VISUAL REVIEW | Vol. 18, No. 6, 2026 | ISSN 2695-9631
International Visual Culture Review / Revista Internacional de Cultura Visual
https://doi.org/10.62161/revvisual.v18.6443

COMPARISON OF GENERATIVE IMAGE AI FROM THE PERSPECTIVE OF UNIVERSITY STUDENTS

DANIEL HERNÁNDEZ-GUTIÉRREZ [1]
d.hernandez@correo.ler.uam.mx
[1] Autonomous Metropolitan University, Mexico

KEYWORDS

Artificial intelligence students
Higher education
digital literacy
Generative AI

ABSTRACT

The research presents a case study comparing Stable Diffusion, ImageFX, Hugging Face, Openart AI, and Leonardo AI. Data collection was carried out using quasi-experimental observation techniques with five university students. The results indicate that Openart AI and Leonardo AI offer better user experience and a simpler learning curve. The highest satisfaction ratings for the images created were for Leonardo AI, OpenAI Art, and Stable Diffusion. It is noteworthy that these tools facilitate the creation of illustrations, teaching resources, presentations, social media advertising, illustrated books, and 3D images.

Recibido: 03/ 07 / 2026
Aceptado: 05/ 10 / 2026

1. Introduction

It is worth noting that, amid the wave of AI-driven changes in education, we have observed exponential growth in research on its main challenges. Thus, the link between education and artificial intelligence is strong, is being studied across all areas of knowledge and at all educational levels, and encompasses the entire educational community (teachers, students, and school administrators). This situation has, in principle, allowed us to recognise its forms and technical developments and, in a very basic way, understand how it works as an automated technological system. On the other hand, it has been plausible to establish frameworks of reference to conceptualise phenomena in the social sciences and humanities and, finally, to guide the lines of study that give rise to reflections and responses to the complexity of the facts.

In summary, generative AI (AI-Gen) is a technology that uses large language models to learn from data and content, thereby solving specific tasks (Hall, 2024). Gen-AI, a subfield of deep learning, can perform various automated tasks by training on existing content, developing a statistical model to predict expected responses, and generating new content (Guettala et al., 2024).

It is undeniable that AI-Gen is part of students' daily tasks. According to a survey conducted by the Digital Education Council, 86% of students reported using artificial intelligence in their studies, with 24% using it daily and 54% at least once a week (Kelly, 2024). In particular, regarding the use of AI among the student population in our country, it is worth looking at the data from the study by Benavides-Lara et al. (2025), which shows that 87% of the UNAM population responded that they use some AI-Gen tool in high school, 88% in graduate school, and 81% in undergraduate studies.

In the academic sphere, there is growing interest in studies linking AI and teaching and learning processes, particularly the use of ChatGPT to investigate, among other things, the quality of responses and biases, plagiarism, authenticity, personalised learning, teaching activities, assessments, and feedback (Memarian & Doleck, 2023; Ali et al., 2024).

However, chatbots are not the only AI-Gen technology students use daily. Similarly, students are gradually using AI-Gen tools such as Midjourney, DALL-E, and Stable Diffusion to generate images from text. These programs can create highly realistic images across a variety of artistic styles and design techniques, marking a new chapter in digital creativity and content creation (Wang, He, & Peng, 2024).

According to some authors, image AI-Gen is driving a new era of innovation and creativity, marking a turning point due to its ability to synthesise multimedia content, including images, text, and audio (Strobel et al., 2024).

There are many questions to consider regarding AI-Gen in the school context, so we will focus on a couple: What kind of skills do university students have for using AI-Gen image tools? Moreover, what kind of educational materials are considered feasible to develop using AI-Gen image tools?

1.1. Research on generative AI for images

As mentioned earlier, in recent years, the combination of AI and education has been widely studied. If we consult any database, we will notice the growth of academic literature on the subject. Let us remember that, as Arbaláez and Onrubia (2014) note, reviewing scientific journals allows us to identify the general landscape of a field of knowledge, enabling descriptive analysis and interpretation of what the study of a topic represents in each historical period.

If we look at the literature reviews on AI in the educational context, we will find studies on machine learning to predict student performance (Ab Rahman et al., 2025); the integration of artificial intelligence into personalized learning in higher education (Merino-Campos, 2025); the multifaceted use of AI to improve personalized learning, foster critical thinking, and support professional education (Matos et al., 2025); analysis of the ethical and social implications of integrating AI-Gen into higher education, especially for students and teachers (Izquierdo-Álvarez & Jimeno-Postigo, 2025); ethical risks in the use of AI-Gen in social, educational, and technological dimensions (Zhu, Sun, & Yang, 2025); and the identification of the various cross-cutting skills required in higher education for the use of AI-Gen (Deroncele-Acosta et al., 2025).

The above shows the large number of articles published, especially in the last three years, which identify some existing lines of research. This makes it possible to briefly map out where existing scientific production on AI and education is located, providing a snapshot of the current situation and

revealing, in addition to the predominant topics of study, the growing number of bibliographic entries and the enormous interest developing in the academic sphere.

However, in the educational context, AI-Gen image systems such as Midjourney, DALL-E, and Stable Diffusion have become popular in recent years. Their models allow users to generate images from text or other images and, in recent years, have incorporated text-to-video and image-to-video properties. In this regard, AI-Gen image automation can serve as a suitable system for enhancing creative processes (Zhou & Lee, 2024).

