

IMPACT OF ARTIFICIAL INTELLIGENCE ON VIRTUAL CLASSROOMS FOR HIGHER EDUCATION

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Summary: A documentary review was carried out on the production and publication of research papers related to the study of the variables Artificial Intelligence and Virtual Classrooms in Higher Education. The purpose of the bibliometric analysis proposed in this document was to know the main characteristics of the volume of publications registered in the Scopus database during the period 2018-2022, achieving the identification of 25 publications. The information provided by this platform was organized through graphs and figures categorizing the information by Year of Publication, Country of Origin, Area of Knowledge and Type of Publication. Once these characteristics have been described, the position of different authors towards the proposed theme is referenced through a qualitative analysis. Among the main findings made through this research, it is found that China, with 7 publications, was the country with the highest scientific production registered in the name of authors affiliated with institutions in that country. The Area of Knowledge that made the greatest contribution to the construction of bibliographic material referring to Artificial Intelligence and Virtual Classrooms in Higher Education was Computer Science with 19 published documents, and the Type of Publication most used during the period indicated above was the Conference Proceedings with 13 Documents of the total scientific production.

Keywords: Artificial intelligence, virtual learning, higher education.

INTRODUCTION

Technology and its advances are the protagonists today since they have come to revolutionize positively or in some cases negatively to each of the aspects that are part of our daily lives. Although some have taken advantage of technology, others have experienced inconveniences for not finding the right way to face it, however, it has become clear that to remain at the forefront of the demands of globalization it is necessary to find the best way to implement it in their activities. That has been the case of education, a sector that has been making changes in its teaching methods for some time but that undoubtedly after the pandemic was forced to completely transform its ways of sharing knowledge and evaluating the acquisition of these. The use of technologies such as information and communication, technological devices, artificial intelligence are examples of the most implemented in this area.

Artificial Intelligence, according to UNESCO:

has the capacity to address some of the biggest challenges facing education today, to develop innovative teaching and learning practices, and ultimately to accelerate progress towards SDG 4.(UNESCO , s.f.)

Although technology does not have an established age range, young children are generally advised not to expose them at an early age to its use in order not to interfere with their social and cognitive development. This is why it is usually more appropriate to involve older children in more advanced school years and with greater control over the use of technology.

Therefore, and additionally, its level of complexity has become frequent for Artificial Intelligence to be part mostly of novel proposals that seek to impact Higher Education since its members are considered capable of "assuming at the same time the parameters that allow a better administration of this important mechanism". (Garro-Aburto, Ocaña-Fernández, & Valenzuela-Fernández, 2019)

Hence, it is precisely with this research article that we seek to verify this assumption through the description of the main characteristics of the set of publications attached to the Scopus database and that are directly related to our variables, as well as the description of the position of certain authors affiliated with various institutions during the period between 2018 and 2022.

GENERAL OBJECTIVE

Analyze from a bibliometric and bibliographic perspective, the elaboration of works on the variables Artificial Intelligence and Virtual Classrooms in Higher Education the period 2018-2022.

METHODOLOGY

This article is carried out through a mixed orientation research that combines the quantitative and qualitative method.

On the one hand, a quantitative analysis of the information selected in Scopus is carried out under a bibliometric approach of the scientific production corresponding to the study of Artificial Intelligence and Virtual Classrooms in Higher Education.

On the other hand, examples of some research works published in the area of study indicated above are analyzed from a qualitative perspective, starting from a bibliographic approach that allows describing the position of different authors against the proposed topic. It is important to note that the entire search was performed through Scopus, managing to establish the parameters referenced in *Figure 1*.

