

The implications of Generative AI on the co-creation process in design and in the production of audiovisual materials

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Abstract: This study focuses on the impact of Generative Artificial Intelligence (AI) on the co-creation process in design, specifically in communication design and audiovisual material production. A relevant pedagogical project activity was implemented in a classroom context for higher education students at three higher education institutions in the areas of Communication Design, Multimedia, and Digital Audiovisual Production, with truly surprising and creative results. An online questionnaire was also developed and subsequently administered in person in the classroom to a sample of 258 polytechnic and university students in Portugal in the areas of communication design, multimedia, and audiovisual design. The main results revealed that Generative AI is widely recognized as a highly productive tool in the academic and creative ecosystem, contributing to differentiation and collaborative innovation. Its relevance in supporting, streamlining, and improving the work of creators/designers/producers of visual content in this new digital age was also verified. The use of Generative AI technology should not be seen as neutral, but rather as an integral part of a pedagogical ecosystem where the critical involvement of students and teachers is crucial.

Keywords: Design, Audiovisuals, Artificial Intelligence (AI), Multimedia, Co-creation, Digital Marketing

Acknowledgments and Funding: This work is funded by N2i, Polytechnic Institute of Maia, Portugal.

1 Introduction

Artificial Intelligence emerged in the 1970s, based on rule-based systems and formal logic and the development of expert systems. From the 1990s onwards, there was a

transition to machine learning and deep learning, highlighting the ability of systems to learn from large volumes of data, which culminated in the deep neural networks that characterize the current era of AI (Delipetrev, Tsinarakis & Kostić, 2020). The overall objective of this study is to analyze the perception of design and audiovisual students on the use of generative AI in creative processes, exploring their practices of use, the impact on the creativity and subjectivity of creators, as well as their future expectations and concerns. As specific objectives, this study sought to understand how students use Generative Artificial Intelligence (AI) and their level of satisfaction associated with its use. It also aimed to identify the main Generative AI tools used in creative processes, as well as their purposes and contexts of application, assessing their usefulness or possible limitations.

The overall objective of this study was to gather relevant insights into the perceptions of Design, Multimedia, and Audiovisual students regarding the use of Generative AI in creative processes. The study also focused on the practical applications of AI in content creation, the problems experienced in the relationship between technology and the subjectivity of creators, and, finally, students' perceptions of the impact of Generative AI on their future professional activities. It begins with an introduction to the main topic, followed by a review of the literature based on the main related topics. Next, the methodology followed is described and the results are analyzed. It ends with the presentation of the main considerations and conclusions, highlighting the value of the study, its practical implications, limitations, and proposals for future research.

2 Theoretical Framework

The current era is marked by deep neural networks that have enabled significant advances in machine learning and the performance of intelligent systems. Recently, still in this technological phase, Generative AI emerged, an advanced application of these neural networks, which stands out for its ability to create original content in text, image, sound, or video, based on human instructions (prompts). This creative ability comes from the use of large language models (LLMs) and generative adversarial networks (GANs), whose technical complexity contrasts with the simplicity of their user interface. GAI has democratized access to Generative AI, bringing new ethical and pedagogical challenges, but also transformative opportunities for teaching, learning, and creation (Goodfellow et al., 2016; Brown et al., 2020; Miao & Holmes, 2023).

The main objectives of this study are to understand the impact of Generative AI on the co-creation process of higher education design students in Portugal. As specific objectives, the researchers aim to understand the use of Generative AI and the main purposes of its use: creativity/subjectivity, generative AI and emotional stimuli, impact on co-creation, the use of AI as a technology for problem solving, problems, threats, and challenges in the use of generative AI, verification and analysis of generative AI results, and the future challenges of Generative AI.

Generative AI has increasingly established itself as a dynamic ecosystem that encompasses advanced learning models. Among the main models, generative neural networks stand out, such as Generative Pre-Trained Transformer (GPT) models for natural

language processing (Brown, 2020) and Generative Adversarial Networks (GANs) applied to image synthesis (Goodfellow, 2014). In the context of tools, platforms such as ChatGPT, DALL-E, and Stable Diffusion are widely used for generating text, images, and videos, facilitating co-creation and creative automation processes. In addition, cloud-based computing ecosystems such as OpenAI, Google DeepMind, and Hugging Face are democratizing access to advanced AI models, promoting innovation in design, audiovisual, and other creative areas. Although these tools increase productivity and experimentation, challenges such as algorithmic bias, personalization, and ethics in the use of AI remain relevant. Future studies should investigate ways to improve the adaptability of AI to individual needs, ensuring a balance between automation and human creativity.

Generative AI is driving digital creativity through advanced digital tools. Models such as GPT-4 (OpenAI) and DALL-E (Ramesh, 2022) are notable references in text and image creation, respectively, while Stable Diffusion (Rombach, 2022) stands out for its overview of customized generative images. In terms of audiovisuals, Generative AI digital tools such as Runway Gen-2 and Sora (OpenAI) and Capcut are excellent examples of significant progress in the creation of increasingly realistic audiovisual objects. In turn, Midjourney and Adobe Firefly offer greatly improved capabilities for creating graphic design and conceptual digital art.