According to Bandi, Adapa, and Kuchi (2023), there are five main models for generating images from text instructions: Denoising Diffusion Probabilistic Models (DDPM); Guided Language to Image Diffusion for Generation (GLIDE); Image; Attentional Generative Adversarial Networks (AttnGAN); and CogView. Among the models mentioned, diffusion models (DMs) stand out for their ability to generate high-quality, realistic images that more closely follow user-defined criteria during generation (Wang, He, and Peng, 2024). DMs are probabilistic models that require considerable computational resources to accurately capture the complexity of the data, as their training involves intentionally corrupting the data with Gaussian noise and then training the model to reconstruct the original data from the noisy version (Kumar, 2025).

However, numerous studies on AI-generated images investigate, for example, gender bias in the production of visual representation (Locke & Hodgdon, 2025); the use of content for social media (Park, Oh, and Kim, 2024); and the socio-ethical implications of deep fakes (Partadiredja, Entrena-Serrano, and Ljubenkov, 2020).

On another note, several studies indicate that the use of AI-generated images in higher education is transforming teaching methods and techniques. We emphasise the statement by Dehouche and Dehouche (2023), noting that text-to-image artificial intelligence has the potential to transform the way art history is taught by enabling experimentation and expression exercises. In architecture, Başarir (2022) suggests integrating AI into the curriculum, as these tools enable diverse learning experiences and reflect the evolution of architectural design practice in the coming years. For their part, Hwang and Wu (2025) point out that training in graphic design in the era of generative AI requires different objectives and methods than those used in traditional education in this field. The authors point to the development of visual literacy skills in AI and to improvements in prompts or keywords to refine results.

Of course, there is research comparing various generative AI image tools in terms of their realism (Jamal, Wimmer, and Rebman, 2024), their creative functionality (Angelova, 2024), and user experience (Vacanti et al., 2024).

Given this scenario, it is necessary to address underexplored topics, as the aim is to compare the processes of digital empowerment and AI literacy among higher education students in the production of educational materials.

2. Image AI-Gen from the perspective of educational communication

Studies on educational communication, also known as educommunication, have highlighted the intricate relationship among traditional media, media consumption, and critical reflection on messages. For instance, in the 1990s, new communication models emerged with the dawn of the internet era and network connectivity. Soon after, the emergence of new virtual learning environments, powered by digital technologies, required new approaches, especially for what became known as the new normal. Finally, in recent years, the integration of automated artificial intelligence processes into everyday work and educational tasks has made it urgent to understand the processes of digital literacy and appropriation that help to address communication and educational challenges.

The emergence of artificial intelligence in schools raises questions ranging from its ethical use to new forms of teaching and automated assessment, since, as Castañeda-De León (2023) points out, AI directly impacts teaching, research, and administrative management in higher education institutions.

At a time when the technological race is defined by the constant improvement of AI tasks and functions, we are seeing increasing use by society. In other words, with each new model released or each new version of previous models, artificial intelligence is transforming everything from everyday habits and tasks to industrial and commercial sectors. As Morley once said: "If for many people the future represents a worrying realm of constant change, much of that concern is symbolised by—and in—technological forms" (Morley, 2009, p. 139). For example, the number of AI model releases in 2024 exceeded 100 (https://huggingface.co/spaces/reach-vb/2024-ai-timeline).

Let us assume two realities: the first is that generative AI has become a valuable tool for the rapid and effective production of media content (Franganillo, 2023). Moreover, the second premise is that the contribution of AI-Gen images to the field of education can be geared towards: enriching teaching activities; avoiding copyright issues; recreating historical or social events; creating educational content; enriching online education; eliminating conceptual misunderstandings; and dispensing with the lack of content (Aktay, 2024).

Given the above, it is necessary to turn to educational communication frameworks that provide a comprehensive understanding of the challenges and advances this entails. As Crovi Druetta comments: "Constant technological innovations challenge educational communication processes and content, making it necessary to renew their analysis from a multidisciplinary perspective" (2024, p. 267). With the rise of AI-Gen in higher education, the creative, design, and production processes for educational communication resources and materials are undergoing substantial changes. Specifically, Miao et al. (2021) comment that the convergence between AI and educational communication is mainly articulated around three axes: the support that artificial intelligence can provide to educational processes, the necessary training or qualification to learn about AI, and the adaptation required by coexistence with intelligent and autonomous entities in the short term (in Torres-Toukoumidis; Santín-Picoita & Henríquez-Mendoza, 2024).

In this sense, the notion of digital literacy, understood as providing the necessary scaffolding to address the challenges of AI-Gen, becomes relevant. Within this framework, it is possible to develop schemes focused on the processes of use and appropriation of the educational community, rather than on the instruments or technology per se. Directing our analytical gaze through the prism of digital literacy will help explain why, how, and for what purposes we use, make sense of, and appropriate this technology. The fundamentals of digital literacy can reveal existing inequalities and gaps, warn of ethical and legal implications, deploy enabling actions, and propose workflows for communicative, educational, and cultural content.

At this point, it is prudent to clarify that there is a concept of artificial intelligence literacy (AI literacy), whose scope primarily encompasses four dimensions: knowing and understanding, using and applying, evaluating and creating, and ethical issues (Ng et al., 2021). As such, this recently developed conceptualisation identifies the factors for effective AI integration in educational settings. In fact, Ng et al. (2021) draw on Bloom's Taxonomy to propose a classification of cognitive process levels in the context of AI learning. They then refer to the TPACK model to identify how teachers can incorporate technologies into their teaching methods and content knowledge to integrate AI literacy.

Considering the above and knowing the elements described for AI literacy, we believe that these are faithfully framed within the notions of digital literacy in the educational context, whether formal, non-formal, or informal. Currently, we believe that the notion of AI literacy is theoretically subordinate to digital literacy, which is why we have opted to use the latter.