3.1. Methodological design

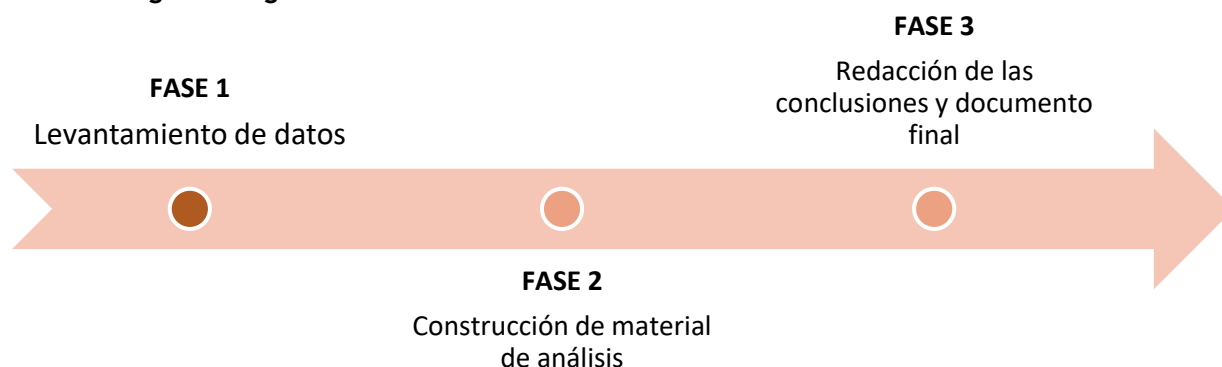


Figure 1. Methodological design

Source: Authors.

3.1.1 Phase 1: Data collection

Data collection was executed from the Search tool on the Scopus website, where 25 publications were obtained from the choice of the following filters:

TITLE-ABS-KEY (artificial AND intelligence AND on AND virtual AND classrooms AND higher AND education) AND (LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-

TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018)) AND (LIMIT-TO (EXACTKEYWORD , "Artificial Intelligence") OR LIMIT-TO (EXACTKEYWORD , "E-learning") OR LIMIT-TO (EXACTKEYWORD , "Higher Education"))

- Published documents whose study variables are related to the study of Artificial Intelligence and Virtual Classrooms in Higher Education.
- Limited to the years 2018-2022.
- No limit of countries.
- No publication area limit.
- Limited to the keywords "Artificial Intelligence", "Virtual Learning" and "Higher Education".
- Regardless of type of publication.

3.1.2 Phase 2: Construction of analysis material

The information collected in Scopus during the previous phase is organized and subsequently classified by graphs, figures and tables as follows:

- Co-occurrence of words.
- Year of publication.
- Country of origin of the publication.
- Area of knowledge.
- Type of publication.

3.1.3 Phase 3: Drafting of conclusions and outcome document

In this phase, we proceed with the analysis of the results previously yielded resulting in the determination of conclusions and, consequently, the obtaining of the final document.

RESULTS

4.1 Co-occurrence of words

Figure 2 shows the co-occurrence of keywords found in the publications identified in the Scopus database.

