INFLUENCE OF ARTIFICIAL INTELLIGENCE ON HIGHER EDUCATION VIRTUAL CLASSROOMS

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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 variable Artificial Intelligence, Virtual Classrooms and 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 2017-2022, achieving the identification of 40 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 8 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 the study of the variable Artificial Intelligence, Virtual Classrooms and Higher Education was Computer Science with 31 published documents, and the Type of Publication most used during the period indicated above were Conference Articles with 40% of the total scientific production.

Keywords: Artificial Intelligence, Virtual Classrooms and Higher Education.

1. INTRODUCTION

Over time, the convergence of artificial intelligence in various fields has changed the way we live, work and learn. One area where artificial intelligence is having a big impact is higher education, especially virtual classrooms. As technology continues to evolve and change the landscape of education, artificial intelligence will play a central role in enhancing students' learning experience, improving teaching methods, and changing paradigms of traditional education.

Virtual classrooms, also known as online or distance learning platforms, have gained popularity in higher education due to their flexibility, accessibility, and adaptability. Enabling students to obtain higher education anywhere in the world, breaking geographical barriers and opening doors to a wide range of students. However, the challenge is to replicate the interactivity and engaging nature of the traditional classroom environment in the virtual realm. Al offers countless opportunities to solve these problems and improve the virtual classroom experience. Using artificial intelligence technologies such as machine learning, natural language processing, and computer vision, educational institutions can create intelligent virtual learning environments that are tailored to individual student needs, facilitate personalized learning journeys, and provide real-time feedback to improve student performance.

One of the key benefits of incorporating artificial intelligence into the virtual classroom is its ability to tailor educational content and delivery to each student's unique needs. AI-powered systems can

analyze large amounts of student data, including learning preferences, strengths, weaknesses, and patterns of progress, to create personalized learning paths. This personalized approach not only increases student engagement, but also fosters a deeper understanding of complex concepts, ultimately leading to better learning outcomes.

In addition, artificial intelligence can facilitate intelligent learning systems to deliver interactive and responsive learning experiences. These systems can use natural language processing to understand student queries and provide immediate, accurate answers that simulate the experience of an expert teacher or tutor. Through adaptive assessment, AI can also identify areas where students are struggling and provide specific interventions or remedial resources to ensure students have a thorough understanding and mastery of the subject. Using the power of artificial intelligence, educational institutions can create adaptable and personalized learning environments where students learn at their own pace and style. AI-powered virtual classrooms have the potential to revolutionize education by driving innovation, inclusion, and better learning outcomes for prospective students. For this reason, this article seeks to describe the main characteristics of the compendium of publications indexed in the Scopus database related to the variables Artificial Intelligence, Virtual Classrooms and Higher Education, as well. As the description of the position of certain authors affiliated with institutions, during the period between 2017 and 2022.

2. GENERAL OBJECTIVE

Analyze from a bibliometric and bibliographic perspective, the elaboration and publication of research works in high-impact journals indexed in the Scopus database on the variables Artificial Intelligence, Virtual Classrooms and Higher Education during the period 2017-2022.

3. 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 Artificial Intelligence, Virtual Classrooms and 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



3.1.1 Phase 1: Data collection

Data collection was carried out from the Search tool on the Scopus website, where 40 publications were obtained from the choice of the following filters:

TITLE-ABS-KEY (artificial AND intelligence, 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) OR LIMIT-TO (PUBYEAR, 2017))

- Published documents whose study variables are related to the study of the variables, Artificial Intelligence, Virtual Classroom and Higher Education.
- Limited to the years 2017-2022.
- Without distinction of country of origin.
- Without distinction of area of knowledge.
- 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.

4. 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.

Artificial Intelligence was the most frequently used keyword within the studies identified through the execution of Phase 1 of the Methodological Design proposed for the development of this article. Distance Education is also among the most frequently used variables, associated with variables such as Students, Education Engineering, Digital Technology, Teaching, Big Data. From the above, it is

striking that virtual classrooms powered by AI algorithms can adapt to the needs, preferences and instructional styles of individual students, thus offering personalized educational space and pace. By examining student interactions, AI algorithms can identify knowledge gaps, provide specific feedback, and mandate appropriate instructional assets, fostering personalized and adaptive instructional research that maximizes student engagement.

4.2 Distribution of scientific production by year of publication

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





Among the main characteristics evidenced by the distribution of scientific production by year of publication, a level of number of publications registered in Scopus is notorious in the years 2022, reaching a total of 14 documents published in journals indexed in said platform. This can be explained thanks to articles such as the one entitled "Student performance, engagement and satisfaction in an inverted classroom of static and mechanics of materials: a case study" This article presents a case study of the evidence-based practice of flipping a classroom. The flipped (or flipped) classroom has long been promoted as a method of improving student engagement in the classroom, as it creates opportunities for active learning experiences during class time that would otherwise be consumed in passive instruction. A flipped classroom relies on students independently preparing for class before the scheduled lesson time, usually by watching pre-lesson videos or reading instructor-assigned material. Having been exposed to the lecture material, synchronous class time can be used to complete active learning exercises in small groups with direct supervision and immediate feedback offered by the instructor. At Johns Hopkins University, Statics and Mechanics of Materials has been taught for many years using a traditional lecture-style mode of instruction to students of civil, environmental, and mechanical engineering. Aware of the documented benefits of the flipped classroom model, in 2019 the author created a library of pre-lesson videos and accompanying in-class learning exercises to experiment with this mode of instruction. (Sangree, 2022)

4.3 Distribution of scientific production by country of origin

Figure 4 shows how scientific production is distributed according to the country of origin of the institutions to which the authors are affiliated.