Based on these facts, the principles of digital literacy have enormous strategic value for developing critical skills, identifying the meanings and significance of content in digital environments, analysing and making decisions about information, and being able to generate one's own content (Garay & Hernández-Gutiérrez, 2019).

We agree with Crovi in pointing out that AI is ubiquitous in that it encompasses a myriad of everyday practices, which, in terms of technological appropriation, will imply a cultural change that occurs when the appropriated object and the practices that accompany it are incorporated into daily activities and transform them (Crovi, 2024). In this sense, it is established that, if AI-Gen represents a new technological generation for educational communication, digital literacy processes must be prioritised so as not to displace the study of the technical instrument, but rather to orient it towards aspects of social appropriation.

3. Methodology

This research presents a qualitative methodology with a case study approach that provides a situated, limited approximation to reality while allowing a description of the context in which it takes place. The use of case studies enables the identification and distinction of educational and social phenomena by collecting data that describe participants' situations and activities (Ballester et al., 2022).

For data collection, quasi-experimental observation techniques were used to account for the scope of use of five generative artificial intelligence image tools by five students (four women and one man) in

their fourth, sixth, and eighth semesters of the Bachelor's Degree in Education and Digital Technologies at the Autonomous Metropolitan University, Lerma campus.

To this end, a user guide was developed for participants that systematically detailed the study's instructions, tools, and timing. For just over a month, everyone used a specific AI-Gen image tool each week (Table 1).

Table 1. Schedule for the use of generative AI for images

	Week 1 March 10-16	**Week 2 March 17-23**	**Week 3 March 24-30**	**Week 4 March 31 to April 6**	**Week 5 April 7-13**
Participant 1	Stable Diffusion	Openart AI	Hugging Face	Leonardo AI	ImageFX
Participant 2	ImageFX	Stable Diffusion	Openart AI	Hugging Face	Leonardo AI
Participant 3	Leonardo AI	ImageFX	Stable Diffusion	Openart AI	Hugging Face
Participant 4	Hugging Face	Leonardo AI	ImageFX	Stable Diffusion	Openart AI
Participant 5	Openart AI	Hugging Face	Leonardo AI	ImageFX	Stable Diffusion

Source: author, 2025

A tracking log was designed for each student to record their progress, with four basic categories: 1) experience using the interface, 2) learning the tool, 3) satisfaction with the images generated, and 4) creation of educational materials.

3.1. ImageFX

Google's image creation platform, called ImageFX, uses the Imagen model (currently in version 4), developed by the company and built on advanced machine learning techniques. Although the technical details of its architecture are not public, Jamal, Wimmer, and Rebman (2024) comment that Google Image probably uses transformer-based models similar to those of DALL-E or GPT for text encoding and generation, additionally incorporating attention mechanisms or generative adversarial networks (GANs) for image synthesis to improve the realism and diversity of the images generated.

3.2. Hugging Face

The Hugging Face platform was created in 2016, initially developing a chatbot application, and later embarking on "the mission to democratise good machine learning" (https://huggingface.co/huggingface). According to Pol, Vadar, and Moharekar (2024), Hugging Face's goal is to provide accessible open-source tools and foster a dynamic AI community, facilitating the implementation of natural language processing (NLP) models by developers and researchers through cutting-edge libraries. Essentially, Hugging Face hosts repositories for developing machine learning models and datasets, as well as spaces for developing demonstration applications for the community (Ait, Izquierdo, & Cabot, 2023). It is precisely in these so-called spaces where the user community can try out various AI-Gen models for images, video, audio, and 3D, free of charge. For this study, in addition to exploring various demos in spaces, it was suggested to review the MagicQuill, InstantID, and InstantMesh models.

3.3. Stable Diffusion

Stable Diffusion, developed in collaboration by Stability AI and Runway, was introduced in 2022 as a leading deep learning model. Stable Diffusion uses diffusion techniques to generate complex images from text, combined with inpainting, outpainting, and other dependencies (Jamal, Wimmer, & Rebman, 2024). For this study, a cloud version was used via a Google Colab notebook with the Fooocus interface, so the participating group could use it freely and at no cost, without having to download the software locally.

3.4. Openart AI

This is a generative image artificial intelligence program founded in San Francisco by former Google employees, with an interface similar to Canva that lets users write instructions, and the system generates realistic images using an algorithm (Locke & Hodgdon, 2025). The Openart AI platform

incorporates various models for image generation, such as Stable Diffusion, Flux, GPT, Imagen, HiDream, etc., as well as models for video generation, such as Kling, Veo (Google), Runway, Wan, Seedance, etc. Participants were provided with access to an Essential account that gave them enough credits to generate images during the study period.

3.5. Leonardo AI

According to its website, Leonardo AI offers a robust, dynamic platform for creative production that combines cutting-edge generative AI technology with model fine-tuning, prompt adherence, training speed, inference rate, and multi-image prompt capabilities (https://leonardo.ai/). Leonardo AI offers its own models, such as Lucid and Phoenix, as well as third-party models including GPT-Image, Flux, and Flux Kontext. Similarly, it has its own video-generation model called Motion and integrates Google's Veo model. Participants were provided with an Apprentice account that gave them sufficient credit to generate images during the study period.

4. Discussion

It is worth noting that the group used the corresponding tool for an average of four hours per week. The lowest reported weekly use was two to three hours, and the highest was eight to nine hours. The latter, according to the logs, was due to using AI-Gen to complete schoolwork. It should be noted that two students did not comply with the use of an assigned tool during the indicated period; however, the bulk of the data collected enabled analysis of the categories shown below.