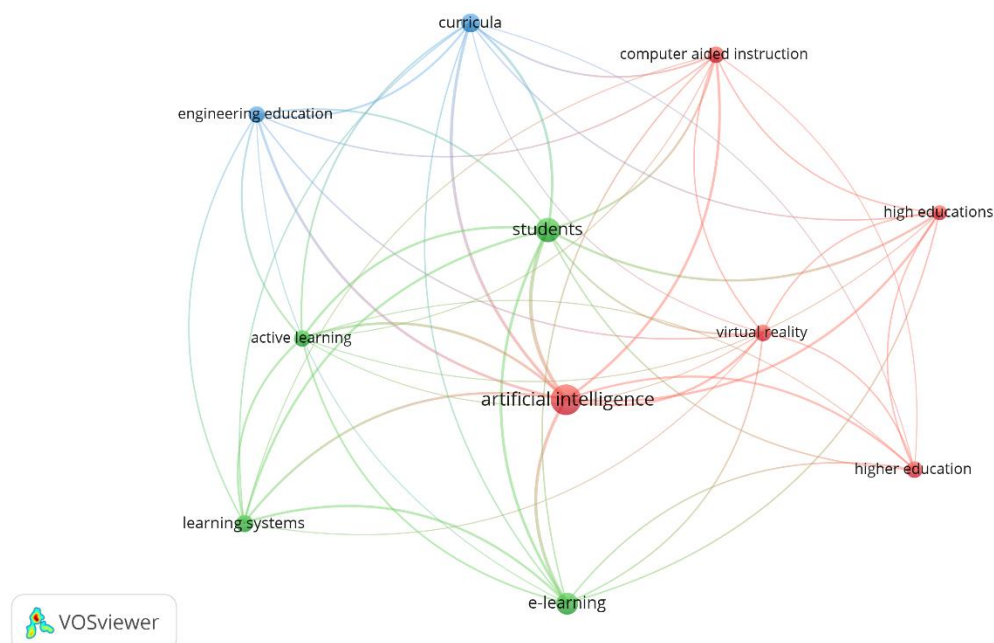


Figure 2. Co-occurrence of words

Source: Own elaboration (2023); based on data exported from Scopus.

The data in Figure 2, exported from Scopus, shows us our variables and their relationship with other terms which we will explain below.

Globalization and the fourth industrial revolution have been responsible for involving technology with its multiple advances in everyday life. On the side of higher education, over time the use of technology has become indispensable to generate greater student participation through more striking processes. It is there when Artificial Intelligence becomes important, which seeks to facilitate access to information by trying to simulate the functioning of the human brain involving all available data.

4.2 Distribution of scientific production by year of publication

Figure 3 shows how scientific production is distributed according to the year of publication.

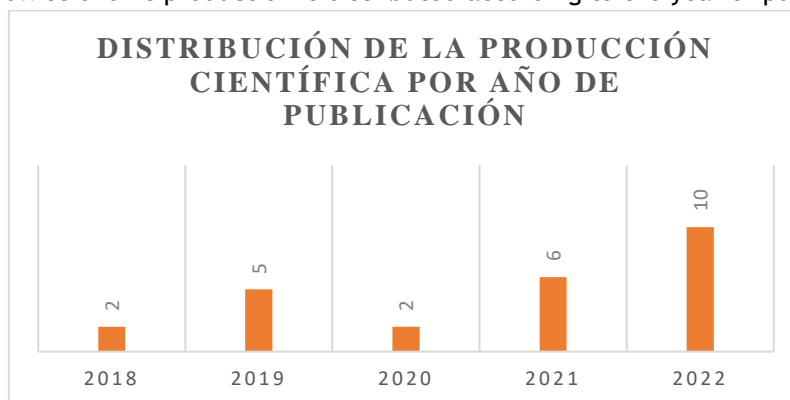


Figure 3. Distribution of scientific production by year of publication.

Source: Own elaboration (2023); based on data exported from Scopus

In figure 3 we find the scientific production concerning the variables Artificial Intelligence and Virtual Classrooms in Higher Education during the period between 2018 and 2022 which resulted in the publication of 25 documents, in the Scopus database, containing the keywords. Likewise, it is evident that some changes were experienced throughout the period. We started 2018 with 2 documents, reaching the highest number in 2022 with the publication of 10 documents.

Among the articles found was the one entitled "Artificial intelligence: a universal virtual tool to increase tutoring in higher education" in (Ahanger, et al., 2022) which reference is made to the importance of the use of this type of emerging technologies in human life, more specifically in higher education. The objective of the authors is "to predict the future of higher education with the help of artificial intelligence", (Ahanger, et al., 2022) finding throughout their research various problems in the implementation of Artificial Intelligence in education, therefore, it was sought with this article "close The gap between human teachers and the machine. We are also concerned about the psychological emotions of faculty and students when artificial intelligence takes over." (Ahanger, et al., 2022)

4.3 Distribution of scientific production by country of origin

Figure 4 shows how scientific production is distributed according to the nationality of the authors.

