativa y creatividad en la educación fotográfica: innovaciones para el desarrollo artístico y crítico

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ABSTRACT

This article presents a teaching innovation that integrates the use of generative artificial intelligence (GenAI) and its implications in courses of the Bachelor's Degree in Photography and Audiovisual Creation at the TAI University School of Arts (an affiliated center of the Rey Juan Carlos University). We propose an action-research design structured in three phases—technological exploration and image generation (DALL·E 3, Midjourney, Runway ML Gen-4), critical editing and post-production (Adobe Photoshop, Lightroom, DaVinci Resolve, After Effects), and ethical-ecological reflection with a final individual report (Prezi). Data were collected through students' reflective journals, classroom forums, and end-of-module critical memos. Results, organized thematically, indicate: (a) increased visual production (15–40 images per student) and enhanced ideation; (b) development of algorithmic bias awareness—almost 100% of participants

explicitly addressed bias and proposed inclusive strategies; (c) greater attention to the environmental footprint of generative artificial intelligence; and (d) a shift in the teacher's role toward critical mediation. We discuss implications for curriculum design in arts education, limitations related to measurement instruments, and future lines for evaluation using validated scales.

Keywords. Generative artificial intelligence, visual creativity, higher education, digital ethics, sustainability.

RESUMEN

Este artículo presenta una innovación docente que integra el uso de la inteligencia artificial generativa (IAG) y sus repercusiones, en asignaturas del Grado en Fotografía y Creación Audiovisual de la Escuela Universitaria de Artes TAI (centro adscrito a la Universidad Rey Juan Carlos). El diseño, de investigación-acción, se estructura en tres fases: (1) exploración tecnológica y generación de imágenes (DALL·E 3, Midjourney, Runway ML Gen-4); (2) edición crítica y postproducción (Adobe Photoshop, Lightroom, DaVinci Resolve, After Effects); y (3) reflexión ética y ecológica con memoria individual final (Prezi). La recogida de datos se realizó mediante diarios de aprendizaje, foros de aula y memorias críticas. Los resultados, organizados por ejes, evidencian: (a) incremento de la producción visual (15–40 imágenes por estudiante) y de la capacidad de génesis; (b) desarrollo de la conciencia sobre el sesgo algorítmico —casi el 100% lo abordó de forma explícita—; (c) mayor atención a la huella ambiental de la inteligencia artificial generativa; y (d) re-configuración del rol docente hacia la mediación crítica. Se discuten implicaciones curriculares para la educación artística, limitaciones (instrumentación y medición) y líneas futuras de evaluación con escalas validadas.

Palabras clave. *Inteligencia artificial generativa, creatividad visual, educación universitaria, ética digital, sostenibilidad.*

INTRODUCTION

University-level photography training is undergoing a profound transformation, largely driven by the convergence of technological developments, new forms of visual consumption, and the ethical and social challenges of our time.

In this context, the emergence of generative artificial intelligence (GenAI) constitutes one of the most significant innovations of recent years, with a direct impact on how we conceive, produce, and teach images. GenAI focuses on the creation of new content (text, images, audio, and video) from existing data (Cortés Hernández et al., 2024). With algorithms capable of generating visual content from text, as in platforms such as DALL·E, Midjourney, or Runway ML Gen-4, the boundaries between human creation and automated production become blurred, raising new questions about authorship, creativity, aesthetics, and the veracity of images.

The emergence of these automatic image-generation tools not only transforms artistic and professional practices, but also forces a reconsideration of the pedagogical frameworks through which photography is taught at university. Traditional teaching, centred on capture technique, composition, colour theory, and visual storytelling, must be expanded to include competencies related to the mindful use of emerging technologies.

This entails not only knowing how to operate tools, but also understanding their foundations, biases, limitations, and ethical, political, and environmental implications. Thus, twenty-first-century photography education must integrate advanced digital literacy with a critical perspective that enables students to position themselves with respect to images not as passive consumers or functional technicians, but as critical and ethically responsible creators.