The considerable increase in the use of these tools reflects their accessibility and capacity for creative automation. However, it is extremely important to critically and actively reflect on the ethical and copyright principles relating to the use of these Generative AI tools, with prior validation of the data or final products generated from reliable and/or scientific sources. Currently, the importance of Generative AI has a cross-cutting relevance that directly or indirectly impacts all citizens; consequently, higher education has taken on a decisive role in promoting skills that enable its balanced, productive, critical, and ethical use. After the widespread panic that characterized the initial phase following the launch of ChatGPT in 2022, motivated by concerns related to academic rigor, there is now widespread recognition that GAI is here to stay. It is therefore imperative that we adapt to their ever-expanding capabilities without losing sight of the challenges that this technology poses, as well as its limitations (Liu & Bates, 2025).

Artificial Intelligence has long been the subject of research in higher education, with multiple applications identified, such as adaptive systems, means of personalizing learning paths, automated assessment, pedagogical diagnosis, and intelligent tutoring models (Zawacki-Richter et al., 2019). However, Zawacki-Richter et al. (2019) consider that the approaches adopted have been mostly quantitative and often lacking critical pedagogical reflection, which highlights a significant gap in the ethical and theoretical analysis of the use of these educational technologies. There is, therefore, a significant gap between technological development and an in-depth pedagogical understanding of its application in an academic context.

With the exponential growth of Generative AI and the emergence of a new generation of tools, driven by the public launch of ChatGPT in November 2022 (McDonald et al., 2025), a more robust body of literature has emerged that seeks to fill this gap by critically addressing the pedagogical, ethical, and social impacts of AI on education, particularly in higher education. In this scenario, the growing responsibility assigned to

teachers regarding the pedagogical integration of Generative AI has motivated the production of institutional guidelines and international guides, such as that of UNESCO in 2021, aimed at supporting ethical and effective practices in the context of education. McDonald et al. (2025) conducted a study in which they analyzed the institutional policies of 116 US universities on the use of Generative AI. This research reveals a clear trend toward encouraging its use, as several educational institutions provide detailed guidelines, lesson plans, and examples of activities to support teachers in integrating Generative AI into their teaching and learning practices. However, these guidelines focus mainly on writing activities and are still underdeveloped in other areas of knowledge.

Recognizing the need to provide clear guidance on the use of Generative AI, UNESCO produced the document “Guidance for Generative AI in Education and Research” in 2023 to promote the ethical, safe, and effective use of Generative AI in education and research. This document highlights the importance of using these tools to encourage creativity, counteracting trends such as plagiarism or the production of superficial results. Co-creation processes promote a more democratic and participatory education, directly contributing to greater student engagement with content and the field of study. By positioning students as active participants in the design of their own learning experiences, these methods stimulate a sense of ownership and responsibility for their educational journey, reinforcing creativity, motivation, and interest in the proposed activities (Gkogkidis & Dacre, 2020).

In this specific context of Generative AI, co-creation becomes a particularly relevant approach because it allows not only the technical use of digital tools, but also a shared critical reflection on their pedagogical and ethical impacts, particularly in creative areas such as design and audiovisual. Furthermore, it is increasingly clear that higher education cannot limit itself to prohibiting or restricting the use of these tools. On the contrary, it must promote a transition “from policing to pedagogical potential” (Liu & Bates, 2025), taking on a transformative vision of educational processes. In this new framework, Generative AI is seen as an ally in the development of critical, creative, and collaborative skills. Co-creation thus proves to be a privileged way of integrating Generative AI pedagogically and ethically, valuing the active participation of students and teachers in the design of their own learning experiences.

The APRU Whitepaper (Liu & Bates, 2025) supports this view, proposing the CRAFT model, structured around five dimensions: culture, rules, access, familiarity, and trust. In the specific context of co-creation processes, the model offers a valuable reference by ensuring that the use of Generative AI takes place in an environment that promotes shared experimentation, the development of critical literacy, and trusting relationships between students, teachers, and technology. This approach is particularly relevant in creative areas such as design and audiovisual, where the use of AI can improve ideation, iteration, and visual expression, always framed by critical reflection on its limits and implications.

Creativity, as several authors point out, is not limited to the cognitive exercise of associating ideas; it also involves subjective, emotional, cultural, and motivational dimensions. Margaret Boden (1998), even before the emergence of current Generative AI, proposed a typology of creativity based on three levels: combinatory, exploratory, and

transformational. These levels allow us to understand the different ways in which computer systems can collaborate in the creation of ideas.