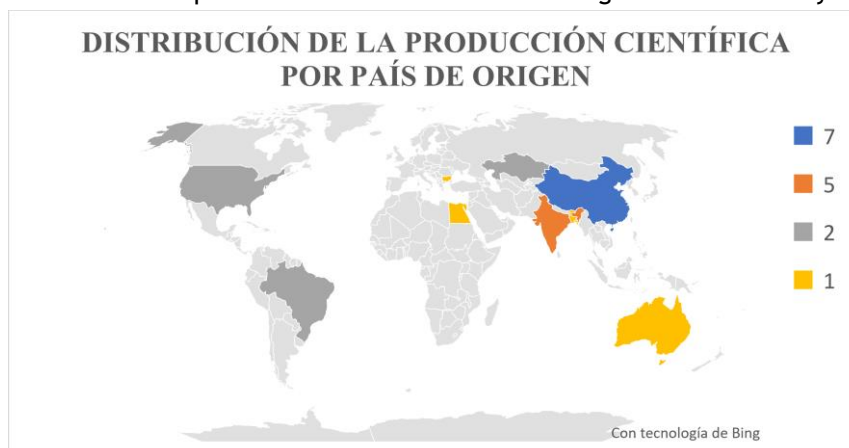


Figure 4. Distribution of scientific production by country of origin.

Source: Own elaboration (2023); based on data provided by Scopus.



In the study of Artificial Intelligence and Virtual Classrooms in Higher Education, China has the list of published documents with a total of 7 records in the Scopus database during the period of the years 2018-2022, followed by India and Brazil with 5 and 2 documents respectively.

Precisely in China emerged the article called "Application of Artificial Intelligence Techniques in the Operational Mode of the Academic Governance of Professors in American Research Universities" in (Li, Li, Shi, & Wang, 2021) which the authors recognize the positive impact generated by this technology in school teaching, ensuring that the United States has been the country that has advanced the most in relation to these changes since "has built a mechanism of linking federal leadership, university follow-up and social collaboration and implemented smart technology in school teaching and academic governance of teachers", which (Li, Li, Shi, & Wang, 2021) is why his research work "aims to study the academic governance of professors at American research universities by mining Internet data, the method of historical analysis, the documentary method, the survey method and other methods". (Li, Li, Shi, & Wang, 2021) They were finally able to conclude that "The academic governance of professors is a vital part of the modern university system," there is a "clear division of power and responsibility between professors and administrators based on an artificial intelligence decision system in American research universities (Li, Li, Shi, & Wang, 2021)," and "the academic (Li, Li, Shi, & Wang, 2021) governance of professors." Professors exercise academic power under the guarantee of diversified guaranteed systems based on the artificial intelligence evaluation system and the ideology of mutual respect based on the artificial intelligence management and service system." (Li, Li, Shi, & Wang, 2021)

At this point, it is important to highlight that the preparation of scientific publications in many cases or several countries. Therefore, the same publication can be linked to one or more authors with different nationalities and thus to more than one country simultaneously, being part of the total number of articles or publications of each of them in the final sum. Next, in *Figure 5*, you will see in greater detail the flow of collaborative work carried out by several countries.

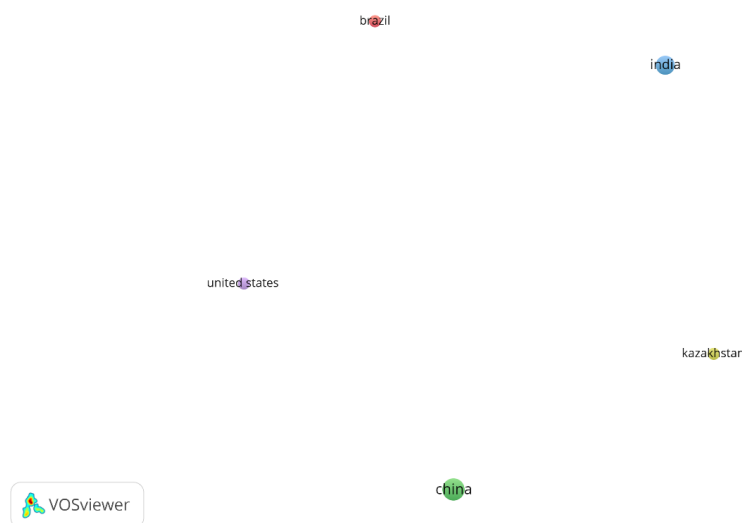


Figure 5. Co-citations between countries.

