




# Impact of the use of artificial intelligence for digital content creation in multimedia engineering undergraduate students

## *Impacto del uso de inteligencia artificial para la creación de contenidos digitales en estudiantes del pregrado en ingeniería multimedia*

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**Abstract:** The study analyzed the impact of the use of artificial intelligence in the production of digital content among undergraduate students of Multimedia Engineering at Universidad Simón Bolívar, Cúcuta, during the 2023-2 academic semester. The objective was to evaluate how this technology influences the development of creative and technical skills, as well as the creative autonomy of students, considering their understanding of authorship attribution and ethics in the collaboration between human and AI. Conducted within a positivist paradigm with a quantitative deductive-logical design, data were collected through a survey of a simple random sample of 123 students out of a total of 178, with a sampling mortality of 6%. The results showed a dual perception of the impact of AI on skills improvement, highlighting the pedagogical need to address AI in vocational training.

**Keywords:** Artificial intelligence, engineering, multimedia engineering, creativity and ethics.

**Resumen:** El estudio analizó el impacto del uso de inteligencia artificial en la producción de contenidos digitales entre estudiantes universitarios de Ingeniería Multimedia en la Universidad Simón Bolívar, sede Cúcuta, durante el semestre académico 2023-2. El objetivo fue evaluar cómo esta tecnología influye en el desarrollo de habilidades creativas y técnicas, así como en la autonomía creativa de los estudiantes, considerando su comprensión de la atribución de autoría y la ética en la colaboración entre humano y AI. Realizado dentro de un paradigma positivista con diseño deductivo-lógico cuantitativo, se recopilieron datos mediante una encuesta a una muestra aleatoria simple de 123 estudiantes de un total de 178, con una mortalidad muestral del 6%. Los resultados mostraron una percepción dual sobre el impacto de la IA en la mejora de habilidades, destacando la necesidad pedagógica de abordar la IA en la formación profesional.

**Palabras clave:** Inteligencia artificial, ingeniería, ingeniería multimedia, creatividad y ética.

## 1. INTRODUCTION

Today's world in many ways resembles a place of wonder, similar to that described by British mathematician Charles Lutwidge Dodgson, known as Lewis Carroll, in his famous novels. Advances in artificial intelligence (AI) have made possible image recognition, the use of smart speakers and the development of autonomous vehicles. AI is defined as the ability of a system to interpret external data, learn from it, and adapt to achieve specific goals [1]. Despite being established as an academic discipline in the 1950s, AI remained relatively unknown and of limited practical interest for more than half a century. Today, however, thanks to the growth of Big Data and advances in computing power, AI has entered the business arena and has become a topic of public conversation [2].

Artificial intelligence (AI) is a scientific and technological field dedicated to the creation of systems that can solve tasks that typically require human intelligence. In recent years, this discipline has advanced considerably thanks to three key factors: the development of more advanced algorithms, increased processing power and access to large volumes of data. These factors have enabled the application of AI in a wide variety of areas, including medicine, finance, meteorology, and transportation, among others [3],[4].

In the progress of artificial intelligence, three distinct phases can be identified, each with its own capabilities. The first phase, known as symbolic AI, involves programming logical rules to enable a system to perform intelligent tasks, such as playing chess or diagnosing diseases. The second phase, called data-driven AI, uses machine learning techniques to identify patterns and knowledge from large volumes of data, and is responsible for the current growth of AI. The third phase, context-based AI, is central to artificial superintelligence, a concept that describes a hypothetical system capable of understanding the real world and proposing innovative solutions to new or unknown problems.

These phases are also distinguished by the level of complexity and autonomy of the AI, classifying it as specific or weak AI, and general or strong AI. So far, only forms of specific AI, capable of solving specific and limited tasks, have been developed. General AI represents a very ambitious and complex

goal, which generates divided opinions about its feasibility and desirability to achieve [5].

One of the most influential and controversial applications of artificial intelligence (AI) is automated content creation. For this, neural networks trained using machine learning processes are used [6]. These processes include deep learning, which mimics the way humans learn skills such as word prediction or shape recognition. Generative models process large unstructured data sets, such as text, audio or images, to generate new content in a style similar to the original data.