In this sense, co-creation with Generative AI in creative contexts, such as design and audiovisual, gains added importance. More than mere technical tools, Generative AI models can function as collaborative agents, as Manovich and Arielli (2024) argue, promoting iterative and unexpected interactions between humans and machines. However, these interactions only become pedagogically relevant when inserted in an environment that values students' subjectivity, their intrinsic motivation, and the freedom to explore, test, and make mistakes. Language, intuition, emotion, and imagination continue to escape the total control of Generative AI, which makes it even more pertinent to invest in co-creation methodologies, where students take an active role in creative dialogue with technology and their peers.

Amiel & Reeves (2008) emphasize the importance of rethinking the integration of technologies in education as a situated process, guided by clear educational values. Applied in creative contexts, Generative AI should not be seen as neutral, but as an integral part of a pedagogical ecosystem where the critical involvement of students and teachers is essential. Thus, co-creation processes promote not only the technical potential of Generative AI, but also subjective expression and collaborative negotiation of meanings. In this framework, creativity emerges not only from the use of Generative AI, but from the relationship established between technology, participants, and the educational values that guide practice. As the cases analyzed in the APRU white paper, Liu & Bates (2025) point to practices such as assessment hackathons (collaborative and intensive events in which students and teachers explore, test, and reuse pedagogical tasks with the help of Generative AI), student ambassador programs, or co-design of pedagogical activities.

Demonstrate the potential of co-creation to transform Generative AI into an educational tool for creativity and meaningful learning. However, implementing these practices requires more than occasional enthusiasm: it requires favorable institutional conditions. The CRAFT model (Liu & Bates, 2025) offers a useful framework for ensuring these conditions, highlighting the importance of a culture based on innovation, clear rules, equitable access to tools, technical literacy, critical thinking, and trusting relationships among those involved.

In short, integrating generative artificial intelligence into higher education, especially in creative fields such as design and audiovisual arts, requires a critical and collaborative approach that values students' subjectivity and creativity. The co-creation processes framed by the CRAFT model are promising for exploring the potential of Generative AI, without neglecting its risks. By combining this framework with research conducted with students, this study aims to contribute to the understanding of how Generative AI should be integrated into the academic context in an ethical and meaningful way.

3 Methodology

In this study, the methodology implemented consisted of two phases. The first phase involved the implementation of a pedagogical activity developed in a project work context (laboratory practice) in the classroom with polytechnic and university students

studying Communication Design, Multimedia, and Digital Audiovisual Production, with four class sessions (three hours each, for a total of 12 hours). This pedagogical laboratory practice involved students from three higher education institutions in Portugal, namely IPMAIA (Maia), ISCE Douro (Penafiel), and ISMT (Coimbra). The second was quantitative, with the application of an online questionnaire adapted from Oscar Robayo-Pinzón, Sandra Rojas-Berrio, Jeisson Rincón-Novoa, and Andrés Ramírez-Barrera (2024), which resulted in a robust sample (158 responses).

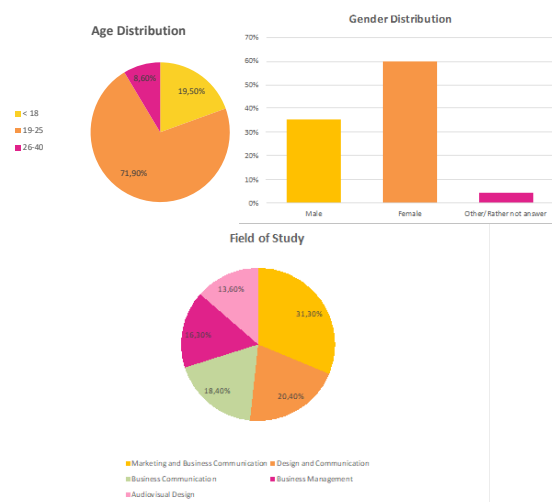
The questionnaire had a total of 20 questions, 10 of which used the Likert scale (with five levels of assessment/satisfaction) and the remaining 10 were multiple choice. All students (300) were invited to participate, resulting in a convenience sample of 258 complete and valid responses from students in the scientific areas of Communication Design, Multimedia, Digital Audiovisual Production, and Business Communication from various polytechnic and university higher education institutions in Portugal. Before the questionnaire was given to the students, a pre-test was carried out with three polytechnic and university teachers to verify, correct, and improve the data collection instrument.

The questionnaire was administered and shared in person, in the classroom, with the support of the teachers of the respective courses, between December 2024 and March 2025. All participants were duly informed about the objectives of the study and gave their consent, respecting the principles of personal data protection and ensuring the anonymity of the respondents. Data analysis was performed using Microsoft Excel software, version 2019.

