Contributions and challenges of generative artificial intelligence in educational research processes

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Abstract
This text is based on a critical and reflective scenario regarding the incursion of generative artificial intelligence into educational research processes, seeking to reveal and question the contributions and challenges that are projected in investigative practice and in the processes of publication and evaluation of scientific production. For this, a qualitative approach is addressed that contributes to the reflection and holistic understanding of the phenomenon in the study. The results obtained allude to the need to assume a critical stance towards the ethical and rigorous use of this technological power in investigative activities; However, specific contributions are recognized in the tasks of any researcher, such as the construction of states of art, the review of theoretical frameworks, bibliometric analyses, the exploration of different fields of study, among others, which require a critical look from the researcher to avoid excessive dependence on this technology, and, on the contrary, favor it critical thinking, autonomy and the capacity to build knowledge.
Keywords: educational research, generative artificial intelligence, critical thinking, editorial policies.

INTRODUCTION

This reflection is carried out within the framework of the research project *"Pedagogies, didactics and technologies: a triad for the configuration of innovative learning environments", seeking to* install a critical look at the contributions that generative artificial intelligence summons in educational research processes, this, taking into account the stir that the arrival of this technological giant has detonated in educational processes, An increase in the number of publications, congresses, conferences and other academic activities that discuss the impacts that are being promoted in different fields of knowledge. In this sense, it is essential to open an academic debate that allows us to situate the scope

and limitations that generative artificial intelligence is causing within the current technological ecosystem in which educational research processes and scientific production are mobilized.

Indeed, the view projected in this paper seeks to provide practical and methodological elements for the use of generative artificial intelligence, IAG in research tasks, which support data analysis and decision-making from an ethical framework to guarantee its responsible integration into education and society. Thus, the need to promote multidisciplinary scientific teams that accompany the reflection towards this new technological phenomenon is projected. To the extent that the impacts of this technology are known, questions arise that motivate constant reflection. In this sense, it is essential not to supplant human reflection with aspects of efficiency or productivity, but on the contrary, the task of building knowledge must continue to be in charge of the human mind.

METHODOLOGY

The methodological design is proposed from a qualitative approach aimed at facilitating the understanding of the phenomenon under study. Thus, it begins by conducting a review of scientific literature on the subject in different scientific databases, from which discourses and experiences are obtained around the contributions and challenges of IAG in the field of educational research. Then, a direct observation is developed where the experience and reflection of the researchers is collected through a systematic recording of data, revealing practices of use, writing and publication that facilitated the process of interpreting results.

It should be noted that, for the analysis of the documentary corpus, the content analysis technique was applied, which allowed obtaining an initial overview of the object of study, which was triangulated with the appreciations and experiences of the researchers involved in this study.

RESULTS AND DISCUSSION

Challenges and concerns of the use of generative artificial intelligence in educational research processes

The systematic literature review exercise revealed different positions that move between contributions and challenges of the integration of generative artificial intelligence in educational research processes, that is, this technological phenomenon has become the center of various studies that analyze its importance and effects in the educational field. Thus, this academic conversation is nourished by approaches such as those of Martinell et., al. (2024) who states that generative artificial intelligence is fed by the information it has access to and pre-training, achieving a broad and unprecedented language model. Likewise, García & López (2024) have pointed out that the constant use of generative artificial intelligence affects students' reflective and critical skills, therefore, they recognize that it is essential to balance the use of this technological ecosystem with innovative teaching methods that promote the development of skills such as critical thinking, autonomous learning, and creativity.

On the other hand, artificial intelligence has simplified data use and analysis processes that benefit some day-to-day tasks, but has facilitated the creation of fake profiles and identity theft, in this regard, Regueiro (2023) mentions that identity theft, also known as *spoofing*, has been configured as one of the most harmful practices, enhanced by

the use of new technologies, where cybercriminals create artificial identities through real and fictitious elements, carrying out illegal practices that seem to be within the law. In this context, artificial intelligence plays a crucial role in facilitating the creation of *deepfakes* and the execution of *phishing attacks*.