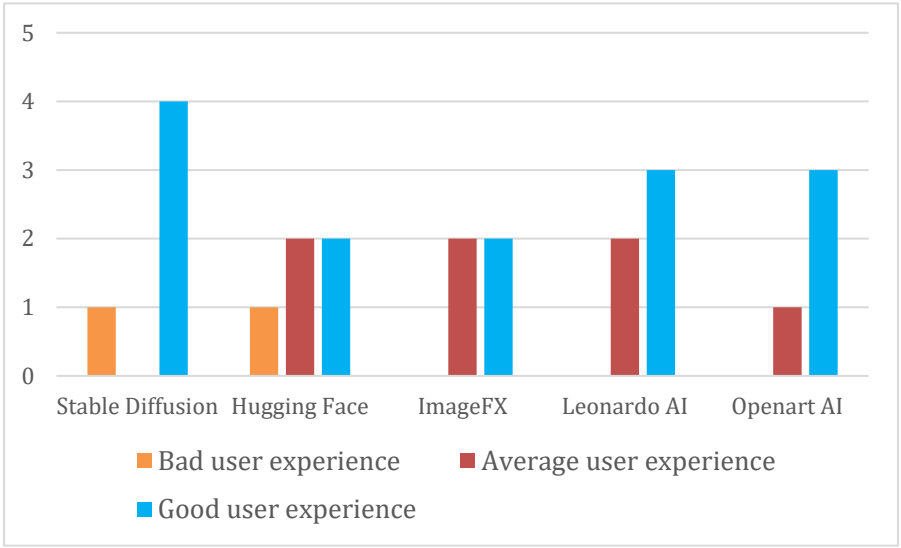
4.1. Experience of using the interface

This section highlights the diversity in the AI-Gen tools' interfaces, which meant the participating group had to experiment with multiple environments. Considering that, for example, Hugging Face functions more like a repository, and that Leonardo and Openart AI share a more common design with a menu of options on the left (like Canva), the group observed important differences in the user experience of these tools.

It is important to remember that, in terms of software, applications, and digital tools, it is important to understand the walkthrough method of users as an indication of how they interact directly with an interface, taking into account its technological mechanisms and cultural references, in order to understand how that tool guides users and shapes their experiences (Light, Burgess, & Duguay, 2018).

Thus, the participating group highlights Leonardo AI and Openart AI as the most intuitive and organised interfaces, which facilitate a better understanding and experience of using the tools. Similarly, some participants indicated that using Stable Diffusion was practical and simple once the interface was loaded, since the Focus interface was used via the cloud in a Google Colab notebook (Figure 1).

Figure 1. Experience of using the interface



Source: Author, 2025

Stable Diffusion

- I became quite familiar with the tool. However, at first, I noticed that for someone unfamiliar with it, it can be difficult to understand how to access and load the image generation servers (participant 1).
- Although access can be somewhat complex, it becomes easy once you get the hang of it (participant 2).
- I already had some knowledge of it, but without guidance, I think I would have been lost, because you have to follow several technical steps to get it started (participant 3).

Hugging Face

- Each AI model has unique features, which means that even though the interface resembles that of a repository and makes navigation easy, the user experience is different (participant 1).
- At first, I felt lost because it had more technical tools. Nevertheless, after exploring for a while, I realised that it is not that complicated (participant 3).
- At first, I had a little trouble because I did not really understand what it was about. The interface is not very intuitive in the suggested demos, but after watching a tutorial, I understood it a little better (participant 4).
- In the short time I used Hugging Face Spaces, I managed to familiarise myself with its repository-like interface, which contained various AI models (participant 5).

ImageFX

- The tool is quite user-friendly from the start. In a short time, you can understand how to generate basic images, although there are not as many options for customisation as other AIs (participant 3).
- It was too easy. I think it was the one that felt most complete and offered the most options for production, from images to music to stickers.
- The interface is somewhat cluttered, with many sections that sometimes move or shift around (participant 5).

Leonardo AI

- I do not consider myself an expert, but I managed to create pretty good images that matched what I had in mind. I tried different visual styles and experimented with the tool's settings (participant 1).
- I did not become an expert, but I did manage to generate images that looked decent, and I saved some for a class project I have (participant 3).
- I became quite familiar with the tool as the interface is easy to use and intuitive in its basic aspects, thus facilitating my learning and adaptation process in a very short period of time (participant 5).

