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Statistical Analysis: Impact of Artificial Intelligence on Academic Performance

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Abstract

A documentary review was carried out on the production and publication of research papers related to the study of the variables Artificial Intelligence and Academic Performance. 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 by Latin American institutions, achieving the identification of 56 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 on the proposed topic is referenced through a qualitative analysis. Among the main findings made through this research, it is found that Mexico, with 17 publications, was the Latin American country with the highest scientific production registered in the name of authors affiliated with institutions of that nation. The Area of Knowledge that made the greatest contribution to the construction of bibliographic material related to the study of Artificial Intelligence and Academic Performance was Computer Science with a total of 37 published documents, and the most used Publication Type during the period indicated above were Journal Articles with 53% of the total scientific production.

Keywords: *Artificial Intelligence, Academic Performance.*

1. Introduction

Emotional intelligence, often referred to as emotional quotient, is a concept that has garnered a lot of attention in recent decades due to its significant impact on all aspects of a person's life, including academic performance. It reflects an individual's ability to effectively identify, understand, manage, and use their own emotions and those of others in a variety of social and emotional contexts. This multifaceted skill includes aspects of empathy, self-awareness, self-regulation, interpersonal relationships, and emotional awareness. In the field of education, the impact of emotional intelligence on academic performance is undeniable and multifaceted. In the first instance, emotional intelligence plays a critical role in developing students' overall well-being and mental health. Being able to identify and effectively manage emotions can have a direct impact on reducing stress, anxiety, and depression, which are common obstacles students face during their academic journey.

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High emotional intelligence gives students the tools to manage academic stress, build resilience, and mental agility when faced with assignments, exams, and interactions with peers. In addition, emotional intelligence can lead to better relationships, which is an important aspect of academic success. Students with high emotional intelligence are better able to understand the feelings and opinions of their peers and teachers. They can communicate more effectively, resolve conflicts amicably, and collaborate productively on team projects. Not only do these skills enhance the classroom experience, but they also help create a more positive and supportive learning environment.

Self-awareness is a key component of emotional intelligence and allows students to better understand their strengths and weaknesses, learning preferences, and areas for improvement. This understanding allows them to set realistic goals, manage their time effectively, and seek appropriate academic support when needed. Basically, students with high emotional intelligence tend to be more active and self-directed in their academic pursuits. In addition, emotional intelligence is closely related to motivation and goal setting. Students with high emotional intelligence tend to have a clearer sense of purpose and greater intrinsic motivation. They can channel their emotions to boost academic performance and stay committed to their long-term goals even in the face of setbacks.

In addition, emotional intelligence affects the ability to make decisions. Emotional intelligence promotes the ability to evaluate situations, weigh options, and make rational decisions. In an academic context, this means making more thoughtful and strategic decisions about course selection, study strategies, and career choices. In particular, the impact of emotional intelligence goes beyond individual students and includes the entire class. Teachers with high emotional intelligence create a more inclusive and supportive learning environment. They are better equipped to understand and respond to students' emotional needs and thus facilitate a positive and nurturing educational experience. 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 and Academic Performance, as well. Such as the description of the position of certain authors affiliated with institutions, during the period between 2017 and 2022.

2. General Objective

To analyze, from a bibliometric and bibliographic perspective, the preparation and publication of research papers in high-impact journals indexed in the Scopus database on the variables Artificial Intelligence and Academic Performance during the period 2017-2022 by Latin American institutions.

3. Methodology

This article is carried out through a research with a mixed orientation 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 the variables Artificial Intelligence and Academic Performance. On the other hand, examples of some research works published in the area of study mentioned above are analyzed from a qualitative perspective, based on a bibliographic approach that allows describing the position of different authors on the proposed topic. It is important to note that the entire search was carried out through Scopus, managing to establish the parameters referenced in Figure 1.