Source: Own elaboration (2023); based on data provided by Scopus.

Figure 5 shows that, in relation to our variables, there is no collaboration between authors from different countries in conducting research and subsequent publication of documents that contribute to the study of these. That is, we observe that there are five countries interested in the subject, although individually.

4.4 Distribution of scientific production by area of knowledge

Figure 6 shows the distribution of the elaboration of scientific publications from the area of knowledge through which the different research methodologies are implemented.

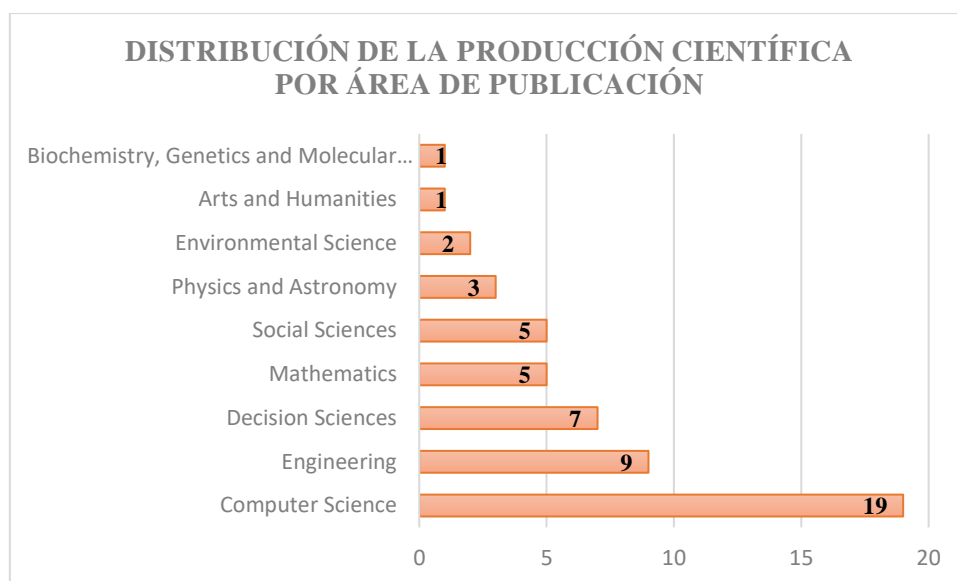


Figure 6. Distribution of scientific production by area of knowledge.

Source: Own elaboration (2023); based on data provided by Scopus.

Due to the nature of Artificial Intelligence and the methods used in Virtual Classrooms, it is not strange that most of the publications found in the Scopus database, about these are made from computer science occupying the main position in the publication of documents. Additionally, studies are carried out from other areas such as engineering as well as decision sciences have contributed to the study of these variables, publishing 9 and 7 documents respectively.

That is, as we can see in *figure 6*, the variables object of this study are relevant in various areas of knowledge, since they have the capacity to positively and / or negatively impact human life.

4.5 Type of publication

In the following graph, you will observe the distribution of the bibliographic finding according to the type of publication made by each of the authors found in Scopus.

