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RESEARCH ARTICLE

ChatGPT and Artificial Intelligence: A Bibliometric Analysis in Latin America

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ABSTRACT

The aim of this study was to perform a bibliometric analysis of ChatGPT and artificial intelligence in Latin America. Scientific productivity was quantified by analyzing bibliometric data. The 84 Scopus papers used for the study were chosen based on their relevance and keywords in English (ChatGPT, artificial intelligence). In 2023, the highest substantial growth in scientific production was achieved (n=68; 8%), with Brazil standing out as the most important country (n=41 publications, 47.7%). Important sources: Archives of Medical Research and Gaceta Medica de Mexico had three publications, while the most cited author, Kitamura, F.C., had 91 citations and two papers. Most of these papers were scientific articles (44%), of which 24% belonged to the field of social sciences and 21% to computer science. It is concluded that there is an increase in the topics covered, authors, sources and resources in general related to ChatGPT and artificial intelligence in Latin America, providing a more complete view of the region's scientific production in terms of its visibility, impact and importance. Therefore, this bibliometric study serves as a basis for future studies, providing evidence-based support that critically examines the research.

1. INTRODUCTION

Currently, artificial intelligence (AI) is part of our daily lives, thanks to the plethora of applications that make use of it (Aparicio, 2023). According to Estupiñan et al. (2021), artificial intelligence (AI) refers to research on programming computers to perform tasks that until now were only human. As a result, technological advances have made data analysis more efficient and faster, while increasing the quality of the results (Sanabria-Navarro et al., 2023).

In that order of ideas, AI has progressed over many decades, however, deep learning and artificial neural networks have been instrumental in achieving enormous advances in the last twenty years (Alastruey, 2021). According to Albuja and Guadalupe (2022), the use of artificial intelligence (AI) is increasing in many disciplines, such as medicine, biology, physics, engineering, and the social sciences.

On the other hand, the Chat GPT (Chat Generative Pre-Trained Transformer), introduced by OpenAI in 2022, ushered in a new era of AI (Hill-Yardin et al., 2023; Al-khresheh., 2024). This AI linguistic model created by OpenAI uses deep learning techniques to produce natural language logic text in reaction to an input text, which relies on a neural network architecture known as "Transformer" to mimic the style and tone of the input text (Alonso-Arévalo & Quinde-Cordero, 2023). Consequently, to generate natural language, ChatGPT, a pre-trained generative language model, is used (Beltrán & Mojica, 2020).

Coupled with this, there has been a radical change in the education system in Latin America (Sekeroglu et al., 2019). Where AI has come a long way, and ChatGPT is a good example of this (Román, 2023; Incio et al., 2022). Although the process is nothing new, the introduction of AI is driving a dramatic change in the educational landscape (Arana, 2021). Educational goals, pedagogical procedures, teaching materials, student performance, and ultimately the rise of research in various fields are expected to be systematically affected by this change (Raraz-Vidal & Raraz-Vidal, 2023).

In this regard, the last decade has seen an increase in ChatGPT and AI research in Latin America. Therefore, the expansion of its use in education is of utmost importance, as it has the potential to enhance learning through the provision of user-specific, adaptive and personalized support (Rodriguez et al., 2023). In any case, bibliometrics allows researchers to monitor the expansion of knowledge and establish the relative value of various publications through the analysis of written and other scholarly works (Caló, 2022; Leyva et al., 2022).

Therefore, databases require precise study data collection skills in order to serve the purposes of scientific background recognition (Sanz, 2022). Consequently, bibliometric indicators are used, which are metrics that quantify the amount of literature on a specific topic or group of related topics (García-Villar & García-Santos, 2021; Llerena & Arévalo, 2021).

Also, a bibliometric framework for Latin American data collection on ChatGPT and IA is essential for research and understanding. The indicators considered for evaluation will be: year of publication of the document, place of origin, subject, type, institution and authors. Therefore, the following study objective is proposed, to perform a bibliometric analysis of ChatGPT and artificial intelligence in Latin America between 2023 and 2024.

METHODOLOGY

The current dataset on ChatGPT and IA scientific research papers in Latin America was evaluated by bibliometric analysis. In this sense, bibliometrics was very important to facilitate data collection for the study (Salinas and Garcia, 2022). In addition, due to the novelty of the topic, a search was conducted in Scopus, a recognized database that analyzes academic papers from all over the world.

To limit the scope of the study, Boolean search keywords such as *ChatGPT* AND *artificial* AND *Intelligence* were used, the process yielded 214 academic papers. However, after data collection and cleaning, 84 papers were selected. The following additional criteria were also used to exclude studies from the dataset: (1) studies conducted before 2023 or after 2024; (2) duplicate publications; (3) publications that were not from Latin American countries; and (4) studies unrelated to the present investigation.