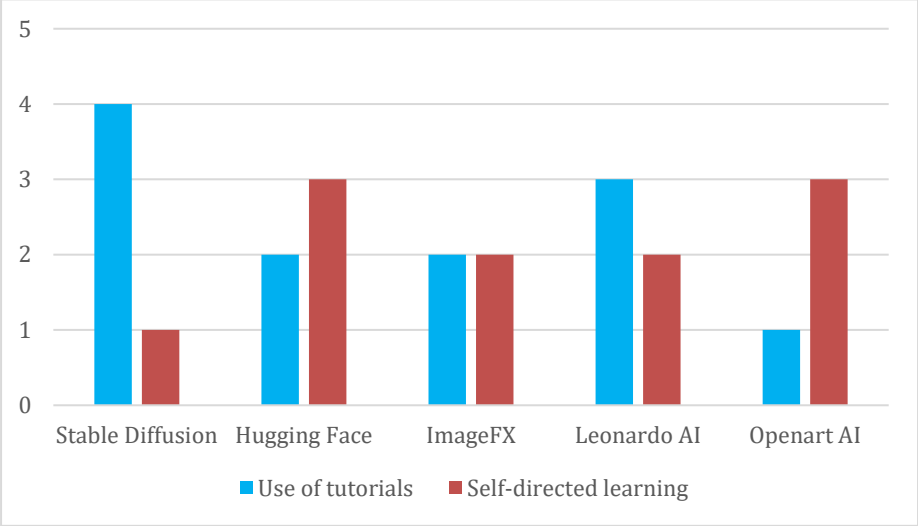
Openart AI

- Its interface is quite intuitive and easy to use. I quickly learned to navigate the features and create digital art effectively (participant 1).
- I like the fact that its interface is quite aesthetic and organised, which helps you get familiar with it quickly. It takes time to fully understand how to use its tools, especially since it offers several models and a range of functions. I entertained myself by trying out its models and seeing how they reacted to the same prompts (participant 3).
- It was very easy to see the features it has, although not speaking English made it difficult to get the results I expected for the prompts (participant 4).

4.2. Learning the tool

This section shows mixed trends that can be explained by limited time spent using the tools and by the characteristics of each tool, indicating varied learning experiences across the five AI-Gen options (Figure 2). First, it should be clarified that there is no set pattern for whether to consult or not consult tutorials that support learning to use the tool. In any case, the responses indicate that tutorials were used only to generate a particular image or design, not as part of a systematic learning process.

Figure 2. Learning the tool



Source: Author, 2025

In this dimension, ideas can be explored to help enable the use of AI-Gen for better appropriation, since the responses indicate complications in its use and a diversity of understandings of the image generation process.

Stable Diffusion

- Exploring the advanced settings took some time, especially in relation to resource optimisation and the quality of the images generated (participant 1).
- The tricky part is understanding the function of each section, since activating or deactivating a field can change how the image looks or is generated (participant 2).
- The advanced options make the configuration more complex, but you also get something more complete to start working with (participant 4).

Hugging Face

- My learning was mainly based on experimenting with tools such as MagicQuill, InstantID, and InstantMesh (participant 1).
- I tried it on my own first and got frustrated, so I decided to look for tutorials that helped me understand how some of the tools worked (participant 3).
- I had to watch tutorials, but in general, they were not very helpful; they talked more about what it was, but hardly anything about how to use it (participant 4).

ImageFX

- The navigation is easy to understand, but it does not return many results with instructions in Spanish, and understanding that can be complicated (participant 2).
- Sometimes the images came out very different from what I imagined, and I did not know how to refine the result (participant 3).
- Another important aspect to consider is that the tool works better with prompts in English (participant 5).

Leonardo AI

- The hardest part for me was understanding how to choose between the different models and styles offered by the AI (participant 1).
- I think the most complicated aspect was understanding how the available models and styles worked because sometimes it was not clear which one to use to achieve certain effects (participant 3).
- Another aspect to consider is that the quality of the images is subject to the users' skill in using the tool and generating their prompts (participant 5).

Openart AI

- At first, I found it difficult to understand how to adjust the parameters to get the desired results, especially when trying to customise the advanced styles and models (participant 1).
- The images are of good quality, but it is very noticeable that they are images generated with artificial intelligence (participant 2).

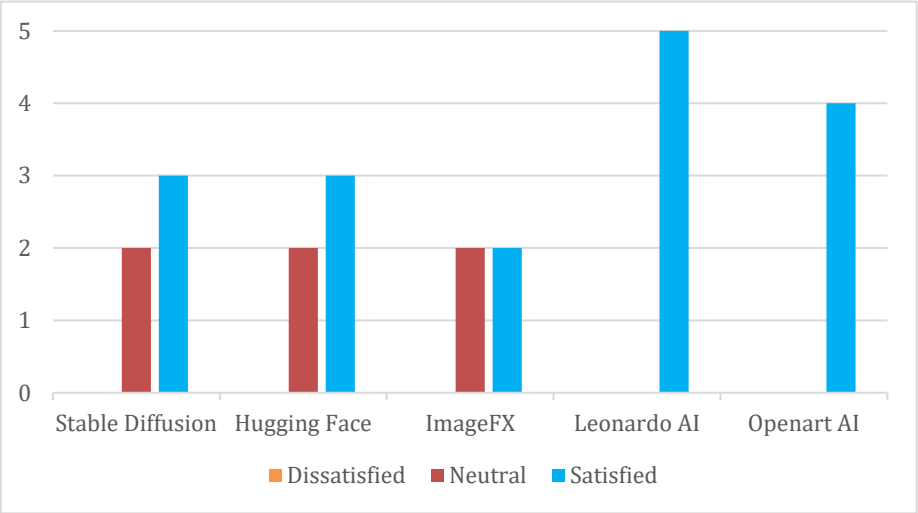
- There are many options, and at first, it is easy to get lost among so many features. Something that I found very difficult was using the styles (participant 3).
- Making a prompt is somewhat complicated in Spanish; in the video, they only give movement to the images, but I could not make a story as such (participant 4).

Taking these responses into account, it is possible to identify opportunities to improve students' digital skills in using AI-Gen image tools. Five main topics can be suggested, aimed at: a) understanding the architecture and training of models, b) teaching utilities and advanced configuration for image refinement (controllers, adapters, editing, retouching, styles, etc.), c) methods for writing and structuring prompts for audiovisual content generation, d) production process guidelines according to the type of educational material, and e) solid and comprehensive training in ethics and responsible use.

4.3. Satisfaction with the images generated

At this point, it is important to note two trends. The first refers to the quality of the images generated, given the models' technical capabilities, and the second refers to adherence to each participant's text-image instructions. In this sense, the degree of satisfaction with the images generated by the five tools generally remained high (Figure 3).