Undoubtedly, the processes of research and scientific dissemination are going through great challenges as a result of the arrival of generative artificial intelligence, since at first glance it has modified traditional pedagogical and educational research practices, posing challenges at the theoretical, practical and methodological levels. But it has also disrupted the role of the contemporary researcher, who is benefited by the support and ease in the development of some tasks, however, it is necessary not to abandon the ethical and human criterion. In this regard, Techasermwattanakul & Suwannatthachote (2024) highlights that tools such as chatbots contribute significantly to learning processes by generating personalized feedback schemes, however, they warn about the concern that exists regarding equitable access and ethical use of data.

In addition to the above, Martínez & Rodríguez (2023) state that artificial intelligence can accentuate prejudices present in society by using data and algorithms that reflect inequalities, thus perpetuating existing problems in the education system. In this sense, the integration of these technologies must be taken care of, guaranteeing equity and inclusion in their implementation, since the use of artificial intelligence can accentuate pre-existing discrimination, in case the data with which it has been trained contains such inequalities (Palomares et al., 2021).

Indeed, the incorporation of generative artificial intelligence in research processes in education poses ethical, social and pedagogical challenges, for this reason, it is necessary to reflect on these challenges from the perspective of research practices, promoting an integration from a critical and situated approach that responds to the needs of the contexts (Pérez & Gómez, 2023). Thus, it is well known that artificial intelligence is here to stay, denoting great possibilities in terms of efficiency and productivity in various areas. However, a great risk is enabled that can lead to dehumanization as a result of consumption and technological dependence. Zhang and Aslan (2023) highlight that most AI implementations in higher education lack rigorous ethical assessments, and warn that this lack of critical reflection could compromise the role of education as a space for educating conscious and critical citizens.

On the other hand, Cadena (2024) adds that another risk associated with the use of artificial intelligence is gender bias in algorithms, highlighting how these reinforce existing prejudices in society, since stereotypes such as the predominance of scientific professions in men are perpetuated and in the case of women, professions related to languages or cooking are attributed. In this sense, it is important that the configuration of work teams for the development of research work considers gender diversity to reduce biases and improve the quality of technological products.

Also, within the systematic literature review, the vagueness of algorithms and the lack of transparency in automated decision-making processes emerged as a concern, questioning how and why certain decisions are made using artificial agents (Collin, Lepage, & Nebel, 2021) For their part, Thelma et al. (2023) indicate that there is an urgent need to draw up a clear regulatory guideline that promotes data protection and privacy of people. From this perspective, it is worth stating what (Zhang & Begum, 2021) proposed:

ethics and the use of AI in education are very important and complex issues. It is important to consider the ethical and practical issues that may arise, as well as the need for an ethical perspective in the implementation of AI in education. In addition, educators need to be trained to identify and address ethical issues related to AI in education and for an ethical regulatory framework for AI in education to be established (p.30).

Indeed, although AI offers multiple benefits in the field of educational research, its integration into different sectors must be accompanied by an in-depth and multidisciplinary reflection on its ethical, social and pedagogical implications. The active participation of researchers, educators, policymakers, entrepreneurs, and technologists is essential to ensure responsible development of these technologies.

Contributions of the use of generative artificial intelligence in educational research processes

Undoubtedly, the ways of consulting information have been transformed, now, it is common to make personalized content requests with the use of *prompts* through *Chatbots,* from where different information outputs are obtained. These new forms of interaction with virtual assistants respond to human requests and become a daily practice among users. However, it is necessary to take a critical look at the information provided by generative artificial intelligence, since this phenomenon, although efficient and practical, raises questions about how these tools are shaping educational and social dynamics.

However, since the use of GAI became popular in the academic and research scenario, the algorithms have been perfected, the creative component continues to be improved and there is innovation in the diversity of applications that they contribute to the tasks of any academic or researcher, for this reason it is convenient to specify the specific tasks where GAI helps their development. Thus, it is possible to begin by mentioning the great contribution it offers in the processes of systematic literature review, since it helps to summarize long texts, to graph their content through keywords, to ask questions about the content of a text to facilitate its understanding, which allows the identification of categories, research trends and gaps that demarcate the scenario or field of study on which to start a researcher. In the same vein, López (2023) alludes that "AI can help researchers and writers analyze large amounts of data quickly and efficiently, identify patterns and trends, and even generate written content" (p.20).

Indeed, generative artificial intelligence offers great contributions in the construction of theoretical frameworks or states of the art, facilitating the recognition of authors and the comparison of approaches and ideas, that is, if these assistants are used properly, a broad and deep theoretical construction can be achieved. According to Sánchez (2023) "there is a positive attitude towards the use of ChatGPT in didactic processes, strengthening adapted learning, writing aid, the creation of novel ideas and research skills" (p. 29).