Generative AI has undergone rapid technological advancement and is reaching a level of sophistication that previously seemed unimaginable. However, it is crucial to keep in mind that the safety of this tool depends on its use. Although human creativity seems limitless, the same technology capable of solving old problems can also generate new problems if not used properly. This is why in recent years initiatives such as the OpenAI project, the OdiseIA observatory or Google's AI for Social Good program have emerged to promote the ethical and responsible use of AI for the benefit of society.

The use of generative AI for content creation has implications in a number of areas, including labor, economics and education. In the labor market, for example, it is estimated that the global impact of AI will not be significant until after 2030. Although it could increase productivity and create new jobs, it could also devalue some jobs and increase economic inequality [7],[8].

In the media field, this technology can facilitate the work of professionals, but it also entails risks for the originality, quality and veracity of content. It implies new challenges and opportunities for content creators and consumers, who must acquire new skills and ethical and social awareness about the responsible use of AI [9].

Automated content creation has a number of potential applications, such as the production of news, features, scripts, translations and re-creations of public personalities. While it can improve the productivity and diversity of content, it poses significant ethical, legal and social challenges related to veracity, authorship, transparency and its impact on public opinion. Recent advances in AI

present opportunities, but also limitations and threats that must be considered [9].

This research seeks to explore the impact that the use of artificial intelligence has on undergraduate students in multimedia engineering during the process of digital content creation. Using a mixed approach that combines quantitative and qualitative methods, it aims to analyze how the application of AI technologies influences the quality, efficiency and creativity of the projects carried out by students.

The findings of this study could shed light on the advantages and disadvantages of the use of AI in the production of digital content in the educational field, as well as on the skills and competencies that future multimedia engineering professionals should develop to take full advantage of these emerging tools. In addition, the results obtained could serve as a basis for the implementation of innovative pedagogical strategies that effectively integrate AI into undergraduate programs in multimedia engineering.

## 2. METHODOLOGY

The positivist paradigm has been selected as the methodological core of this research process. According to Mendoza and Mendoza [10], this paradigm implies several key ideas: 1) Reality is considered independent of people and subject to unalterable observable laws; 2) Knowledge is not relative, but objective and quantifiable, which allows its measurement and contributes to scientific progress; 3) It is based on realism, which implies understanding reality without bias or prior judgments; 4) Positivist scientists presume the existence of laws governing social events, which can be expressed and demonstrated through scientific procedures; and 5) Unlike the qualitative approach, positivism assigns numerical values to variables for their study.

The main reason for adopting the positivist approach in this research is the need to quantify the impact of artificial intelligence in the production of digital content by Multimedia Engineering students. According to Ricoy [11], cited by Ramos [12], this paradigm is fundamental to verify theories by means of statistical tools or to establish criteria by means of numerical expressions. In this way, relating numerical values with the objectives of the study, the influence of this emerging technology on the student process can be analyzed.

In addition, current research employs the deductive-logical method. According to Ruiz [13], as cited by Márquez [14], this method consists of a series of techniques and procedures that start from general statements to arrive at specific situations or events. It is also noted that Aristotle used this method in syllogistics, where a conclusion is established based on premises.

The quantitative research design was adopted. According to [15], research under this paradigm is characterized by its objectivity and the possibility of generalizing the results. This implies that scientific validity is linked to the impartiality or neutrality of the instruments used, the adequate selection of the object of study and the correct use of statistical procedures to interpret the results.

## 3. DEVELOPMENT

The research established three dimensions and twelve variables that respond to the three objectives set out in the research collection instrument as described in Figure 1. As a data collection instrument, a form was created in the Forms tool of the Microsoft 365 service. As shown in Figure 1, it was filled out by students of the Multimedia Engineering undergraduate program of the Universidad Simón Bolívar Cúcuta during the months of October and November 2023. This period of time belongs to the academic semester 2023-2. The reason for using a form as a collection instrument is due to the fact that, as Labrador, Campos and Anguita [16] point out, this is a widely used research method that makes it possible to obtain and analyze data efficiently and quickly.