4 Analysis of results

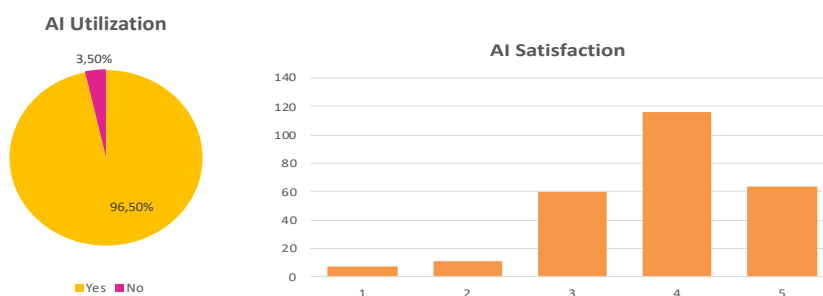
This survey, with 258 valid responses, aims to analyze the impact of Generative AI on co-creation processes in the design and production of audiovisual materials. It addressed issues related to the use of Generative AI, perceptions of its usefulness, challenges faced, its impact on creativity and innovation, as well as respondents' views on the future of this technology in the design sector.

Graphs 1, 2, and 3 present the main demographic data of the sample. Most survey participants were between 19 and 25 years old (71.9%), followed by those under 18 (19.5%). The remainder (8.6%) were aged between 26 and 40, revealing a predominantly young sample at the beginning of their academic or professional careers (graph 1). Analyzing the distribution by gender, graph 2 shows that the majority of participants were female, representing 60.2% of the sample. Males accounted for 35.5%, and the remaining 4.3% were participants who chose not to declare their gender. In graph 3, relating to the academic background of the participants, the data reveals a diversity of courses linked to the areas of design, communication, and management. These data reflect a sample focused on training where creativity, communication, and innovation play a central role, as predefined by the authors.

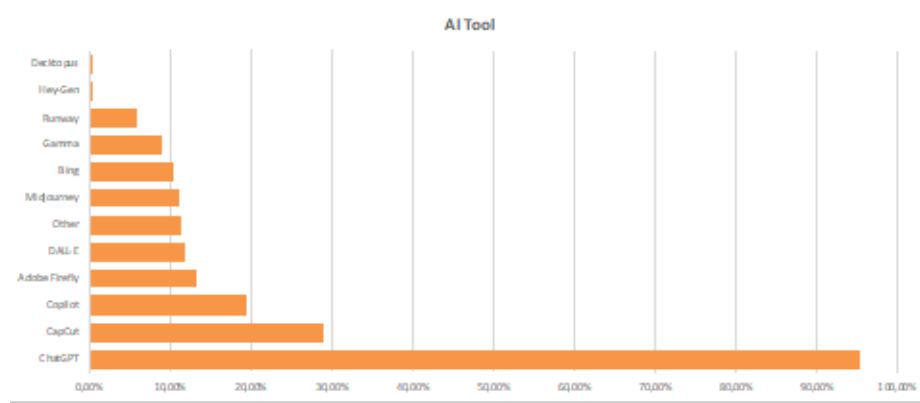


Graph 1, 2, 3 – Age, Gender and Course (source: author)

As shown in Graph 4, the vast majority of participants have already adopted generative AI. Analysis of the data reveals widespread use of these tools, with 96.5% of respondents indicating that they use them, while only a residual percentage (3.5%) said they do not. Regarding the degree of satisfaction with the use of generative AI, the results reveal an overall positive perception (Figure 5). The majority are at the highest levels of the scale, with level 4 standing out as having the highest percentage of responses, followed by level 5, the highest. On the other hand, the lowest levels of the scale (1 and 2) have a significantly lower number of responses in relation to the total.

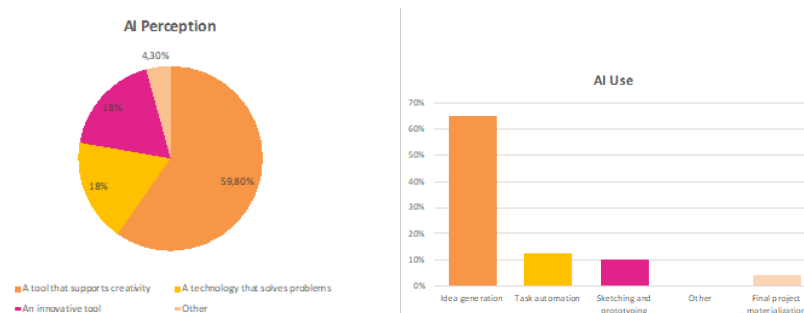


Graph 4, 5 – Use of Generative AI and level of satisfaction (source: author)