The creative potential of generative artificial intelligence is undeniable: it allows exploration of new aesthetic forms, the imagining of visual worlds that would be impossible or prohibitively expensive to produce with traditional means, and experimentation with narratives that challenge conventions of representation. However, this technological promise also entails multiple risks: delegating creativity to an algorithm, reproducing stereotypes through models trained on biased datasets, and trivializing the creative act. According to Iturmendi, algorithmic discrimination may arise as a result of biases in the data used to train and test algorithms. If we start from historical data containing prejudice and discrimination, algorithms can learn and perpetuate those biases (Iturmendi, 2023).

It is also necessary to consider the environmental impact of the large-scale use of these tools, given the high energy consumption required to train and operate GenAI models. This introduces an ecological dimension that must be addressed through a sustainable pedagogy.

In the context of the TAI University School of Arts, a center affiliated with Universidad Rey Juan Carlos (URJC), this proposal is based on the conviction that university faculty play a central role in mediating between technology, creativity, and critical awareness. The inclusion of GenAI in the classroom should not respond solely to a logic of technical innovation, but to a comprehensive educational strategy that promotes a deep understanding of visual media in its social and technological context. Artificial intelligence (AI) comprises a set of techniques in which algorithms discover or learn associations by making predictions from large amounts of data, and in which the algorithm is the procedure that solves the problem. However, the outputs produced by these models may violate human rights (Sandoval-Martin and Martínez-Sanzo, 2024).

Through the design of teaching activities that integrate GenAI into students' creative and reflective processes, this proposal advances a renewal of the pedagogical approach that embraces both the expansion of expressive possibilities and the ethical questioning of the image in the digital era.

OBJECTIVES

The main objective of this proposal is to reframe university-level photography teaching from a critical, creative, and responsible perspective, integrating the use of generative artificial intelligence as a pedagogical tool that not only enables exploration of new aesthetics, but also fosters the development of ethical, social, and environmental competencies in students.

In a visual environment increasingly mediated by algorithms, the university has a responsibility to provide training that prepares future image professionals to engage with these competencies in an informed, innovative, and reflective manner. Within this general framework, the following specific objectives are established:

- To analyze the creative and formative potential of GenAI in the photography classroom. The aim is to identify how these technologies can become catalysts for new processes of visual and narrative thinking. This involves not only experimenting with available tools, but also reflecting on their application in educational contexts and on how their use can stimulate originality, formal experimentation, and the articulation of students' personal visual discourses.
- To design and implement teaching activities that incorporate GenAI into visual-creation projects. We propose developing teaching methodologies that combine theory and practice, enabling students to work with GenAI, editing, and critical analysis. The goal is to foster interdisciplinary thinking by combining technical knowledge with conceptual frameworks drawn from image theory, philosophy of technology, digital ethics, and critical ecology.
- To promote critical authorship in contexts of human-algorithm co-creation. In an environment where images can be generated automatically, it is crucial to redefine the

concept of authorship. Students must learn to position themselves as critical subjects in relation to their creations, identifying automatically generated elements and reflecting on their ethical responsibility in selecting, manipulating, and disseminating those images. The aim is to cultivate sensitivity to the cultural, social, and political frameworks that can shape visual creation, and to develop empathy in this regard.

- To make visible the risks of algorithmic bias in GenAI models. Many of these technologies have been trained on large datasets that carry structural inequalities such as racism, sexism, or Eurocentrism (Crawford, 2021). It is students' responsibility to identify such biases, question them, and avoid reproducing them in their visual projects. Critical literacy with respect to algorithms becomes an essential competence for any image-maker in the twenty-first century.
- To foster environmental awareness in the use of computationally intensive digital tools. The development and use of GenAI models require computational infrastructures that consume large amounts of energy, contributing to climate change (Bender et al., 2021). The aim is to sensitize students to the ecological footprint of their technological decisions, promoting an ethic of responsible, moderate, and sustainable use of digital resources in artistic practice, including the option of foregoing their use if it is considered a threat to nature.
- To strengthen the role of faculty as critical mediators between technology, creativity, and social responsibility. Rather than adopting a merely technical role, faculty should act as guides in a comprehensive training process that includes ethical, political, and aesthetic analysis of digital tools. This implies transforming teaching practice toward a more research-oriented, reflective, and committed approach aligned with values of equity, inclusion, and sustainability.