The aforementioned form was designed under the Likert-type scale, which is a tool used for quantitative data collection [17], filled out by the research subject, students of the multimedia engineering program of any of the 10 semesters of the undergraduate program.

Citing Sulbarán [18], the way in which the scale was applied is categorized as self-administered, since the form or survey was made available to the multimedia engineering student, who accessed it through his Microsoft 365 user using his institutional mail, and selected, according to each proposition, the option that, according to Hernández, Fernández and Baptista [19] cited by Sulbarán [18], best represented his reaction.

**Table 1: Rule Base**

Dimensions	Variables
Perception of the impact on the development of creative and technical skills in students, as a result of the implementation of artificial intelligence for the creation of digital content.	Impact on Creative Skills Improvement of technical skills Utility of artificial intelligence in training Preparation for future challenges.
Influence on the capacity of creative expression for the creation of digital content.	Influence on the capacity for creative expression. Potential for innovation in multimedia production. Impact on creative autonomy. Limitations in creative expression. Freedom to Explore New Ideas.
Awareness of the contribution of artificial intelligence	Identification of AI-generated content. Ability to explain the contribution of AI. Preparation for ethical challenges.

*Source: own elaboration*

The questions on the form were developed to meet the following objectives:

To describe the impact on the development of creative and technical skills in undergraduate students of Multimedia Engineering at the Universidad Simón Bolívar Cúcuta in the second academic semester of the year 2023, as a result of the implementation of artificial intelligence for the creation of digital content.

-How significant do you consider the impact of the implementation of artificial intelligence has been on the development of your creative skills?

-How much have you improved your technical skills as a Multimedia Engineering student due to the implementation of artificial intelligence in the creation of digital content?

-How would you rate the usefulness of artificial intelligence in your training for digital content development?

-How satisfied do you feel with the way artificial intelligence has contributed to your creative development in the field of Multimedia Engineering?

-Do you consider that the implementation of artificial intelligence has adequately prepared students for future challenges in digital content creation?

To determine how the use of artificial intelligence for the creation of digital content influences the creative autonomy of undergraduate students in Multimedia Engineering at the Universidad Simón Bolívar Cúcuta in the 2023-2 academic semester,

exploring whether this technology enhances or limits their capacity for innovation and expression.

-Do you consider that the use of artificial intelligence has improved your ability to express yourself creatively in the creation of digital content?

-Do you feel that artificial intelligence has expanded your possibilities for innovation in the production of multimedia content?

-Do you think that the use of artificial intelligence has positively influenced your creative autonomy in the field of Multimedia Engineering?

-Have you experienced any limitations in your capacity for creative expression due to the use of artificial intelligence in the creation of digital content?

-Do you see artificial intelligence as a tool that complements your creative autonomy rather than replacing it?

-Do you feel that artificial intelligence gives you more freedom to explore new ideas in your multimedia projects?

To point out the understanding and management that students of the undergraduate degree in Multimedia Engineering at the Universidad Simón Bolívar Cúcuta branch in the second academic semester of the year 2023 have in relation to the attribution of authorship in contents generated by artificial intelligence, analyzing whether students are aware of the collaboration between their creativity and AI, as well as the importance of proper attribution in this context.

-How aware do you feel of the contribution of artificial intelligence in the generation of multimedia content?

-How important do you think proper attribution is in AI-generated content in terms of ethics and recognition?

-Do you consider that content generated by artificial intelligence should be clearly identifiable as such to the public?

-Do you feel able to explain to others the specific contribution of artificial intelligence in the creation of multimedia content?