In contrast, 84 papers were evaluated based on bibliometric criteria for their overall contribution to ChatGPT and artificial intelligence in Latin America (Florez-Fernández & Aguilera-Eguía, 2020). In addition, indicators such as date of publication, authors, journals, country of origin, file format, academic discipline and institutions of affiliation were considered. For data processing and analysis, Excel, descriptive statistics, count data and VOSviewer V_1.6.19 were used to generate keyword co-occurrence maps.

RESULTS

Specifically, this bibliometric analysis considered research papers published in 2023 and 2024. A total of eighty-four papers were selected for inclusion in this analysis of Latin American academic publications on ChatGPT and artificial intelligence. Figure 1 shows the most recent Latin American publications included in the Scopus index. In addition, as can be seen in the figure, the annual publication rate reaches its historical maximum in 2023, representing 81% of all Latin American publications (68 academic papers).

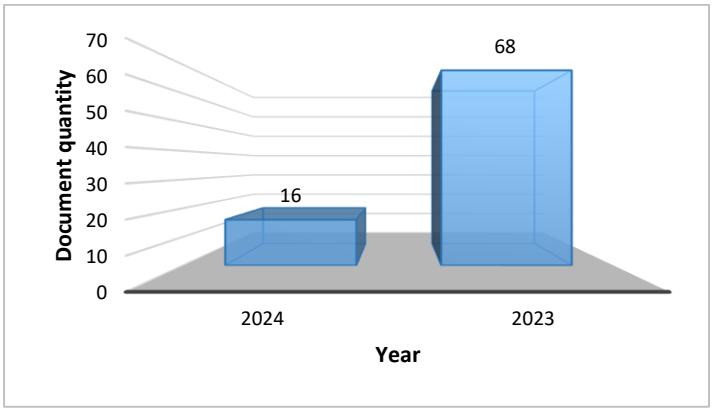
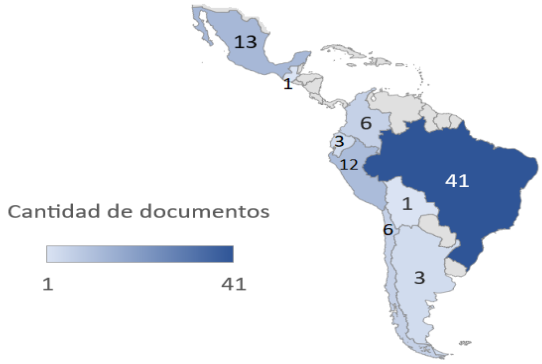


Figure 1. Documents published by year
Source: Scopus data (2024)

Figure 2 shows the publications and countries of origin of those considered. The study focused exclusively on Latin American countries that have made notable contributions in this field. As a result, Brazil (47.7%), Mexico (15.1%) and Peru (14%) are the top three nations in this region in terms of scientific production. Another interesting fact is that English was the language of choice for 76.2% of the publications, while Spanish and Portuguese accounted for only 16.7% and 7.1%, respectively.



Brasil	México	Perú	Chile	Colombia	Argentina	Ecuador	Bolivia	Guatemala
41	13	12	6	6	3	3	1	1
47.7%	15.1%	14.0%	7.0%	7.0%	3.5%	3.5%	1.2%	1.2%

Figure 2. Publication of documents by country
Source: Scopus data (2024)

This analysis is based on the work of 66 academic sources and publications. Table 1 presents a summary of the data used in this study. Table 1 also reveals that in terms of the number of papers published, Archives of Medical Research and Gaceta Médica de México were the two most important journals, with three publications each. Followed by ACM International Conference Proceeding Series, Proceedings Frontiers in Education Conference Fie and Proceedings of The Laccei International Multi Conference For Engineering Education and Technology (n=2 respectively). Furthermore, evaluating the impact factors, these journals are among the best in their respective fields.