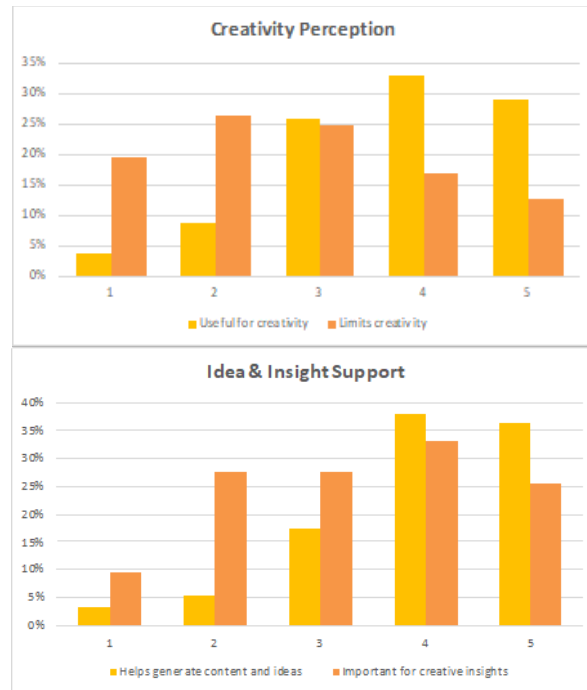
Graph 6 – Generative AI tools used regularly (source: author)

The analysis reveals that the most used Generative AI tool is ChatGPT, mentioned by 95.3% of respondents as being used regularly. This is followed by CapCut, with 28.9% of responses, and in third place is the Copilot tool, used by 19.5%. Tools such as Adobe Firefly, DALL-E, Midjourney, Bing and Gamma have usage levels below 15%. The “Other” option includes tools mentioned less frequently, totaling 11.7% of responses. Tools such as Desktops, HeyGen and Runway have a residual presence, with very low percentages (graph 6).



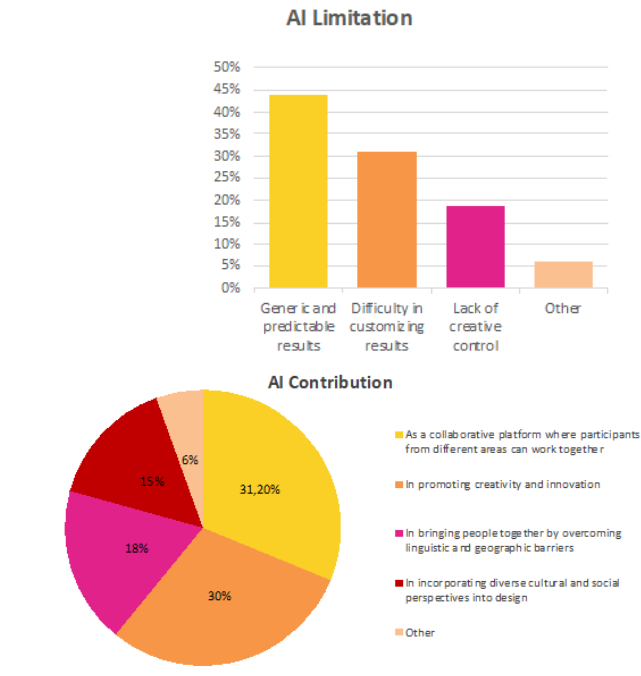
Graph 7, 8 – Generative AI in creation processes and purposes of use in the audio-visual sector (source: author)

The majority of participants (59.8%) view generative AI as a tool to support creativity and recognize its role in the creative process. Another 18% view it as an innovative technology, while an equal percentage see it as a practical solution to problems. The “Other” category accounts for 4.3% of responses that do not identify with any of the main options presented (Figure 7). In terms of the purposes of generative AI in design and audiovisual projects, idea generation is the most frequently cited use by participants (65.2%). This is followed by the automation of repetitive tasks with 12.5%, while drafts and prototypes account for 10.2%. The implementation of final projects is only mentioned by 4.3% of respondents. Finally, the “Other” category (7.8%) includes more specific or individual uses (Figure 8).



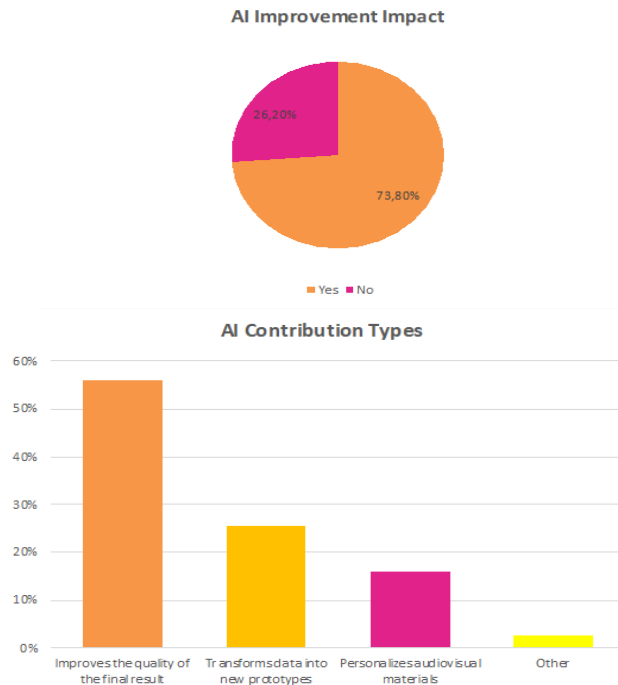
Graph 9, 10 – Useful or limiting Generative AI / practical applications of AI in content creation (source: author)

Most participants consider generative AI to be useful for creativity, with a higher concentration of responses at the highest levels of agreement (4 and 5). On the other hand, the idea that AI limits creativity was more prevalent at lower levels of agreement (1 and 2), indicating that the majority do not consider AI to limit creativity (Figure 9). In graph 10, the comparison between the perception of generative AI as an aid in generating content and ideas and as an important tool in quickly obtaining creative insights shows strong peaks at levels 4 and 5 of agreement, with a slight advantage in the perception of AI as a generator of content and ideas.