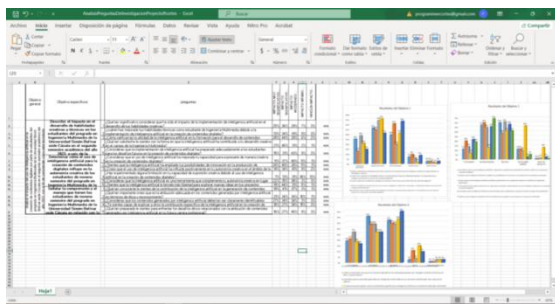
-How prepared do you feel to address the ethical challenges related to artificial intelligence-generated content attribution in your future career? For the processing of the information collected by the survey, use was made of the Microsoft Excel spreadsheet software (see Figure 2), which allows data to be structured and analyzed. In addition, according to Pérez González [20], the program is an ideal tool for researchers, allowing simple data collection and editing, so that when the researcher has a considerable amount of

information, he/she can carry out statistical processes on it according to the set of possibilities that arise.

Now, descriptive statistics played a fundamental role in the processing and analysis of the responses of the undergraduate students in the survey. Regarding the concept of descriptive statistics within the research context, Perez [21] argues that:

1) Descriptive statistics brings with it a series of methods that summarize in a meaningful way the information gathered in a study, allowing a better understanding of the data collected; 2) Descriptive statistics represents the first step, sometimes the only one, when statistically analyzing a research project; 3) The organization of data, categorizing observations, retelling values and synthesizing, in numerical or graphical language, the data series; 4) When using descriptive statistics, the researcher aims to make an easy-to-understand and practical summary based on the essential aspects of the data set (generally applied on a sample); 5) Adequately describing the data allows for better subsequent analyses and encourages the generation of new hypotheses that can be tested empirically.

Mainly, statistical graphs represented the use of descriptive statistics within the processing and analysis phases of the data collected by the survey, since, as pointed out by [22] statistical graphs, understood as images that combine different visual elements within a reference system (coordinates), fulfill two main functions: 1) To replace tables as tools for the representation of quantitative information (numerical type data); 2) To serve as a means for data analysis, usually becoming an efficient instrument for describing, summarizing and analyzing information.



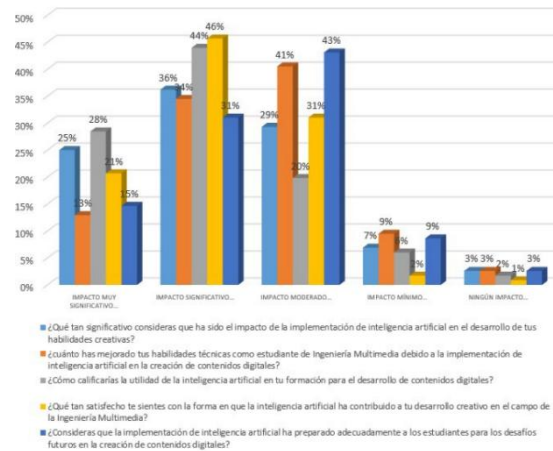
**Fig. 1.** Processing of the information collected by the survey in the Microsoft Excel computer program.

*Source:* own elaboration.

## 4. RESULTS

### 4.1. To describe the impact on the development of creative and technical skills in undergraduate

students of Multimedia Engineering at the Universidad Simón Bolívar Cúcuta in the second academic semester of the year 2023, as a result of the implementation of artificial intelligence for the creation of digital content.



**Fig. 2.** Statistical graph of the data collected by the survey related to specific objective 1.

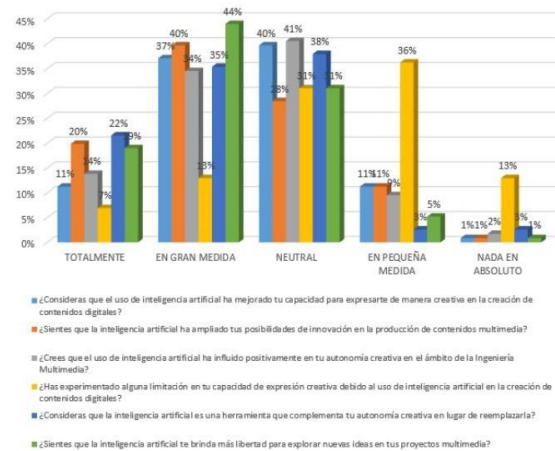
*Source:* own elaboration.