Table 1. Publication of documents by source or journal

Source or Magazine	Number of documents	Source or Magazine	Number of documents	Source or Magazine	Number of documents
Archives of Medical Research	3	British Journal of Surgery	1	Eurasia Journal of Mathematics Science and Technology Education	1
Medical Gazette of Mexico	3	Cell Stress and Chaperones	1	European Journal of Haematology	1
ACM International Conference Proceeding Series	2	Science And Collective Health	1	European Journal of Obstetrics and Gynecology and Reproductive Biology	1
Proceedings Frontiers in Education Conference Fie	2	Cogent Education	1	University Training	1
Proceedings of the Laccei International Multi Conference for Engineering Education and Technology	2	Colombian Journal of Anesthesiology	1	Frontiers in Education	1
Aibi Journal of Management and Engineering Research	1	Communications in Computer and Information Science	1	Frontiers in Psychology	1
Brazilian Journal of Dermatology	1	Dental Press Journal of Orthodontics	1	Ifmbe Proceedings	1
Annals of Biomedical Engineering	1	Pucp Law	1	International Braz J Urol	1
Brazilian Archives of Digestive Surgery	1	Digital Health	1	International Journal of Learning Teaching and Educational Research	1
Brazilian Archives of Ophthalmology	1	Medical Education	1	International Journal of Online and Biomedical Engineering	1
Gastroenterology Archives	1	Environmental Health a Global Access Science Source	1	Library Research	1
Brazilian Journal of Cardiovascular Surgery	1	Studies in Literary Theory	1	Indefinite	29
Brazilian Journal of Occupational Therapy	1	Studies on the Journalistic Message	1	Total magazines	66

Source: Scopus data (2024)

Furthermore, academics from more than 120 different universities have collaborated on these 84 papers. As illustrated in Figure 3, the Universidade de São Paulo is one of the top universities in terms of the number of papers generated during the time examined, with a total of nine. The second position goes to Tecnológico de Monterrey, followed by Universidade Federal de São Paulo, both with six publications each.

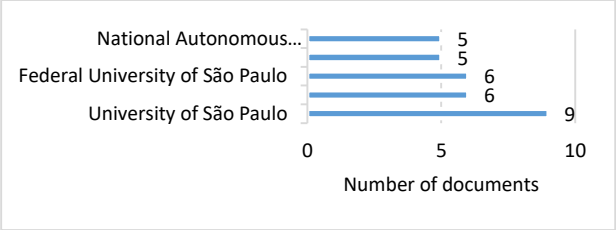


Figure 3. Documents published by institution
Source: Scopus data (2024)

The academic papers chosen represent the combined efforts of 127 authors. Table 2 shows that, of all the authors Kitamura, F.C. received the most citations (91; n=2 papers). He is followed by Martins-Filho, P.R. with ten citations and two publications. The third position goes to Flores-Cohaila, J.A. (n=2; 8 citations).

Table 2. Published papers by author

By author	Quantity	Total citations	By author	Quantity	Total citations
Bermúdez-González, J.L.	3	1	Floresta, L.G.	2	1
Carrillo-Esper, R.	3	1	Kitamura, F.C.	2	91
Carrillo-Perez, D.L.	3	1	Martins-Filho, P.R.	2	10
Gutiérrez-Cirlos, C.	3	1	Vargas-Murillo, A.R.	2	5
Hidrogo-Montemayor, I.	3	1	AGUILERA-DUARTE, L.J.	1	0
Sánchez-Mendiola, M.	3	1	Abdala, N.	1	2
Borges, L.P.	2	1	Aedo, M.	1	0
Flores-Cohaila, J.A.	2	8	Aguiar de Sousa, R.	1	0

Source: Scopus data (2024)

Figure 4 shows a division of academic work on ChatGPT and artificial intelligence in Latin America from 2023 to 2024. In terms of overall growth for understanding this topic, the social sciences account for 24%, followed by the fields of computer science at 21% and engineering at 16%. Similarly, when all production is broken down by type of document, 44% are scientific articles, 25% are papers, 19% are books and 12% are book chapters.

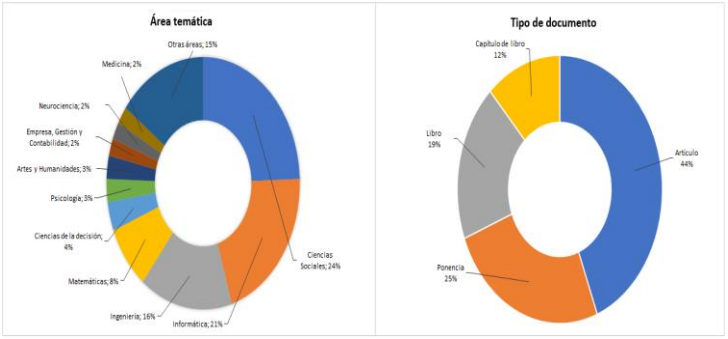


Figure 4. Publication of documents by subject area and type of document
Source: Scopus data (2024)

In Figure 5, you can see the results of the terms that were considered from the abstracts, keyword lists and document titles. To facilitate the examination of sets of terms associated with specific tones, VOSviewer makes use of color to indicate the intensity of the connection between ideas.