METHODOLOGY

Institutional context and design

This proposal was developed within the Bachelor's Degree in Photography and Audiovisual Creation at the TAI University School of Arts (a center affiliated with Universidad Rey Juan Carlos in Madrid), specifically in courses linked to digital imaging and to digital post-production for photography and video. The courses were as follows:

- Video post-production, 3rd year of the Bachelor's Degree in Photography and Audiovisual Creation
- Image technology, 1st year of the Bachelor's Degree in Photography and Audiovisual Creation

The methodology employed follows a logic of teaching innovation, active learning, and a critical approach, oriented not only toward developing technical skills, but also toward fostering students' ethical, aesthetic, and environmental awareness.

The methodological strategy was structured in three main phases, articulated around GenAI practice, critical reflection, and conscious visual production.

The adopted design was action research with exploratory mixed methods, aimed at documenting and improving teaching practice. Participant observation can take two forms: an exogenous modality, which more closely corresponds to non-participant observation, and an endogenous modality, in which the researcher becomes part of the sample (Martínez-Barragán, 2011), providing faculty with an internal point of view as participants in the process.

Participants

The sample comprised thirty-four students, distributed across two courses:

- Video post-production:

18 students
Age: 20-25 years
Gender: 12 women / 6 men

- Image technology:
  16 students
  Age: 18-22 years
  Gender: 10 women / 6 men

Two inclusion and exclusion criteria were established to ensure equitable participation and stability over time, which is crucial for the effectiveness of the sample under analysis. The inclusion criteria were: being enrolled and participating in the GenAI creation practices; the exclusion criteria were: not submitting assignments or not participating in group dynamics.

All participants were enrolled in the corresponding courses and participated regularly in the practical sessions and assessed activities associated with the GenAI proposal. No students were excluded, as all completed the minimum required activities.

Overall methodological approach

The study follows an interpretive qualitative method, complemented by techniques typical of contemporary arts education (Rubio Fernández, 2021):

- Participant observation during practical sessions and debates.
- Analysis of images produced through GenAI and post-production.
- Structured questionnaires assessing the creative and ethical process.
- Students' final report, based on open-ended questions.
- Photo-essay and audiovisual recording as MAE instruments.

This design combines perceptual, discursive, and visual data to understand the educational experience across multiple dimensions.

Tools and conditions of use

Accessibility of the applications was as follows:

- DALL·E 3 (version included in Microsoft Copilot/ChatGPT; free access for part of the student body).
- Midjourney v6 (basic subscription funded by the institution; group use in workshops, not individual).
- RunwayML Gen-2/Gen-4 (basic subscription funded by the institution, with limited credits).

Students did not bear any economic cost; use was supervised during practical sessions. This facilitates replication of the study in other contexts with similar budgets.

Data-collection instruments

Several instruments were incorporated to strengthen the validity of the study, taking into account the limitations imposed by the sample. These tools included:

- Structured evaluation questionnaire (post-activity), which included ten Likert-scale items (1-5) on:
  - clarity regarding the use of GenAI
  - perceived creativity
  - technical difficulties
  - ethical awareness
  - reflection on bias
  - perceived environmental impact
- Final individual report, with the following open-ended questions:
  - What creative decisions did you make in each phase?
  - What biases, risks, or ethical doubts did you identify?

    - What effects did GenAI have on your photographic style?
    - What learning can you transfer to future projects?
- Participant observation and audiovisual records documenting:
    - classroom interactions
    - statements and interventions during debates
    - editing strategies
    - moments of collaboration or creative block
- Visual analysis consisting of:
    - review of compositions
    - comparison between generated images and original photographs
    - identification of repetitive patterns or visual stereotypes.