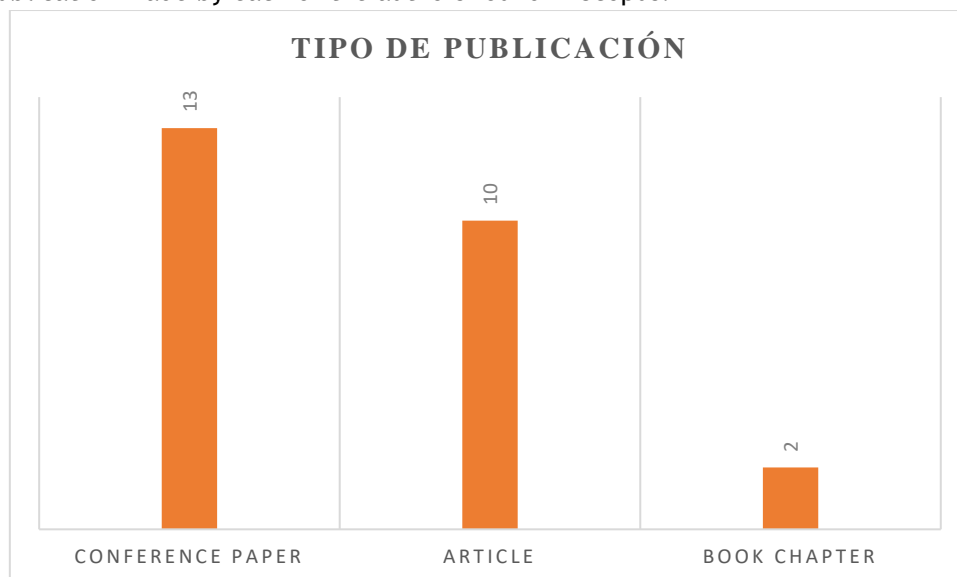


Figure 7. Type of publication.

Source: Own elaboration (2023); based on data provided by Scopus.

Figure 7 clearly shows that the predominant type of publication in the study of Artificial Intelligence and Virtual Classrooms in Higher Education are conference proceedings with a total of 13 papers,



followed in second and third place by the journal article with 10 publications and Book chapters with 2 titles.

The conference proceedings entitled "Development of artificial intelligence campus and higher education management system under the background of Big Data and WSN" (Li C. , 2022) makes use of "big data" in order to contribute to the improvement of so-called traditional careers and allow the exchange of information and "digital resources" that promote teaching " online and offline co-education, and promote the general trend of computerization." (Li C. , 2022)

CONCLUSIONS

From the bibliometric analysis carried out in the present research work, it was established that China was the country with the highest number of records published in relation to the variables Artificial Intelligence and Virtual Classrooms in Higher Education with 7 publications, in Scopus database during the period 2018-2022 and that the area of knowledge with the greatest contribution was computer science with a total of 19 texts.

For the authors, there is no doubt that Artificial Intelligence is one of the most beneficial technological tools for Higher Education, especially after the chaos resulting from the COVID 19 pandemic, which led institutions to modify their face-to-face educational processes to completely virtual ones. where more dedication is required by the parties involved but that can lead to the achievement of better results. As Juan José García argues in his article:

Artificial intelligence allows to customize learning paths, according to the capabilities of each student and, creating new management systems, through big data; It allows the contextualization of a model for learning, through groups of technologies and methods, mediated by the internet, providing improvements to the student's pace. (García Villarroel, 2021)


Additionally, the implementation of Artificial Intelligence in Virtual Classrooms has benefited Higher Education in the following ways:

- a. Access to the platforms by the student.
- b. Time allocated to the different units of study.
- c. Generation of automatic task alerts.
- d. Attention to the requirements raised in the asynchronous lessons.
- e. Timely notices of the lack of work.
- f. Establish notices of academic performance.
- g. Generation of critical point statistics.
- h. Color maps of student risk. (Chaves Ramirez, 2021)

However, it should be noted that this technological revolution has also become a challenge for teachers since it requires them to be completely updated with the information and maintain a close relationship with their students in order not to cause disinterest on the part of the latter. Taking into account all of the above and with the sole objective of continuing to raise awareness of the importance of guaranteeing access to this type of information in a transparent manner by anyone, we hope to encourage with this article the participation of scientific communities in the study of these variables from any scientific profile and area of knowledge always seeking to provide more alternatives that contribute to the research of Topics of general interest.

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