3.1. Methodological design

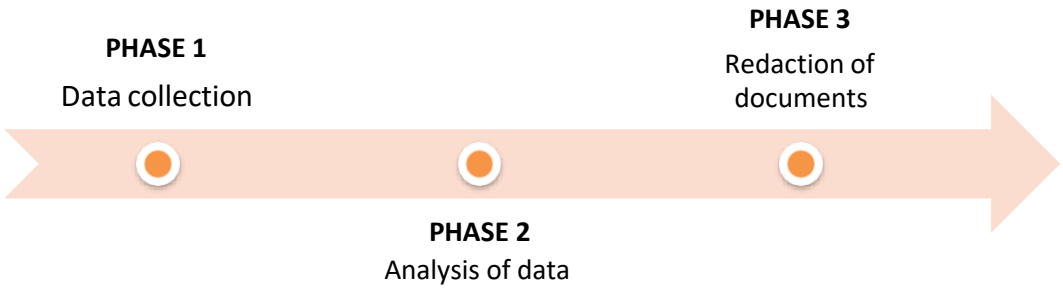

Figure 1. Methodological design
Source: Authors' own creation

3.1.1 Phase 1: Data collection

Data collection was carried out from the Search tool on the Scopus website, where 56 publications were obtained from the following filters:

TITLE-ABS-KEY (artificial AND intelligence, AND academic AND performance) AND PUBYEAR > 2016 AND PUBYEAR < 2023 AND (LIMIT-TO (AFFILCOUNTRY , "Mexico") OR LIMIT-TO (AFFILCOUNTRY , "Brazil") OR LIMIT-TO (AFFILCOUNTRY , "Colombia") OR LIMIT-TO (AFFILCOUNTRY , "Ecuador") OR LIMIT-TO (AFFILCOUNTRY , "Peru") OR LIMIT-TO (AFFILCOUNTRY , "Chile") OR LIMIT-TO (AFFILCOUNTRY , "Argentina") OR LIMIT-TO (AFFILCOUNTRY , "Puerto Rico") OR LIMIT-TO (AFFILCOUNTRY , "Panama") OR LIMIT-TO (AFFILCOUNTRY, "Nicaragua") OR LIMIT-TO (AFFILCOUNTRY, "Honduras") OR LIMIT-TO (AFFILCOUNTRY, "Cuba") OR LIMIT-TO (AFFILCOUNTRY, "Costa Rica")

- Published documents whose study variables are related to the study of the variables Artificial Intelligence and Academic Performance.
- Limited to the period 2017-2022
- Limited to Latin American countries.
- Without distinction of area of knowledge.
- No distinction of type of publication.

3.1.2 Phase 2: Construction of analytical material

The information collected in Scopus during the previous phase is organized and then 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, the results of the previous results are analysed, 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.

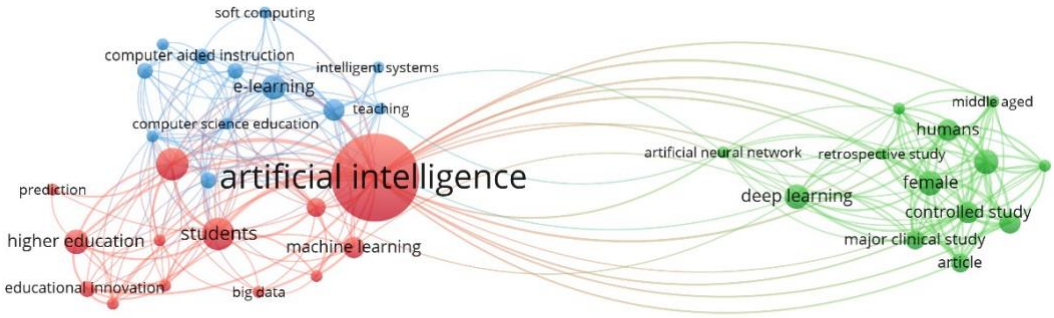

Figure 2. Co-occurrence of words

Source: Authors' 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. Emotional Intelligence is among the most frequently used variables, associated with variables such as Students, Higher Education, Natural Language, Big Data, E-learning. From the above, it is striking, the impact of emotional intelligence on academic performance is profound. Students with high emotional intelligence tend to excel academically because they are better able to manage stress, build positive relationships, face challenges, set and achieve goals, and make sound decisions. As the importance of emotional intelligence in education continues to be recognized, it becomes clear that the cultivation and development of these skills must become a fundamental aspect of the academic curriculum and ultimately contribute to the overall development and success of students.