Phases of the teaching-research process

Phase 1: Technological exploration and visual generation

In the first stage, students became familiar with GenAI tools such as DALL·E 3, Midjourney, and Runway ML Gen-4. Through practical sessions, they were taught how to formulate complex prompts (textual instructions) to generate images, which provided an opportunity to develop skills in visual description, linguistic precision, and aesthetic conceptualization. Students were asked to develop a series of images based on personal ideas or visual concepts linked to their artistic interests.

An introductory and accessible explanation was provided of what a generative model is, how it interprets a prompt, how it is trained and with what implications, its technical limitations (resolution, style, coherence), and the biases derived from training data.

This phase did not focus solely on the instrumental use of the technology, but also on observing and analyzing the results. Discussion addressed the visual quality of the images, the models' interpretive fidelity, and possible repetitions or stereotypes that appeared in generated representations. This made it possible to initiate a discussion on algorithmic bias and the training logic of the models, introducing basic notions of how datasets are constructed and what types of images are prioritized or excluded.

Each student generated several initial images based on personal concepts or topics related to the course. This phase produced the first visual data and allowed for recording technical difficulties, strategies, and variations in the use of descriptive language.

Phase 2: Critical editing and creative post-production

In the second stage, the generated images underwent editing and post-production processes using software such as Adobe Photoshop, Lightroom, DaVinci Resolve, and After Effects, integrating color correction, montage, and combination with original photographs. The objective was to develop a hybrid visual language that dialogued between generated imagery and traditional photography. Analysis focused on compositional decisions, visual coherence, the mixing of analog/digital techniques, and aesthetic and narrative intentionality.

This approach encouraged reflection on image materiality, chromatic coherence, and visual intentionality. In addition, the role of the author in relation to images produced partly by an automated system was discussed, fostering in-depth questioning of the notion of assisted creativity and the boundaries between technical production and artistic expression.

This phase also made it possible to assess students' technical knowledge in terms of their handling of digital tools, as well as their ability to make conscious compositional decisions.

Phase 3: Ethical debate, ecological impact, and final reflection

In the final phase, sessions of critical analysis and collective debate were held addressing ethical issues related to authorship, representation, the use of synthetic images in documentary

and advertising contexts, and the role of GenAI in contemporary creation. Key texts such as Kate Crawford's Atlas of AI (2021) and Virginia Eubanks' Automating Inequality (2018) were discussed in order to connect visual practice with current theoretical frameworks.

In addition, analysis of the environmental impact of these technologies was introduced, explaining the high energy cost of GenAI models and encouraging ecological reflection on the use of digital resources (Bender et al., 2021).

To close, students produced an individual critical report in which they reflected on their creative process, the learning acquired, and the ethical and ecological dilemmas identified. Prezi, an application for creating presentations, was used, supporting its design with GenAI.

Figure 1. Screenshot of the Prezi application.

Source: Screenshot. Author's own image.

Analysis procedure

To ensure rigor and clarity in the analysis, the following steps were followed:

- Thematic coding of the questionnaire and reports.
- Data triangulation across:
  - observation
  - generated images
  - audiovisual records
  - students' responses.
- Comparative visual analysis across productions.
- Categorization according to the study's objectives (creativity, ethics, sustainability, authorship, visual literacy).

Ethics and confidentiality

Students were informed of the academic purpose, confidentiality was ensured, and the use of images of people without consent was avoided.