Figure 3. Levels of satisfaction with the quality of the images generated



Source: Author, 2025

Among the details of the responses regarding image quality and satisfaction, the following were mentioned:

Stable Diffusion

- The quality is good. The images are very detailed, and if you do it right, you can achieve well-defined styles. Something I like is that it allows you to replicate poses with images that you attach as references (participant 3).

Hugging Face

- If different multimedia formats are combined, the potential of Hugging Face Spaces could be even greater (participant 1).

ImageFX

- It is a very simple AI; it achieves acceptable results without much effort, and it gets you out of a tight spot when you need something visual quickly without too many complications (participant 2).

Leonardo AI

- The image quality has improved a lot compared to other AIs, and the tool is better at detecting the style we want as users (participant 5).

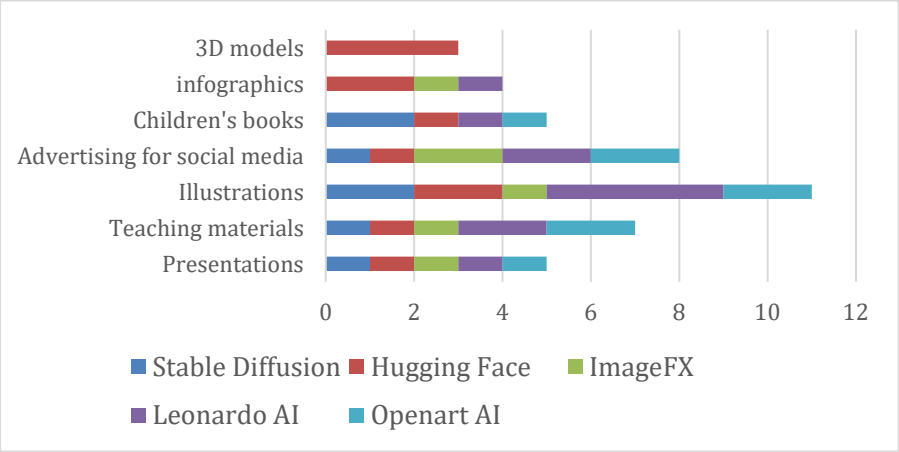
Openart AI

- I like that it offers variety and quality. Some images need adjustments, but in general, the artistic level achieved is high, especially with practice (participant 3).

4.4. Creation of educational materials

According to the report, the group listed more than a dozen options for using AI-Gen image tools to create educational materials. Among the most frequently mentioned materials are illustrations, teaching resources, presentations, social media advertising, and children´s books (Figure 4).

Figure 4. Creation of educational materials with AI-Gen



Source: Author, 2025

The most frequently mentioned were illustrations, as it was felt that the images generated are helpful in contexts where copyright-free, easily obtainable, high-quality images are needed. This aligns with Aktay (2024), who notes that in education, AI-Gen images address copyright issues and prevent content shortages.

Responses referring to the use of AI-Gen tools as a teaching resource mentioned generating images, graphics, and photographs for digital learning resources created in Canva, Kahoot, or Genially. Another benefit of using the tools was the ability to generate visual content to support school presentations. In relation to their use in social media advertising, the tools' potential to generate attractive designs for posters and flyers for academic events was highlighted.

Finally, AI-Gen's ability to create educational picture books for children was noted, as it can apply various artistic styles (drawing, painting, illustration, etc.) and create specific characters to accompany the stories. Of course, this would require broader production processes (writing, storyboards, scripts, etc.) and the use of other digital tools (publishing, design, etc.).

In summary, the impressions of the participating group regarding the AI-Gen tools were as follows:

- Stable Diffusion (Fooocus). Generally perceived as a more technical interface, but it becomes easier with use. The quality of the result was satisfactory. It takes time to understand and use the advanced features. The fact that it is open source and can be used in the cloud is emphasised, making it possible to use it without high-end equipment or arduous installation processes in a local environment.
- Hugging Face. It is considered a collection of several AI models with different interfaces, which, on the one hand, highlights its diversity of options and, on the other hand, makes it difficult to have a uniform experience. It is an ideal tool for students to try out new AI-Gen models.
- ImageFX. A very user-friendly, intuitive tool that helps you quickly learn how to generate basic images. Unlike other tools, it offers fewer options for customising or refining images.
- LeonardoAI. Praised for its easy-to-understand interface and the quality of its generated images. Students appreciated the variety of models, utilities, and styles, which, in turn, poses a challenge in understanding the various parameters.
- OpenArtAI. Considered an intuitive, aesthetic, and easy-to-use tool. Extensive features and a good variety of styles and models. Complexity in some options and in English writing prompts may be a limitation for certain populations.

Finally, it should be noted that the availability of models, training types, architecture, and associated utilities is extensive and growing daily. Therefore, the more the technical qualities of these tools are known, the greater the understanding of the results they provide. It should be recognised that AI-Gen image tools have been enhanced to allow configuring advanced settings for desired visual refinement.

While there is talk of optimal prompt engineering to improve results, it is also true that most tools offer functions to control, adapt, retouch, edit, scale, and apply styles, suggesting more rigorous training processes.

It is prudent to pay attention to how prompts are structured to generate images, especially when creating images for educational materials. In this regard, it is necessary to know both the general rules for writing prompts and the key elements specific to each AI model. There is consensus that AI-Gen image tools are useful for producing educational materials. However, it is essential to use methods appropriate for the type of resource desired (teaching material, tutorial, illustrated book, presentation, etc.). It must be acknowledged that AI-Gen, like other educational technologies adopted for these purposes, requires the design of training paths and digital literacy strategies in higher education institutions.