- Green cluster. "artificial intelligence" (n=186 occurrences), groups the following words: ChatGPT, education, chatbot, AI, generative AI, students.
- Red cluster. "machine learning" (n=119 occurrences), groups the following words: algorithm, writing, language, internet, software, technology, publication, scientific literature, publishing.
- Blue cluster. "large Language model" (n=89 occurrences), groups the following words: natural language processing, deep learning, language processing, computational linguistics.

As can be seen, most of the most frequent search terms originate from this topic, as shown in the grouping.

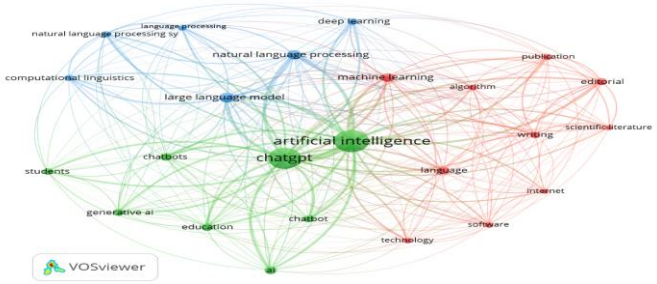


Figure 5. Map of keyword co-occurrence
Source: Results in VOSviewer (2024)

DISCUSSION

The time period covered by this analysis is from 2023 to 2024. According to the data, the highest number of scientific papers on ChatGPT and artificial intelligence in Latin America were published in 2023. In this study, the literature from Latin American countries on topics related to ChatGPT and artificial intelligence was examined and analyzed. According to García-Peñalvo et al. (2024), they state that AI is a field of computer science that focuses on the design of intelligent systems capable of mimicking human intelligence, moreover, it has a long and illustrious history, as well as a promising future thanks to the work of many dedicated professionals. Similarly, Flores (2023) agrees that the potential of AI to understand human language and visual elements opens exciting possibilities for its application in education, this could bring about a revolution in the way education is currently delivered.

For their part, Cahan & Treutlein (2023) state that in addition to producing content snippets, ChatGPT can handle and analyze massive volumes of data (data mining). However, there are barriers that need to be resolved before ChatGPT can be implemented, despite its promising features (Ojeda et al., 2023). In this regard, Siche and Siche (2023) agree that it is not possible to use ChatGPT to generate ideas or notions worthy of scripts since it is a linguistic model and not a creative writing tool.

In addition, Zumba et al. (2023) state that human language is the intended user interface of the tool. Hernandez (2022) agrees that the basis of this field is computational linguistics, an interdisciplinary subfield of language that studies human language and how computers can analyze and generate it in order to create hypotheses about how software engineers might use this area of study.

In general, according to Jofre (2023), AI is a subfield of computer science that aims to create programs that can mimic human intellect, i.e., AI is the ability of computers to perform mental operations that were previously reserved for people. Consequently, ChatGPT is an AI that can emulate human conversational style and generate genuine sounding texts by applying deep learning and natural language processing, this allows it to have more realistic conversations with humans (Tlili et al., 2023).

CONCLUSION

In accordance with the stated objective of the study, the number of research conducted on ChatGPT and artificial intelligence in Latin America increased in recent years. By examining all publications indexed by Scopus in 2023, the bibliometric study shows an increase of 81% (n=68). Furthermore, of all the nations examined, Brazil has the highest production rate (47.7%, n=41), while the highest percentage of publications written in English was (76.2%; n=64). In addition, the author Kitamura, F.C. was referenced 91 times; the two most important sources, Archives of Medical Research and Gaceta Médica de México, published three scientific papers each.

Likewise, scientific articles accounted for 44%, with social sciences accounting for 24% of the total, while computer science made up 21%. The term "artificial intelligence" had a number of occurrences of 186 times in the VOSviewer keyword analysis. In addition, because they are relevant to the chosen research, the phrases "machine learning" and "large language model" should be taken into account.

Moreover, the research of 84 papers shows that there are significant differences between countries in the region; however, when it comes to the scientific production of ChatGPT and artificial intelligence in Latin America, Brazil stands out as the regional leader. Consequently, the increase in the quantity and quality of data, along with technological advances, will continue to be the future determinants of AI, where ChatGPT, a deep learning algorithm capable of handling and analyzing huge volumes of data for the production of content snippets.

Finally, it is concluded that there is more variety in the topics covered, authors, sources and more resources in general, related to ChatGPT and artificial intelligence in Latin America, providing a more complete view of the region's scientific output in terms of its visibility, impact and importance. Thus, offering its evidence-based support that critically examines the research, this bibliometric study serves as a foundation for future studies.

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