Now, another support that can be received from the integration of generative artificial intelligence in educational research processes corresponds to the analysis of qualitative and quantitative data that are collected from the application of instruments such as surveys, interviews, field diary, focus groups, among others, since it contributes to categorizing and detecting patterns or trends that provide a horizon of the field of knowledge that is being explored. obtained some approximations or preliminary explanations.

Delving a little deeper into the specific tasks that lead the research processes, such as the definition of the methodological design, the IAG can support the researcher in aspects such as the construction of the question, the objectives and the delimitation of the object of study, as well as in the definition of methods, techniques or instruments related to the type of question posed by the researcher. analyzing its scope and intention, that is, it can be considered a research methodology assistant. However, it will be the researcher who makes the decision of the elements to be taken into account according to his perception, experience and context where the research is planned to be developed.
Table 1 briefly shows the support in specific tasks that generative artificial intelligence can offer in the process of educational research.

Table 1. Support from the IAG in the processes of research in education.

Research activity	**IAG's contribution**	**Examples**
Problem statement	It facilitates the delimitation of topics, formulation of research questions and provides elements to justify an investigation.	Generation of research questions, reformulation of problems.
Literature review	Synthesize information, identify trends and key concepts. It allows you to question documents.	Abstracts of articles, comparison of theoretical approaches.
Methodological design	Suggests appropriate methods, techniques, and instruments according to the research question.	Proposals for qualitative, quantitative or mixed designs.
Instrument development	Supports in grammatical aspects, writing and initial validation of instruments.	Creation of questionnaires, interviews or rubrics.
Data collection	Automate and support information collection processes.	Chatbots for surveys, analysis of open responses.
Data analysis	It facilitates qualitative and quantitative analysis according to data provided.	Data coding, identifying patterns and trends.
Interpretation of results	It helps in the interpretation and explanation of findings and their relationship with previous theories.	Generation of preliminary interpretations.
Drafting the report	Support the writing of the final report by highlighting textual coherence.	Drafting, proofreading.

Dissemination of results	It facilitates the search for scientific journals and events for academic dissemination.	Executive summaries, presentations, informative materials.

It is also worth recognizing the great contribution that can be obtained from generative artificial intelligence in the processes of academic writing and writing, favoring the initial planning of a piece of writing, such as defining a scheme on which to work, suggesting specific ideas that must be deepened and expanded by the researcher, ordering scattered ideas to give a logical argumentation, improve style and semantic clarity, technically explain concepts, correct grammar, spelling and coherence, machine translation, adapt texts to a specific standard, among other specific aids. However, it is necessary to use it with ethical criteria, so as not to blur the role that the researcher should have in this process, who must choose to privilege critical thinking in his or her actions as a researcher, demonstrating a responsible and transparent attitude about its use, since in the end the decision-making and interpretation of the results is still human.

Now, it is worth mentioning that during all these actions that the IAG can support in the tasks of a researcher, unwanted situations can occur such as losing the originality of the writing, inventing references or data if they are not verified. On the other hand, it is necessary as an ethical practice to declare its use and always review the rules of academic ethics and plagiarism so as not to incur in any improper action. In this regard, Camino and Clavijo (2024) state that:

The use of artificial intelligence is a growing trend that has the potential to significantly improve the efficiency and quality of research. However, it is important to be aware of concerns about the originality and quality of research, and to work to address these issues as technology continues to advance (p.19).

In fact, the IAG does not replace the researcher in education, but it enhances his analytical, creative and operational capacity, making research more efficient, in-depth and innovative. Thus, "it would be interesting to use the advances of automatic agents with AI to assess critical understanding in a context of adapted learning in research and define patterns of knowledge assimilation routes" (Zepeda, 2024, p.54).

Generative AI tools to support research tasks

The rise of artificial intelligence has triggered the emergence of a series of generative tools that maximize human work in different areas, including research, as it facilitates information analysis, decision-making and automation of tasks, saving time and allowing the researcher to dedicate himself to other activities that require human presence. such as fieldwork, interaction with communities, experimentation, among others. In this sense, artificial intelligence tools should be considered as an ally to promote productivity and efficiency, as long as they are used with ethical and critical rigor. Table 2. Some of these tools that researchers can use to accompany their research tasks are described.