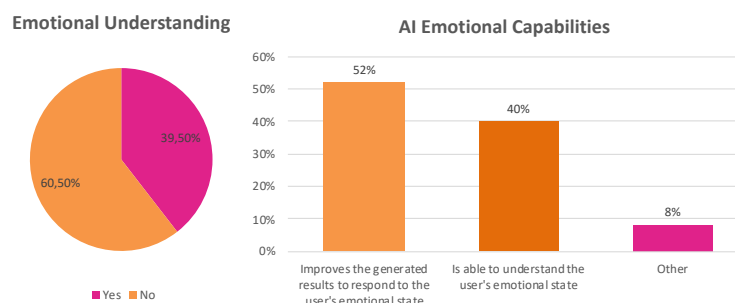
Graph 11, 12 – Problems and perception of the role of Generative AI (source: author)

The students surveyed identified generic or predictable results (44.1%) and the difficulty in personalizing results (31.2%) as the main problems with generative AI. In addition, 18.4% highlighted the lack of creative control, while 6.2% pointed out other problems not specified in the main categories (graph 11). About one-third of the participants in this study see generative AI as a tool with high collaborative potential in the future (31.2%) and one that promotes creativity and innovation (29.7%). It is also valued for its ability to bring people together, promoting the overcoming of linguistic and geographical barriers (18.4%), as well as contributing to the integration of diverse cultural and social perspectives into creative processes (15.2%). Finally, a small number of responses (5.5%) highlighted other possibilities for future application (graph 12).



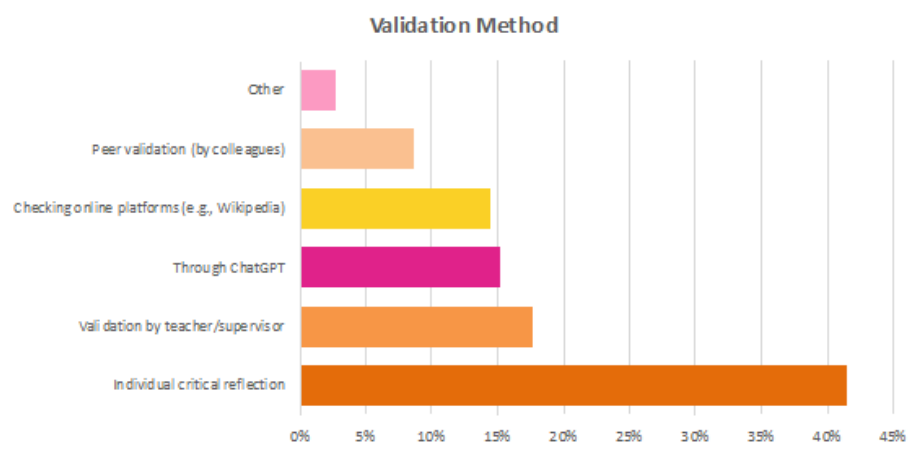
Graph 13, 14 – Generative AI and subjectivity of creators (source: author)

Graph 13 shows that most respondents (73.8%) believe that generative AI is capable of adapting to the subjectivity of its creators, while the rest (26.2%) are more skeptical about this ability. Among those who answered affirmatively to the previous question, 56.1% say that AI improves the quality of the final result, while 25.4% highlight its ability to transform data into new prototypes and 15.9% value its ability to personalize audiovisual materials (Chart 14).



Graph 15, 16 – Perception of the ability to capture emotional (source: author)

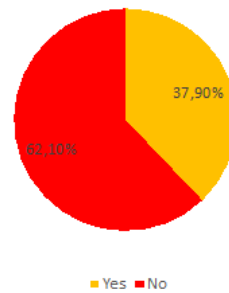
When asked whether generative AI can capture the emotional stimuli transmitted by its users, participants were divided in their perception. Thus, the majority of participants (60.5%) believe that generative AI is not yet capable of capturing these emotional stimuli, while the remaining 39.5% believe that it is (graph 15). Among the group that believes it can, it is noteworthy that AI can improve the results generated based on the user's emotional state (52%) or directly understand these emotions (40%). In addition, 8% indicate other ways of capturing emotions (graph 16).