Creative and technical skills are fundamental within multimedia engineering, because it is through creative ingenuity and skill in the handling of multimedia software and related theory that high quality and impact contents can be conceived, which, in turn, guarantee a pleasant reception of the message being transmitted by the public or objective audience (usually). Now, the compendium of artificial intelligence tools, especially those of generative type have had a more than considerable impact on the development of creative and technical competences in the undergraduate students of multimedia engineering at the Universidad Simón Bolívar Cúcuta during the 2023-2 academic semester, as can be seen in Figure 3, where the options MODERATE IMPACT, SIGNIFICANT IMPACT and VERY SIGNIFICANT IMPACT (highly noticeable effect) register higher response percentages by the sample in comparison with the two remaining options MINIMAL IMPACT and NO IMPACT (which mean a very low incidence of Artificial Intelligence in the improvement of the aforementioned competences by the population under study). Other sections to take into account within the statistical graph of objective 1 are: 1) 60% of the sample feel that artificial intelligence has had a great impact on the development of their creative

skills; 2) 88% of the sample perceive a noticeable improvement in their technical skills thanks to the use of artificial intelligence; 3) 72% of the sample feel that artificial intelligence has been useful for their training in the development of digital content; 67% of the sample are satisfied with the way in which artificial intelligence tools have contributed to the maturity of their creativity in the field of multimedia engineering; and 5) approximately 88% of the sample agrees that artificial intelligence (generative artificial intelligence applications) has had a moderate to notable influence on the training of undergraduate students regarding future challenges related to the creation of digital content. The data collected allow us to observe that the use of artificial intelligence has influenced the positive perception that undergraduate students in multimedia engineering have, during the 2023-2 academic semester, regarding the usefulness of artificial intelligence in their academic instruction. In addition, the high degree of student satisfaction in relation to the development of their creativity evidences the importance and effectiveness of AI in the process of acquiring creative competencies in the field of multimedia engineering.

It is also worth noting that, although not directly related to the direct purpose of the objective, the data collected from the sample suggest a favorable evolution in how students perceive and manage the integration of artificial intelligence in their training process and professional development.

**4.2. To determine how the use of artificial intelligence for the creation of digital content influences the creative autonomy of undergraduate students in Multimedia Engineering at the Universidad Simón Bolívar Cúcuta in the 2023-2 academic semester, exploring whether this technology enhances or limits their capacity for innovation and expression.**



**Fig. 3.** Statistical graph of the data collected by the survey related to specific objective 2.

*Source: own elaboration.*

A fear that has arisen due to the boom and potential of artificial intelligence tools within the areas that are part of multimedia engineering is that these could be limiting the creative capacity of

undergraduate students, which would negatively influence their ability to innovate and express themselves creatively when structuring and developing digital content. Neutrally, the data collected by the survey that are related to the aforementioned aspect allow to dispel to a large extent the fear of a role of artificial intelligence as a limiting factor of creative autonomy in undergraduate students of multimedia engineering at the Simon Bolivar University, Cucuta campus during the academic semester 2023-2. However, as evidenced in Figure 4, it is interesting to observe how there is some skepticism among the sample with respect to assuring that they have not experienced limitations in their creativity when using artificial intelligence tools, since 50% of the answers to the question Have you experienced any limitation in your capacity for creative expression due to the use of artificial intelligence in the creation of digital content? are concentrated in the options classified as NEUTRAL, TO A GREAT EXTENT, and TOTALLY (in these last two options to a lesser extent).

Furthermore, in the questions Do you consider that artificial intelligence is a tool that complements your creative autonomy instead of replacing it? and Do you feel that artificial intelligence gives you more freedom to explore new ideas in your multimedia projects? the percentages that are located in the NEUTRAL, TO A SMALL EXTENT and NOT AT ALL options are 44% and 37% respectively (in the last two options, of course, to a much lesser extent).