RESULTS

The evaluation of the teaching experience centered on the use of GenAI in the university classroom of the Bachelor's Degree in Photography and Audiovisual Creation yielded a series of

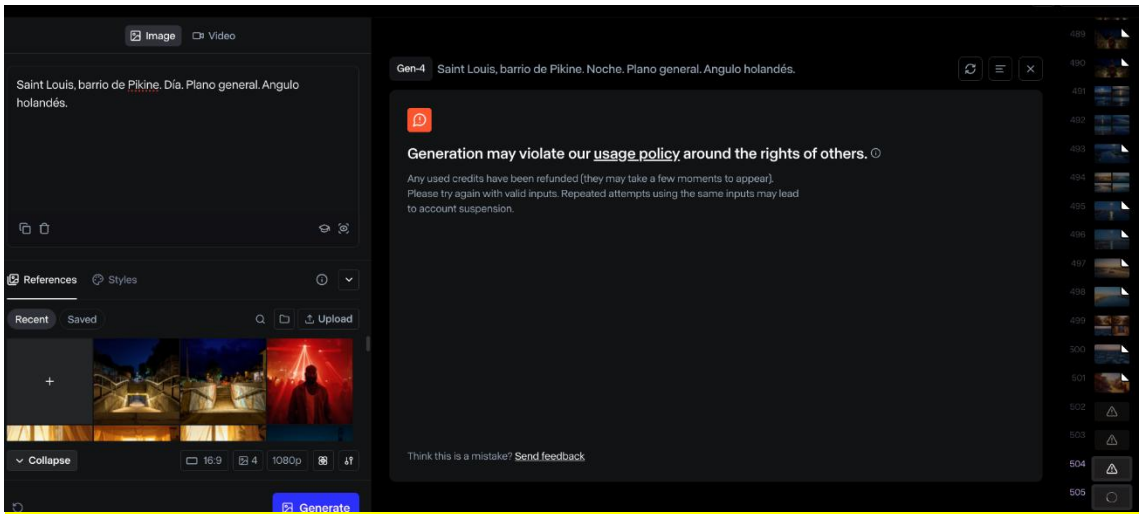
relevant results across multiple dimensions of the educational process, including the development of creativity, critical thinking, visual literacy, and ethical awareness.

This section systematizes these results, organized around six main axes: visual production, creativity, algorithmic bias, environmental awareness, methodological transformations, and overall assessment.

Visual production

One of the most immediate and visible results was the high quantity and diversity of visual productions generated throughout the module. Each student was able to produce between 15 and 40 original images with tools such as DALL·E, Midjourney, and Runway ML Gen-4, depending on their interests and the time invested. These images ranged from futuristic portraits and oneiric landscapes to hybrid photomontages and conceptual visual essays. A notable exploration of styles, techniques, and genres was evident, broadening the understanding of the photographic as an expanded field.

Figure 2. Screenshot of the Runway ML Gen-4 application.



Source: Screenshot. Author's own image.

The possibility of experimenting without technical restrictions allowed many students to develop complex ideas that would otherwise have been unfeasible due to a lack of material resources or time. This democratizing aspect of GenAI was especially valued by those students with less technical experience or limited access to professional equipment. In addition, an improvement was observed in project visual planning, as students could sketch ideas and test variations quickly before moving on to final production.

Creativity

There was a significant qualitative advance in students' ability to develop visual projects more autonomously. Working through prompts (written instructions for generating images) required precise and coherent linguistic expression, contributing to the development of skills for articulating ideas and visual narratives.

Rather than constraining creativity, the use of GenAI acted as an element that encouraged the conception of alternative realities, visual metaphors, and connections across different disciplines. Several students also reported that the tools helped them overcome creative blocks and doubts, as they felt less pressure to be judged in the initial stages of the creative process. This supports the notion that GenAI can serve as a therapeutic and exploratory tool that facilitates access to

complex creative processes without fear of error or failure. Nevertheless, the process must be carefully guided because, as Jorge Carrión notes, can Big Data and artificial intelligence be used to understand the chronology of emotion, representation, ideas, and human fears? Perhaps. It would undoubtedly be a more just and more rational history, but one with an abstract and alien rationality, profoundly algorithmic, because human art is by nature irrational and unjust (Carrión, 2020).

The table below presents the post-activity questionnaire data together with the description of each item, clearly revealing a positive impact on students' creative development.

Table 1. Post-activity questionnaire: use of GenAI in photography.