Finally, it is imperative to equip students with ethical principles, as dealing with automated systems trained to generate images entails broad responsibilities regarding integrity, respect for human rights, academic standards, and the clarity of their use.

5. Conclusions

The experiences of the group of students presented here highlight the diverse landscape of image generation tools, each with its own strengths, weaknesses, and learning curves. Attention must be paid to the various factors that influence the use and, therefore, the appropriation of these technologies. Among the most notable elements are interface design, available learning resources, prompt-writing requirements, and specific user objectives. All these factors significantly influence the perceived usability and effectiveness of these tools and, consequently, the desired results. While some tools are more beginner-friendly, others offer greater customisation and advanced features that require more time and effort to master.

On the other hand, the responses also highlight the growing potential of AI in creative and educational fields, as students recognise practical, specific applications for content creation. Of course, the design and production of educational materials require implementing methodical digital literacy processes to meet student expectations. Recognising the key considerations for using these tools helps us develop training guidelines to better integrate AI-generated images into higher education.

In short, AI-Gen images are on their way to becoming a resource that genuinely enhances creativity and audiovisual production. Therefore, in higher education, it is advisable to commit to critical digital literacy processes that inform program formulation, considering not only technical issues but also how to build the skills necessary to use these powerful tools effectively.

Although there are indications that the integration of AI significantly improves digital literacy by facilitating sophisticated information processing and active technological interaction (Wu & Zhang, 2025), it is the situated and contextual processes of digital literacy that will provide adequate guidance for addressing challenges and enhancing its educational and communicative uses.

6. References

Ab Rahman, N. F., Wang, S. L., Ng, T. F., & AB, Ghoneim, A. S. (2025). Artificial intelligence in education: A systematic review of machine learning for predicting student performance. *Journal of Advanced Research in Applied Sciences and Engineering Technology*, *54*(1), 198-221.

Ait, A., Izquierdo, J. L. C., & Cabot, J. (2023). Hfcommunity: A tool to Analyze the Hugging Face Hub Community. In *2023 IEEE International Conference on Software Analysis, Evolution, and Reengineering (SANER)* (pp. 728-732). IEEE.

Aktay, S. (2024). The usability of Images Generated by Artificial Intelligence (AI) in Education. *International Technology and Education Journal*, *6*(2), 51-62.

Ali, D., Fatemi, Y., Boskabadi, E., Nikfar, M., Ugwuoke, J., & Ali, H. (2024). ChatGPT in Teaching and Learning: A Systematic Review. *Education Sciences*, *14*(6), 643. https://doi.org/10.3390/educsci14060643

Angelova, N. (2024). The capabilities of the art-oriented artificial intelligence Adobe Firefly and its visual advantages and disadvantages. *Journal" Fundamental Sciences and Applications"*, *30*(1), 1-10.

Arbeláez Gómez, M., & Onrubia, G. J. (2014), Análisis bibliométrico y de contenido. Dos metodologías complementarias para el análisis de la revista colombiana Educación y Cultura, en *Revista de Investigaciones UCM*, vol. 14, núm. 23, pp. 14-31.

Ballester, B. L, Nadal, C. A, Amer, F. J., & Quesada, S. V. (2022). Métodos de investigación educativa. Universitat de les Illes Balears.

Bandi, A., Adapa, P. V., & Kuchi, Y. E. (2023). The Power of Generative AI: A Review of Requirements, Models, Input–Output Formats, Evaluation Metrics, and Challenges. *Future Internet*, *15*(8), 260. https://doi.org/10.3390/fi15080260

Başarir, L. (2022). Modelling AI in Architectural Education. Gazi University Journal of Science, 35(4), 1260-1278. https://doi.org/10.35378/gujs.967981

Benavides-Lara, M., Cazales, V. J. R., Rivas, N. E., Hernández, A. M. D. P. M., & Mendiola, M. S. (2025). Presencia y uso de la inteligencia artificial generativa en la Universidad Nacional Autónoma de México. *Revista Digital Universitaria*, *26*(1).

Castañeda-De León, L. M. (2023). La inteligencia artificial en la educación superior. En J. L. Ponce López y L. M. Castañeda de León (Coords.), *Inteligencia artificial en la educación superior, perspectivas e implicaciones prácticas en las instituciones mexicanas* (pp. 27-44). ANUIES.

Crovi Druetta, D. (2024). Comunicación educativa en pospandemia. Factores que interpelan a la formación digital universitaria. InMediaciones de la Comunicación, 19(1), pp. 267-281.

Dehouche, N., & Dehouche, K. (2023). What's in a text-to-image prompt? The potential of stable diffusion in visual arts education. *Heliyon*, *9*(6).

Deroncele-Acosta, A., Sayán-Rivera, R. M. E., Mendoza-López, A. D., & Norabuena-Figueroa, E. D. (2025). Generative Artificial Intelligence and Transversal Competencies in Higher Education: A Systematic Review. *Applied System Innovation*, *8*(3), 83.

Franganillo, J. (2023). La inteligencia artificial generativa y su impacto en la creación de contenidos mediáticos. *methaodos.revista de ciencias sociales, 11*(2), m231102a10. http://dx.doi.org/10.17502/mrcs.v11i2.710

Garay, L. M., & Hernández, D. (coords.) (2019). *Alfabetizaciones digitales críticas. De las herramientas a la gestión de la comunicación.* UAM-L/Juan Pablos Editor.