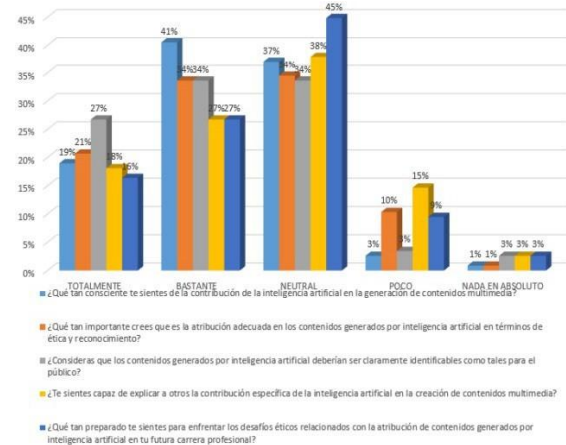
The skepticism mentioned above can be understood as the result of the simplification of processes that artificial intelligence tools allow in the development of digital content, since in several cases the final result of a content is not far from being different from the output generated by the AI, and even the multimedia engineer in training may have simply retouched the content generating very minimal changes. However, we must be careful not to fall into a generalization, since there are also cases in which, although the content created by the student maintains a certain relationship with the output generated by the tool, when comparing the two, substantial differences can be seen that demonstrate the creative capacity of the student and the originality of the content.

Another scenario that can be contemplated is that sometimes multimedia engineers in training use these tools in order to overcome creative blocks or generate pieces that serve as inspiration when developing digital content, so that in relation to the outputs or responses of the tool, the content generated may not bear any resemblance. However, we must emphasize that the NEUTRAL option only shows skepticism that can be classified as insecurity when

some individuals in the sample decided whether to respond positively or, on the contrary, critically to the questions mentioned, so if we disregard the percentage belonging to that option, we could observe that the picture is more positive than critical, since 48% of the sample answers TO A GREAT EXTENT and TOTALLY to the question Do you consider that the use of artificial intelligence has improved your ability to express yourself creatively in the creation of digital content?, 60% of the sample answers TO A GREAT EXTENT and TOTALLY to the question Do you feel that artificial intelligence has expanded your possibilities for innovation in the production of multimedia content?, and 48% of the sample answers TO A GREAT EXTENT and TOTALLY to the question Do you think that the use of artificial intelligence has positively influenced your creative autonomy in the field of Multimedia Engineering?

**4.3 To determine how the use of artificial intelligence for the creation of digital content influences the creative autonomy of undergraduate students in Multimedia Engineering at the Universidad Simón Bolívar Cúcuta in the 2023-2 academic semester, exploring whether this technology enhances or**

**limits their capacity for innovation and expression.**



**Fig. 4.** Statistical graph of the data collected by the survey related to specific objective 3.  
 Source: own elaboration.

The purpose of collecting data on this aspect is to know the degree of understanding that students of the Multimedia Engineering undergraduate program of the Universidad Simón Bolívar Cúcuta during the 2023-2 academic semester have regarding the collaborative work relationship (to refer to this process in some way) that exists between their creativity and artificial intelligence tools, as well as to observe how much awareness they have regarding

the correct attribution of authorship when it is due. The fundamental aspect to evaluate in this objective, therefore, lies in evidencing the link between human creativity - artificial intelligence within the context of the development or elaboration of digital contents, as well as identifying, through the answers given by the sample, the perception of the undergraduate students regarding the ethical imperative of properly attributing authorship within the current technological context: the considerable contribution made by artificial intelligence (generative artificial intelligence tools) in the creation of multimedia content, the need for proper attribution within the contents generated by artificial intelligence tools from the ethical perspective and recognition, and the importance of pointing out to the public the origin of the contents generated by artificial intelligence. This can be confirmed by the following figures: 1) regarding the question "How aware do you feel of the contribution of artificial intelligence in the generation of multimedia contents? 60% of the sample answers with the options "A LOT" and "TOTALLY"; 2) regarding the question "How important do you think is the proper attribution in the contents generated by