4.2 Distribution of scientific production by year of publication

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

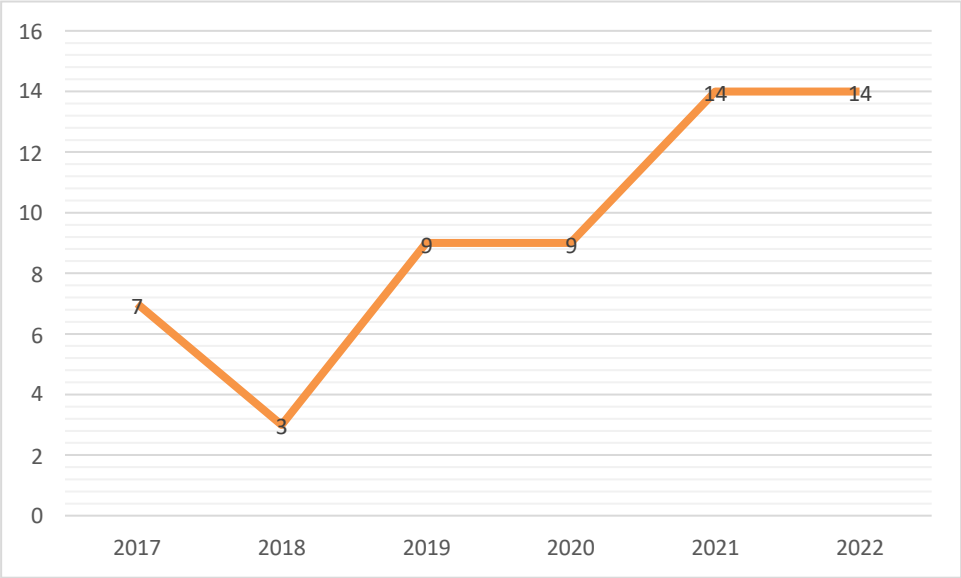

Figure 3. Distribution of scientific production by year of publication.

Source: Authors' own elaboration (2023); based on data exported from Scopus

Among the main characteristics evidenced through the distribution of scientific production by year of publication, the number of publications registered in Scopus was in 2021 and 2022, reaching a total of 14 documents published in journals indexed on this platform. This can be explained thanks to articles such as the one entitled "Artificial intelligence and legal education: their incorporation during the Covid-19 pandemic" The purpose of this study is to analyze the incorporation of artificial intelligence in the teaching of law at the university level during the COVID-19 pandemic. It is important because it recognizes the need for their incorporation, which would encourage reading, critical thinking, research culture, and improve the academic performance of law students. A qualitative research was developed, with a non-experimental design and exploratory level. An instrument was developed, which was validated using the Deplhi method. The instrument was applied to lawyers who work as professors in Peruvian universities. The results show the importance of the incorporation of technology, which allows a virtual education process, becoming a complementary tool in training processes, with which the replacement of teachers is feared. It was concluded that the incorporation of artificial intelligence in the training process of law students is feasible because it would prioritize digital literacy.(Quezada Castro, Inteligencia artificial y educación jurídica: su incorporación durante la pandemia de Covid-19, 2022)

4.3 Distribution of scientific production by country of origin.

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

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

Source: Authors' own elaboration (2023); based on data provided by Scopus.

Within the distribution of scientific production by country of origin, the registrations from institutions were taken into account, establishing Mexico as the country of that community, with the highest number of publications indexed in Scopus during the period 2017-2022, with a total of 17 publications in total. In second place, Brazil with 10 scientific papers, and Colombia occupying the third place presenting to the scientific community, with a total of 9 papers among which is the article entitled "Teaching through learning analysis: prediction of the learning profiles of students in a physics course in a higher education institution" This study aims to determine to what extent the K-nearest neighbor algorithms and Random forest could become a useful tool to improve the teaching-learning process and reduce academic failure in two physics courses at the Instituto Tecnológico de Monterrey, Mexico (n = 268). A quasi-experimental and mixed-method approach was carried out. The main results showed significant differences between the first and second trimester assessments in the two groups. One of the main findings of the study is that the predictions were not very accurate for each student on the first-quarter assessment. However, the predictions became more accurate as the algorithm was fed larger datasets from the second-quarter assessment. This result indicates how predictive algorithms based on decision trees can offer a close approximation of the academic performance that will occur in the class, and this information could be used in conjunction with the teacher's personal impressions.(Rincon-Flores, 2022)