Figure 4. Distribution of scientific production by country of origin. **Source:** Own elaboration (2023); based on data provided by Scopus.

Within the distribution of scientific production by country of origin, records from institutions were taken into account, establishing China, as the country of that community, with the highest number of publications indexed in Scopus during the period 2017-2022, with a total of 8 publications in total. In second place, India with 7 scientific papers, and the United States occupying the third place presenting to the scientific community, with a total of 3 documents among which is the article entitled "Application of the UTAUT model to explain the acceptance by students of an early warning system in Higher Education" This article analyzes the acceptance by students of an early warning system developed in a Completely online university. Following a pre- and post-use experimental design based on the Unified Theory of Technology Acceptance and Use model and Structural Equation Modeling, we observed how, within four courses (839 participants in the 2019-20 academic year, of which 347 participants answered a pre- and post-use questionnaire), Student acceptance changed over time. Our findings revealed a disconfirmation effect on the acceptance of the early warning system, i.e. a difference between expectations around the upstream and downstream use of the technology, and shed light on the ways in which Al systems should be integrated into higher education virtual classrooms.(Raffaghelli, 2022)

4.4 Distribution of scientific production by area of knowledge

Figure 5 shows the distribution of the elaboration of scientific publications from the area of knowledge through which the different research methodologies are implemented.



Figure 5. Distribution of scientific production by area of knowledge. **Source:** Own elaboration (2023); based on data provided by Scopus

Computer Science was the area of knowledge with the highest number of publications registered in Scopus with a total of 31 documents that have based their methodologies Artificial Intelligence, Virtual Classrooms and Higher Education In second place, Engineer with 11 articles and Social Sciences in third place with 9. The above can be explained thanks to the contribution and study of different branches, the article with the greatest impact was registered by the Computer Science area entitled "Impact of the advancement of AI-based metaverse technologies on higher education students" whose objective is to examine how augmented reality affects motivation in the classroom. Core motivation theory increases motivation in the classroom. The attention, relevance, trust and satisfaction model (ARCS) affected how Augmented Reality was perceived and how the material was updated. This study evaluated augmented reality smartphone applications by analyzing SEM models. The study used the ARCS model to analyze the educational applications of augmented reality, its effect on higher education and its relationship with respect to attention, relevance, satisfaction and confidence are motivational variables with significant findings. The study found that using an augmented reality smartphone app would help students learn and be more motivated.(Bhavana S, 2022)

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 6. *Type of publication*. **Source:** Own elaboration (2023); based on data provided by Scopus.

The type of publication most frequently used by the researchers referenced in the body of this document was entitled Conference Articles with 40% of the total production identified for analysis, followed by Journal Articles with 35%. Conference Journal are part of this classification, representing 17% of the research papers published during the period 2017-2022 in journals indexed in Scopus. In this last category, the one entitled "Innovative research on intelligent teaching mode in the classroom in the "5G" era stands out, this article aims to analyze the characteristics of high speed and low latency in the 5G era, analyzes the development of teaching in the smart classroom promoted by 5G technology and creatively presents different teaching strategies in combination with the existing problems in A smart classroom in universities. and universities. Students interact with real virtual or virtual scenes built in real time. With the help of artificial intelligence teaching, it can establish artificial intelligence teaching assistants and learning partners, support one-to-one skill training, also provide teachers with an intelligent learning environment, integrate teaching resources, optimize the teaching path, improve teaching interaction, provide a reference for future teaching activities, explore the application of an innovative teaching mode based on 5G communication. Big data will record learning behavior in the process and use it for diagnosis and evaluation of dynamic learning

outcomes, providing a foundation for educators to practice "people-oriented" and help students grow.(Rong, 2022)

5. CONCLUSIONS

Through the bibliometric analysis carried out in the present research work, it was established that China was the country with the largest number of records published for the variables Artificial Intelligence, Virtual Classrooms and Higher Education with a total of 8 publications in the Scopus database. Similarly, it was established that the application of theories framed in the area of Communication Science, were the most frequently used in measuring the impact generated by the integration of artificial intelligence (AI) in virtual classrooms can revolutionize higher education. AI technologies can enhance the learning experience by providing personalized and adaptive learning, facilitating effective assessment and feedback, and enabling innovative teaching methods. Alpowered virtual classrooms can tailor educational content to individual needs, learning styles, and student pace, resulting in higher engagement and better academic outcomes. This personalized approach helps students understand concepts more effectively and allows educators to address knowledge gaps early. In addition, artificial intelligence can automate administrative tasks in virtual classrooms, such as task grading and feedback. AI-powered virtual classrooms can also introduce innovative learning methods. AI-powered chatbots and virtual assistants can answer students' questions in real time, providing assistance and guidance twenty-four hours a day, seven days a week. Although artificial intelligence in virtual classrooms offers many advantages, it is also important to address potential issues and ethical considerations. It is critical to protect student privacy, ensure algorithmic objectivity, and maintain human oversight in the decision-making process. Educators and institutions must also provide students and teachers with the appropriate training and support to use AI tools effectively and maximize their potential.

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