artificial intelligence in terms of ethics and recognition? 55% of the sample considers the options ENOUGH and TOTALLY; and 3) to the question Do you think that content generated by artificial intelligence should be clearly identifiable as such to the public? 61% of the sample opts for the options ENOUGH and TOTALLY. Despite the fact that the picture appears to lean towards a remarkable degree of awareness of the sample in terms of authorship attribution and ethical issues, the truth is that, again, there is evident skepticism, specifically in the data collected from the last two questions that make up the series of questions within the survey that relate to the ability assumed by undergraduate students to explain to their peers about the issues of contribution and attribution within the current context of the rise of artificial intelligence within the profession since: 1) 56% of the sample select the options NEUTRAL, LITTLE and NOT AT ALL (the latter two to a much, much lesser extent) to answer the question Do you feel able to explain to others the specific contribution of artificial intelligence in the creation of multimedia content? 2) 57% of the sample concentrated in the options NEUTRAL, VERY LITTLE and NOT AT ALL (the latter two, again, to a much lesser extent than the first option) their answer to the question How prepared do you feel to face the ethical challenges related to the attribution of content generated by artificial intelligence in your future professional career? This skepticism may be due to the lack of confidence or knowledge that students have on the subject, being understandable that this type of ethical issues in an area such as artificial intelligence is constantly evolving and can become too complex to understand and describe.

It is valid to think that students are in the process of fully understanding the complexity of this emerging topic within the context of Multimedia Engineering, so they prefer to be reserved in opting for a more accurate judgment of their own aptitude to address and face the ethical challenges in this particular area of their future career.

## 5. CONCLUSIONS

The undergraduate students of Multimedia Engineering at the Universidad Simón Bolívar Cúcuta in the 2023-2 academic semester express a positive perception, in general, about the impact or influence that artificial intelligence has had on the improvement of their creative and technical skills, which indicates that they are using artificial intelligence tools in their professional training in the

different areas of the multimedia area, from which it can be interpreted that these tools have been of great benefit to them or have met their expectations. The aforementioned allows the generation of multimedia content with higher quality thanks to the partial contribution of AI in the resulting content or in the creative inspiration provided by the content generated by prompts for the development of completely original multimedia material as a moodboard. Although, in contrast, it is worth noting that certain positions of the students express a minimal or imperceptible influence, which may be due to bad experiences when using AI tools (generative type) to develop multimedia content due to the complexity or misuse of it.

The limitations to creative capabilities, creative autonomy or innovation capabilities is an important dilemma that emerges within a current context dominated by tools that, it can be asserted, are capable of producing quality content with a few instructions. These multimedia contents are generated from, generally, standard characteristics of the works with which the tool has been fed. However, it is necessary to establish that it is not the total responsibility of the tools available, but rather, of the creative skills, which have been developed over a long time of consumption and elaboration of digital content, of the multimedia engineer in training being a decisive factor that affects the originality of the content created (substantial attribute that allows to evaluate their level of creative autonomy). Therefore, the student's self-critical capacity is what will determine how much a tool can influence the contents generated by the student to be singular (unique) or, on the contrary, very little different from certain standard styles used by IA tools to generate content.

It is essential to further address the ethical issues of recognition and attribution of authorship of multimedia content generated by artificial intelligence, because students show a certain degree of confidence and, at the same time, skepticism about these issues, which may be due to a lack of awareness on the subject or to the legal gaps that exist regarding copyright and authorship in the national context. It is not possible for future multimedia engineers to use this type of tools indiscriminately without taking into account that they should be cautious when deciding not to generate significant changes in AI-generated content, as this could result in violations of intellectual property or a third party's commercial license. It is extremely important that, again, the multimedia engineering undergraduate student be



critical of his or her actions when using these tools to simplify highly complex tasks or to develop content that can be included in a product (of his or her own) that he or she is making. Therefore, undergraduate students cannot blindly trust the algorithms of the tools they use, it is their moral duty to work efficiently and effectively in an ethical manner, being aware that only through effort, intelligent work, experience, and the correct use of this type of tools on the rise, they will be able to develop the necessary skills that will allow them to train and work as great multimedia engineers.

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