Graph 17 – Generative AI and the subjectivity of creators (source: author)

Analysis of the question “What methods do you use to verify and validate the final results obtained by generative AI?” reveals that a large proportion of participants (41.4%) resort to individual critical reflection. Around 17.6% indicate validation by teachers or supervisors. A significant number of users, 15.2%, use ChatGPT itself as a verification tool, and 14.5% confirm the results by consulting online platforms such as Wikipedia. Peer or colleague verification is mentioned by 8.6%, and 2.7% of respondents indicate other more specific methods not covered by the options presented (graph 17).

Perceived Threat to Professional Future



Graph 18 – Perception of the threat to the professional future of generative AI
(source: author)

Most participants (62.1%) do not consider generative AI to be a threat to their professional future, revealing confidence in the complementarity between AI and human skills. However, 37.9% express concern about the negative impact of technology on their employment opportunities (Figure 18).

5 Discuss and conclusions

Analysis of the data obtained reveals a generally positive perception regarding the use of Generative AI in the context of co-creation in design and audiovisual media. The responses obtained in the questionnaire indicate widespread adoption of Generative AI by participants. ChatGPT stands out as the most popular tool, especially for developing natural language processing tasks and creating multimodal content.

Generative AI seems to contribute to various creative processes, such as brainstorming and idea generation, as mentioned by Gkogkidis & Dacre (2020). However, its use in more advanced stages is still limited, without limiting or inhibiting human creativity. Despite the limitations identified by Liu & Bates (2025), there was a tendency toward generalized results and difficulties in personalization. Despite these limitations, there is growing confidence in the use of Generative AI, both now and in the future. Many participants believe that Generative AI is capable of adapting to users' subjectivity and thus improving the final quality of projects. There is also a perception that Generative AI can respond to emotional stimuli, although this is considered an area still under development.

Individual critical reflection, as mentioned by Zawacki-Richter et al. (2019), is the main method used by participants to validate the generated content, although validation by teachers or supervisors is also a common practice. Human supervision continues to be seen as essential, with many participants highlighting the importance of a conscious and critical approach to the use of AI.

Although many see Generative AI as a useful tool, there are concerns about its impact on the labor market, especially in relation to the replacement of technical tasks and creative automation. The open responses indicate the need to value human skills, also referred to in the studies by Amiel & Reeves (2008), such as critical creativity, ethical sensitivity, and intuition, characteristics that continue to be seen as differentiators in relation to technology.

In short, Generative AI is widely recognized as an innovative and useful tool in academic and creative fields. Although it is seen as an ally in promoting innovation and collaboration, the human factor, with its creativity and ethics, is fundamental to ensuring the relevance and uniqueness of the designer's work in the digital age.

The limitations of Generative AI include the production of results that are often generic, predictable, and notoriously difficult to personalize, always requiring critical and scientific validation and, obviously, human supervision. These aspects must be worked on and adjusted to the educational objectives of students. Generative AI should be positioned within educational practice.

Future studies should focus on possible insights that allow us to find new ways to improve the adaptation of Generative AI to the subjectivity of its users, thus attempting to respond to emotional stimuli. In addition, it is essential to investigate the impact of creative automation in order to find new strategies that allow a balance to be struck between technology and human creativity. The value of skills such as ethical sensitivity and intuition should be encouraged and valued so that Generative AI can be understood as a complementary tool and not as something that will replace the human component.