Guettala, M., Bourekkache, S., Kazar, O., & Harous, S. (2024). Generative Artificial Intelligence in Education: Advancing Adaptive and Personalized Learning. *Acta Informatica Pragensia*, *13*(3), 460-489. DOI: 10.18267/j.aip.235

Hall, R. (2024). Generative AI and re-weaving a pedagogical horizon of social possibility. *International Journal of Educational Technology in Higher Education*, *21*(12). https://doi.org/10.1186/s41239-024-00445-6

Hwang, Y., & Wu, Y. (2025). Graphic Design Education in the Era of Text-to-Image Generation: Transitioning to Contents Creator. *International Journal of Art & Design Education*, *44*(1), 239-253.

Izquierdo-Álvarez, V., & Jimeno-Postigo, C. (2025). Challenges and Opportunities of Integrating Generative Artificial Intelligence in Higher Education: A Systematic Review. *Pitfalls of AI Integration in Education: Skill Obsolescence, Misuse, and Bias.*Edited by Manuel B. Garcia, *et al*.,

IGI Global Scientific Publishing, pp. 391-414. https://doi.org/10.4018/979-8-3373-0122-8.ch017

Jamal, S., Wimmer, H., & Rebman Jr, C. M. (2024). Perception and evaluation of text-to-image generative AI models: a comparative study of DALL-E, Google Imagen, GROK, and Stable Diffusion. *Issues in Information Systems*, *25*(2), 277-292.

Kelly, R. (28 de agosto de 2024). Survey: 86% of Students Already Use AI in Their Studies, Campus Technology. https://campustechnology.com/Articles/2024/08/28/Survey-86-of-Students-Already-Use-AI-in-Their-Studies.aspx

Kumar, P. (2025). Diffusion Models and Generative Artificial Intelligence: Frameworks, Applications and Challenges. *Archives of Computational Methods in Engineering*, 1-44.

Light, B., Burgess, J., & Duguay, S. (2018). The walkthrough method: An approach to the study of apps. *New Media & Society*, *20*(3), 881-900. https://doi.org/10.1177/1461444816675438

Locke, L.G., & Hodgdon, G. (2025). Gender bias in visual generative artificial intelligence systems and the socialization of AI. *AI & Soc* **40**, 2229–2236. https://doi.org/10.1007/s00146-024-02129-1

Matos, T., Santos, W., Zdravevski, E., Coelho, P. J., Pires, I. M., & Madeira, F. (2025). A systematic review of artificial intelligence applications in education: Emerging trends and challenges. *Decision Analytics Journal*, 100571.

Memarian, B., & Doleck, T. (2023). ChatGPT in education: Methods, potentials and limitations. *Computers in Human Behavior: Artificial Humans*, *1*(2). https://doi.org/10.1016/j.chbah.2023.100022.

Merino-Campos, C. (2025). The impact of artificial intelligence on personalized learning in higher education: A systematic review. *Trends in Higher Education*, *4*(2), 17.

Morley, D. (2009). *Medios, modernidad y tecnología: hacia una teoría interdisciplinaria de la cultura*. Gedisa.

Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., & Qiao, M. S. (2021). Conceptualizing AI literacy: An exploratory review. *Computers and Education: Artificial Intelligence*, *2*, 100041.

Park, J., Oh, C., & Kim, H. Y. (2024). AI vs. human-generated content and accounts on Instagram: User preferences, evaluations, and ethical considerations. *Technology in Society*, *79*, 102705.

Partadiredja, R. A., Entrena-Serrano, C., & Ljubenkov, D. (2020). AI or human: the socio-ethical implications of AI-generated media content. In *2020 13th CMI Conference on Cybersecurity and Privacy (CMI)-Digital Transformation-Potentials and Challenges (51275)* (pp. 1-6). IEEE.

Pol, U. R., Vadar, P. S., & Moharekar, T. T. (2024). Hugging Face: Revolutionizing AI and NLP. *International Journal for Research in Applied Science and Engineering Technology*, *12*(8), 1121-1124.

Strobel, G., Banh, L., Möller, F., & Schoormann, T. (2024). Exploring generative artificial intelligence: A taxonomy and types. *Proceedings of the 57th Hawaii International Conference on System Sciences*

Torres-Toukoumidis, Á., Santín-Picoita, F.G., & Henríquez Mendoza, E. (2024). Inteligencia Artificial y educomunicación. En Torres-Toukoumidis, Á.; León-Alberca, T. (coords.), *ComunicAI. La revolución de la Inteligencia Arti-ficial en la Comunicación*. Salamanca: Comunicación Social Ediciones y Publicaciones. ISBN: 978-84-10176-01-0

Vacanti, A., Burlando, F., Paz Ortiz, A. I., & Menichinelli, M. (2024). Challenges and Responsibilities in the UX Design of Text-to-Image AI Models: A Discussion Through a Comparative Heuristics Evaluation. *Temes de Disseny*, (40), 156-175.

Wang, X., He, Z., & Peng, X. (2024). Artificial-Intelligence-Generated Content with Diffusion Models: A Literature Review. *Mathematics*, *12*(7), 977. https://doi.org/10.3390/math12070977

Wu, D., & Zhang, J. (2025). Generative artificial intelligence in secondary education: Applications and effects on students' innovation skills and digital literacy. *PLoS One*, *20*(5), e0323349.

Zhou, E., & Lee, D. (2024). Generative artificial intelligence, human creativity, and art. *PNAS nexus*, *3*(3), pgae052.

Zhu, H., Sun, Y., & Yang, J. (2025). Towards responsible artificial intelligence in education: a systematic review on ideantifying and mitigating ethical risks. *Humanities and Social Sciences Communications*, *12*(1), 1-14.