4.4 Distribution of scientific production by area of knowledge

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

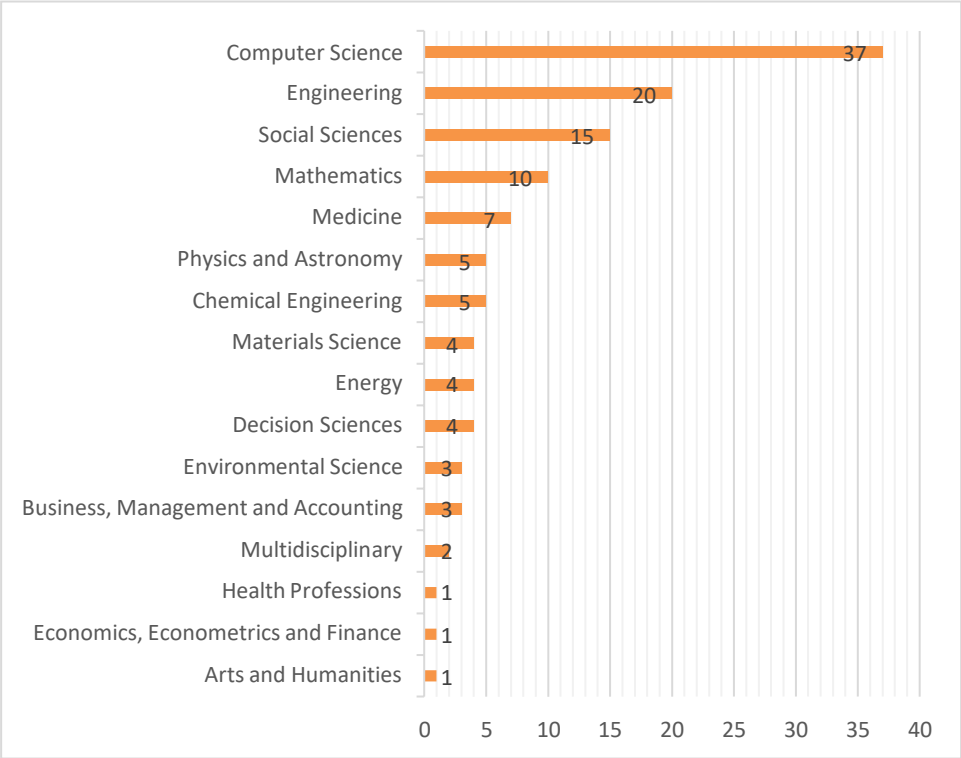

Figure 5. Distribution of scientific production by area of knowledge.

Source: Authors' 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 37 documents that have based their variable methodologies Artificial Intelligence and Academic Performance. In second place, Engineering with 20 articles and Social Sciences in third place with 15. The above can be explained thanks to the contribution and study of different branches, the article with the greatest impact was registered by the area of Computer Science entitled "The future of business culture: a digital framework driven by artificial intelligence for the organizational decision-making process" The aim of this work is to carry out a comprehensive analysis of the literature that examines the confluence of AI and the philosophy of the marketing, as well as building a theoretical model that incorporates concerns based on established studies in the areas. This research shows that, in an environment with artificial intelligence systems, customer expectations, industry standards, and participatory management, strategic business decisions improve. This research provides entrepreneurs with technological means to improve decision-making, illustrating the limitless possibilities offered by AI systems. A conceptual approach is also formed that analyzes the four factors of profit maximization: the relationship of AI and IT tools to corporate goals; AI, organizational learning, and decision-making methodology; and AI, service and value development. This study proposes a way to exploit this innovative innovation without destroying society. We show real-world examples of each of these frameworks, indicate circumstances in which they are likely to improve decision-making performance in organizations, and provide practical implications for their limitations. These observations have a wide variety of implications for the establishment of new management methods and practices from both academic and conceptual points of view.(Rajagopal, 2022)