References

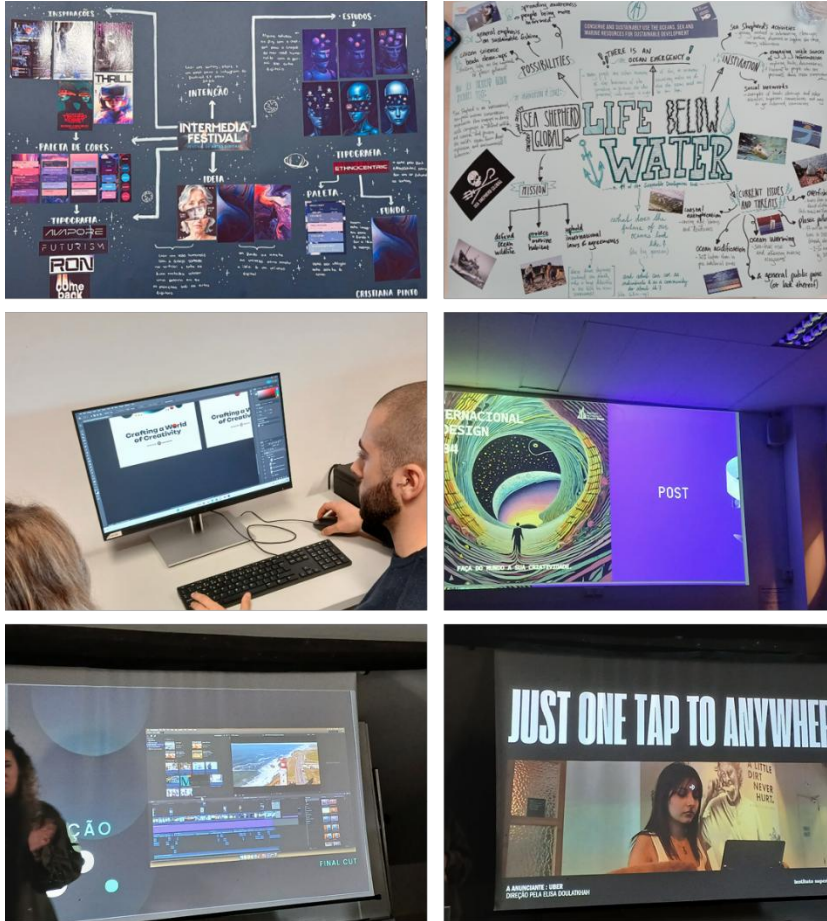
1. Boden, M. A. (1998). Creativity and Artificial Intelligence. *Artificial Intelligence*, 103(1–2), 347–356. [https://doi.org/10.1016/S0004-3702\(98\)00055-1](https://doi.org/10.1016/S0004-3702(98)00055-1)
2. Brown, T. B., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., & Amodei, D. (2020). Language models are few-shot learners. *Advances in Neural Information Processing Systems*, 33, 1877-1901. Retrieved from <https://arxiv.org/abs/2005.14165>
3. Delipetrev, B., Tsinarakis, C., & Kostić, U. (2020). Historical Evolution of Artificial Intelligence (EUR 30221 EN). Publications Office of the European Union. <https://doi.org/10.2760/801580>
4. Gkogkidis, V., & Dacre, N. (2020). Co-Creating Educational Project Management Board Games to Enhance Student Engagement. *European Conference on Game Based Learning*, Brighton, UK. <https://doi.org/10.2139/ssrn.3812772>
5. Goodfellow, I., Bengio, Y., & Courville, A. (2016). *Deep Learning*. MIT Press. Retrieved from <https://www.deeplearningbook.org/>
6. Liu, D. Y. T., & Bates, S. (2025). Generative AI in higher education: Current practices and ways forward. Association of Pacific Rim Universities. Retrieved from <https://www.apru.org/resources/generative-ai-in-higher-education/>
7. Manovich, L., & Arielli, E. (2024). Artificial Aesthetics: AI, Creativity and the Future of Art. Retrieved from <https://manovich.net/index.php/projects/artificial-aesthetics>

8. Microsoft Corporation. (2019). Microsoft Excel (Versão 2019) [Software]. Microsoft. <https://www.microsoft.com/>
9. McDonald, P., Mayes, T., & Johnstone, R. (2025). Apostles, agnostics and atheists: Engagement with generative AI by Australian university staff. Queensland University of Technology. Retrieved from <https://eprints.qut.edu.au/252079/>
10. Miao, F., & Holmes, W. (2023). Guidance for Generative AI in Education and Research. UNESCO. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000386693>
11. UNESCO. (2021). Recommendation on the ethics of artificial intelligence. United Nations Educational, Scientific and Cultural Organization. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000381137>
12. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – Where are the educators? *International Journal of Educational Technology in Higher Education*, 16(1), 1–27. <https://doi.org/10.1186/s41239-019-0171-0>
13. Brown, T., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., & Amodei, D. (2020). Language Models are Few-Shot Learners <https://doi.org/10.1186/s41239-019-0171-0> (https://www.researchgate.net/publication/341724146_Language_Models_are_Few-Shot_Learners)
14. Goodfellow, I., Pouget-Abadie, J., Mirza, M., Xu, B., Warde-Farley, D., Ozair, S., ... & Bengio, Y. (2014). Generative adversarial nets. *Advances in neural information processing systems*, 27 (https://www.researchgate.net/publication/263012109_Generative_Adversarial_Networks)
15. Ramesh, A., Dhariwal, P., Nichol, A., Chu, C., & Chen, M. (2022). Hierarchical Text-Conditional Image Generation with CLIP Latents. DOI: 10.48550/arXiv.2204.06125 (<https://arxiv.org/abs/2204.06125>)
16. Rombach, R., Blattmann, A., Lorenz, D., Esser, P., & Ommer, B. (2022). High-Resolution Image Synthesis with Latent Diffusion Models. DOI:10.1109/CVPR52688.2022.01042 https://www.researchgate.net/publication/363908832_High-Resolution_Image_Synthesis_with_Latent_Diffusion_Models

Appendix

Evidence - images captured in the classroom with students:





Inquérito online by Google Forms:
<https://forms.gle/tmhJ6Yv1azXhWTEC9>

O impacto da IA Generativa no processo de cocriação

Todas as alterações foram guardadas no Drive

Enviar

Perguntas

Respostas **258**

Definições

Total de pontos: 0

258 respostas

Associar ao Sheets

Não aceita respostas. ☐

Mensagem para os inquiridos

Este formulário já não está a aceitar respostas

Resumo

Pergunta

Individual



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