ITEM	ITEM DESCRIPTION	RESPONSE (1-5)
1	I clearly understood how generative artificial intelligence tools work.	4
2	I felt able to generate images relevant to my photographic projects.	5
3	GenAI increased my creativity or opened up new visual possibilities.	4
4	I encountered technical difficulties (prompts, parameters, resolution, coherence).	3
5	It was accessible to learn how to use the tools covered in class.	4
6	I better understand the ethical dilemmas associated with using AI in visual creation.	4
7	I can identify possible biases (cultural, gender, aesthetic) in the generated images.	5
8	I am aware of the environmental impact linked to AI training and use.	3
9	The combination of AI and traditional photography enriched my creative process.	4
10	I consider it necessary to continue working on AI within the Photography degree program.	5

Source: Authors' own elaboration.

Algorithmic bias

An important aspect of the module was the explicit inclusion of sessions devoted to algorithmic bias, stereotyped representations, and power structures embedded in artificial intelligence models. During group activities comparing and analyzing results, recurring patterns were identified in representations of gender and other aspects such as race, social class, and cultural geography. For example, situations were discussed in which concepts such as "engineer," "low-income person," or "artist" frequently led to outputs grounded in stereotypes. Students' ability to identify these biases and reframe them evolved gradually over the course of the module.

In the final reflective essays, all participants explicitly mentioned the issue of bias and suggested ways to create more inclusive images or to counter dominant narratives. This demonstrates a strong development of critical thinking and an ethical use of technological tools. The following table confirms students' identification of bias, with the mean at the maximum level.

Table 2. Item means (based on the average student response)

ITEM	MEAN	INTERPRETATION
1	4.0	Good understanding of how GenAI works.
2	5.0	Very high confidence in producing relevant images.
3	4.0	The tool enhances creativity.
4	3.0	Moderate difficulties, especially technical.
5	4.0	Good accessibility of use.
6	4.0	Strengthened ethical awareness.
7	5.0	High identification of biases.
8	3.0	Moderate awareness of sustainability.
9	4.0	Enriching integration of AI + photography.
10	5.0	Strong interest in continuing to work with AI in the degree program.

Source: Authors' owns elaboration.

Environmental awareness

A noteworthy achievement was students' increased awareness of the environmental implications of GenAI. At the beginning of the course, many students were unaware of this aspect and were surprised and concerned when they learned how much energy these platforms consume. This realization led to a deliberate reduction in the use of AI tools and generated proposals to integrate analog and digital techniques in a more sustainable manner. Some students explored alternatives such as local image editing using free software or using GenAI only for very specific stages of the creative process. Reflection on sustainability was also incorporated into the assessment criteria to promote a balance between innovation and environmental responsibility.

Methodological transformations

The introduction of the GenAI module resulted in a set of pedagogical changes that affected both classroom dynamics and students' roles in the learning process.

An increase in students' active participation and in peer-to-peer exchange of ideas for building collective knowledge was evident. Debate spaces in virtual forums became lively venues where students shared ideas and experiences on educational topics such as prompts (interaction triggers), learning strategies, as well as errors and discoveries made during the process.

The instructor's role evolved toward that of a critical guide who accompanied students along their learning pathway by facilitating learning processes and acting as a mediator between technical aspects of the content and the associated ethical and aesthetic considerations.

This redefinition of roles provided students with greater independence by enabling them to make decisions for themselves and strengthened their ability to self-assess, reflect on their own thinking, and make informed choices grounded in solid information. The learning journal proved highly useful for documenting this process in a detailed and meaningful way; it captured not only the visual achievements attained, but also the emotions experienced and the personal motivations that guided the work.

Overall assessment

At the end of the evaluation of the course in which GenAI was applied within the context of an arts-based subject, participants expressed positive opinions.