Table 2. IAG tools to support research tasks.

Purpose	**AI Tool**	**Description**	**Link**

Literature search and synthesis	**Perplexity**	AI tool that finds and summarizes information, citing relevant sources.	https://www.perplexity.ai/
	Elicit	Identify relevant studies, filter information, and summarize scientific literature.	https://elicit.org/
	ConnectedPapers	Generate visual maps of related articles to discover connections between scientific papers.	https://www.connectedpapers.com/
	JabRef	Open source reference manager that organizes and formats the bibliography.	https://www.jabref.org/
	Qiqqa	PDF and reference management software including mind maps and literature organization.	https://www.qiqqa.com/
Text and Data Analysis	**Tools Indicator Light**	Analyzes text to explore documentary corpora, obtain frequency of terms and patterns.	https://voyant-tools.org/
	Paperguide	It incorporates semantic search, literature review, and key data extraction.	https://paperguide.ai/
	Notebooklm	Makes summaries and helps with the analysis of PDF documents. Allows you to ask questions about documents.	https://notebooklm.google/
Writing and collaboration	**ChatGPT**	Language model that helps generate ideas, write, summarize, and structure research sections.	https://chat.openai.com/
	Authorea	Collaborative platform for writing and publishing scientific papers with integrated reference management.	https://authorea.com/|
Plagiarism Detectors	**PlagiarismCheck.io**	Detect plagiarism and AI-generated content, with detailed similarity reports and matching sources.	https://plagiarismcheck.io/
	Plag.ai	It checks text similarities by showing matches and allowing access to the original sources for detailed analysis.	https://www.plag.ai/

The above table presents a small sample of the universe of artificial intelligence tools that can be found to support research work, however, it is necessary to define what

type of prominence will be given within the research processes, so as not to blur the prominence and responsibility of the researcher. However, it cannot be ignored that "AI marks a before and after in higher education, especially in research and in the writing of academic texts" (Camino & Clavijo, 2024, p.22).

Editorial policies and generative artificial intelligence

The scope of the artificial intelligence phenomenon has also disrupted editorial policies, leading scientific journal committees to integrate ethical criteria associated with the use of these generative tools that guarantee academic integrity in the production of manuscripts, for this, there are express requests such as the need for authors to report their use as a condition of application, clearly indicating the content generated and incorporated into the manuscript, sometimes it is even suggested to specify the tool used and its use is requested exclusively to improve the writing, but not to interpret data or obtain scientific conclusions. Therefore, it is necessary to "seek a balance between the advantages and limitations of AI in order to be able to use it in scientific research and publication without violating values of scientific ethics and integrity" (Machin-Mastromatteo, 2023, p.122).

This reaffirms ethics and criticality in the field of research, which is why it seeks to raise awareness of the responsibility that authors have when they make use of the IAG in the publication processes. Indeed, CERLALC (2020) alludes that "the current state of AI does not imply the elimination of human work, but it entails profound transformations that can generate human capital gaps and affect the competitive capacity of the Latin American publishing sector" (p.6).

Thus, the evaluation mechanisms by editorial committees must be more rigorous and demanding to verify the accuracy, validity and reliability of the content of the manuscripts, as well as the bibliographic references, among other elements that are incorporated to avoid inconsistencies or biased results. Therefore, "the qualification of editorial processes derived from advances in artificial intelligence (AI) is a tangible scientific reality, and will involve the automation of some links in the production chain" (CERLALC, 2020, p.5).

In the same way, the evaluation process in scientific journals must prohibit the evaluator from uploading the manuscript to these assistants to protect the unpublished version and the confidentiality of the manuscript, in addition, the function of evaluating cannot be delegated to an artificial intelligence, but human judgment must continue to prevail as an ethical practice within the arbitration process.

CONCLUSION

The use of generative artificial intelligence is revolutionizing the way in which research, creation and writing is done in the academic scenario, emerging a series of contributions and challenges that disrupt the role of researchers, therefore, it is necessary to generate a research culture that harbors ethical criteria and scientific rigor, to continue maintaining scientific production with reliability and human responsibility. Thus, it is essential to combine its use with critical approaches, which promote transparency, scientific quality and veracity of publications, as well as an ethical attitude on the part of researchers where IAG is assumed as an ally, but not as a way to supplant human action.

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