4.5 Type of publication

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

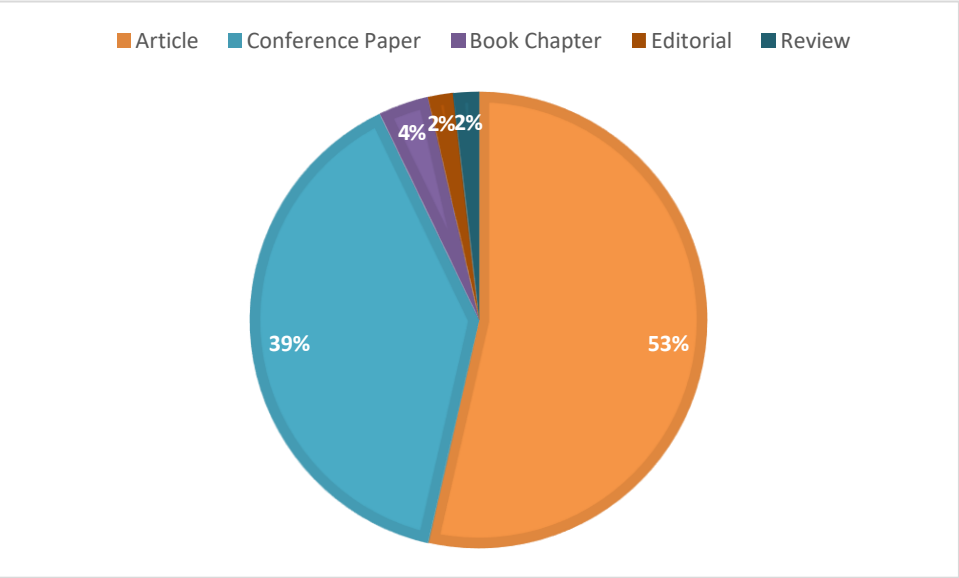

Figure 5. Type of publication.

Source: Authors' 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 the one entitled Journal Articles with 53% of the total production identified for analysis, followed by Session Paper with 39%. Chapter of the Book are part of this classification, representing 4% of the research papers published during the period 2017-2022, in journals indexed in Scopus. In this last category, the one entitled "Applications of artificial intelligence to the automatic classification of communicative purposes in engineering reports" stands out. The aim of this paper is to automate the classification of macromovements (MM) of the mesogenus practical engineering experience report. To this end, seven traditional classification algorithms were considered, as well as the deep learning model for Spanish called BETO and their corresponding configurations. Among the findings, the better overall performance of SVM_lineal stands out. In addition, SVM_linear, BETO, and KNN are more effective for sorting movements into different MMs. These results suggest that the combination of algorithms would be a useful procedure to better classify the macropurposes of this mesogenus. It is planned to evaluate these algorithms in a feedback tool for genre-based written production.(Venegas, 2021)

5. Conclusions

Through the bibliometric analysis carried out in this research work, it was possible to establish that Mexico was the country with the highest number of published records regarding the variables Artificial Intelligence and Academic Performance. with a total of 17 publications in the Scopus database. In the same way, it was established that the application of theories framed in the area of Communication Sciences, although the importance of emotional intelligence in academic performance is widely recognized, challenges persist in its evaluation and integration in educational programs. As research on this topic continues to develop, educators and policymakers must work together to develop effective strategies to increase emotional intelligence in students and teachers. Students with higher emotional intelligence are generally better able to cope with academic challenges, stay motivated, and achieve academic goals. Although emotional intelligence is not the only determinant of success, it is critical to shaping a student's overall educational experience and can contribute significantly to their academic success. Recognizing the importance of emotional intelligence and actively working to improve it can be a valuable strategy for students who want to excel academically. It is important to

mention that emotional intelligence has a multifaceted concept that has a great impact on academic performance. Its impact goes beyond individual students and affects classroom dynamics, teacher-student relationships, and the learning environment in general. Recognizing the critical role of emotional intelligence in education can lead to more versatile and effective teaching methods that ultimately enable students to succeed academically and thrive in a rapidly changing world.

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