One of these positive assessments relates to an increased pace in project development, as well as new options that students can use to personalize their experience. In many cases, this resulted in greater diversity in the outputs obtained, enabling a much more open exploration for the genesis of their proposals. These results are clearly expressed in the following table:

Table 3. Mean scores by dimension

ITEM	MEAN	BRIEF INTERPRETATION
1. UNDERSTANDING HOW GENAI WORKS	~4.1	Good conceptual-technical understanding.
2. ABILITY TO GENERATE RELEVANT IMAGES	~4.6	High sense of competence and efficacy.
3. CREATIVITY EXPANDED BY GENAI	~4.1	Perceived as a tool that expands ideas.
4. TECHNICAL DIFFICULTIES ENCOUNTERED	~2.8	Moderate difficulties, not excessive.
5. ACCESSIBILITY OF LEARNING	~4.0	Tools perceived as easy to adopt.
6. ETHICAL AWARENESS	~4.0	Significant increase in sensitivity to ethical dilemmas.
7. IDENTIFICATION OF VISUAL BIASES	~4.6	High level of critical analysis of algorithmic output.
8. ENVIRONMENTAL AWARENESS	~2.8	More superficial knowledge; needs reinforcement.
9. INTEGRATION OF AI + PHOTOGRAPHY	~4.1	The combination is valued as creatively enriching.
10. CONTINUATION OF AI IN THE DEGREE PROGRAM	~4.7	Very high acceptance and demand.

Source: Authors' own elaboration.

Continuing work with GenAI in the degree program was one of the dimensions most highly valued by students, as shown in the previous table; however, they also offered recommendations for future iterations of the academic program. These included the need to delve more deeply into technical aspects related to AI models; the suggestion to implement workshops in direct collaboration with artists or experts in digital ethics; and the proposal to create custom datasets as a way of intervening critically in the algorithm-training process.

These suggestions demonstrate a high degree of assimilation of the content presented and a proactive willingness to continue exploring new boundaries and challenges: "Generative models process a large corpus of complex, unstructured data, such as texts, audio, or images, and then generate new content in the same style as the original data" (Franganillo, 2023).

CONCLUSIONS

The implementation of GenAI in the Bachelor's Degree in Photography and Audiovisual Creation represents a profound transformation not only in the technical processes of visual creation, but also in pedagogical dynamics, ethical frameworks, and the critical horizons of artistic education.

Throughout this educational proposal, we have observed how these technologies open new possibilities for the development of students' creativity, while also introducing a set of competencies that require a rigorous approach from university faculty.

One of the first notable conclusions, connected to the first objective, concerns the way GenAI alters the traditional conception of creativity. Rather than understanding creativity solely as a manual or exclusively human activity, the classroom becomes a space of collaboration between humans and machines. This interaction does not replace students' creativity; instead, it amplifies it. The task is to guide students so that they understand how to formulate precise instructions, how to interpret and select generated outputs, and how to intervene critically in those products in order to adapt them to their personal visual discourses.

Creativity, understood in this way, does not disappear with automation; it shifts toward new competencies: writing appropriate prompts, anticipating algorithmic responses, making editorial decisions, establishing conceptual relationships between generated images and reality, and reflecting on the limits of what can become automated. It is, therefore, an informed and, consequently, critical creativity.

However, this expansion of possibilities requires much broader visual and technological literacy: it is not enough to know how to use tools; it is necessary to teach students to understand the epistemological and cultural frameworks within which these tools operate. As Crawford (2021) notes, GenAI is neither neutral nor objective; it is a construction that reflects values, biases, and structures of power.

The second conclusion, related to the second and third objectives, concerns the new role of faculty in the contemporary digital classroom. Faced with image-automation tools that may appear magical or limitless, the instructor must become a mediator between technology and critical knowledge. This entails accompanying students not only in the technical handling of platforms such as Midjourney or DALL·E, but also in interpreting their ethical, social, and cultural implications.

Faculty must assume an active role as content curators, facilitators of critical thinking, and creators of learning contexts that encourage debate, self-reflection, and ethical awareness. This responsibility also entails ongoing updating in relation to emerging technologies, but above all an ethical and pedagogical sensitivity so as not to fall into uncritical or dazzled uses of innovation. Training in photography with GenAI means teaching students to look and to think from and about technology. As Benjamin (2019) argues, we cannot allow technological tools to reinforce existing systems of exclusion; on the contrary, we must use them as instruments of emancipation and visual justice.

The third conclusion, linked to the fourth objective, addresses one of the most important learnings from this process: making visible the presence of algorithmic biases in generated images. Many GenAI models reproduce stereotyped representations of gender, race, body, or social class because they have been trained on large amounts of data extracted from the internet without critical filtering. As Bender et al. (2021) have warned, these systems tend to perpetuate existing inequalities rather than correct them.

For students, this represents a crucial lesson: learning to detect, question, and resist biases embedded in models. During the activities, we observed how certain visual representations - for example, the hypersexualization of female bodies, the invisibility of racialized or disabled bodies, or cultural homogenization - were recurrent, even when students attempted to be inclusive: "Although it is essential, it is not enough to investigate gender biases to demonstrate their

existence; it is imperative to seek technical and ethical solutions, such as AI explainability, and to promote analysis and critical reflection among those who design and use these tools through training and literacy practices that take a gender perspective into account" (Sandoval-Martin and Martínez-Sanzo, 2024).

One of the most relevant objectives of this proposal was to foster a more inclusive and diverse visual production, both in content and in processes. Although GenAI is based on large volumes of data, it tends to privilege what is normative, Western, and majoritarian. For this reason, classroom projects that seek to break with these logics can become spaces of creative resistance. Accordingly, students were encouraged to generate images that questioned dominant canons, made non-normative bodies visible, foregrounded peripheral cultures, and represented marginalized experiences. These exercises were especially powerful when linked to personal narratives, collective memory, or contemporary social struggles.

This awareness becomes a pedagogical opportunity to work toward building a more equitable visual culture, in which technical decisions are linked to ethical principles. Teaching about algorithmic bias should be an integral part of the curriculum, not as an add-on theoretical component, but as a sustained practice of critically reading images.

A dimension often overlooked in debates on GenAI is its ecological footprint, one of the objectives of this study and the focus of this fifth conclusion. Training and operating large-scale generative models requires significant amounts of electrical energy and computational resources. Recent studies (Bender et al., 2021) warn about the environmental impact of these technologies, including massive energy consumption and the generation of electronic waste.

In the photography classroom, where high-demand technological equipment (cameras, computers, editing software) is also used, the inclusion of GenAI adds an additional responsibility. It is essential that the use of these tools be accompanied by reflection on their environmental cost and sustainability. This may include practices such as limiting excessive generative trials, encouraging shared use of digital resources, and critically analyzing cycles of planned obsolescence.

Arts education must incorporate an ecological ethic that does not separate the act of creating from its material consequences. Thus, training photographers not only involves teaching them to make images, but also to consider the impact of their technical choices on the planet.

The final conclusion relates to the last objective, which analyzes the role of faculty as critical mediators between technology, creativity, and social responsibility. GenAI can be both a tool of oppression and a tool of emancipation, depending on how it is used. Teaching its use from a critical pedagogy perspective makes it possible to turn it into an ally for creating new imaginaries that challenge what is established and expand the margins of what can be represented.

In this sense, the inclusion of GenAI in photography education cannot remain an isolated experience. It must form part of a broader institutional change that promotes pedagogical innovation from a transformative vision of the university. This experience showed that students are not only prepared to take on the challenges of technology, but can also lead processes of critical reflection and artistic experimentation with notable commitment.

To this end, institutions should facilitate faculty development spaces, provide adequate infrastructure, foster educational research, and support projects that articulate art, technology, and social justice. GenAI can be a lever for pedagogical renewal if integrated into an ethical, sustainable, and interdisciplinary vision of arts education.

The interdisciplinary approach - which connects photography with computing, philosophy, ecology, or cultural studies - is essential for training professionals capable of operating in complex, changing contexts shaped by automation. The goal is not to prepare software technicians, but visually literate citizens who are conscious, critical, and creative.

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