Distance education during the pandemic generated by COVID-19 in Latin America

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Abstract
A documentary review of the scientific production registered in the Scopus database on the study of Digital Distance Education in the COVID-19 pandemic in Latin America was carried out with the purpose of knowing the main characteristics of the generation of new knowledge on this topic. The information analyzed is provided by Scopus through its *Search* tool, by means of which the data is filtered in such a way that a total of 178 research papers published in high impact journals are obtained, referring to distance education during the COVID-19 pandemic. Due to its nature, the temporal delimitation is defined by the two semesters of 2020 and the first semester of 2021, at the date of the present research. The bibliometric review is performed on the basis of these data, which are classified according to their area of knowledge, country of origin and affiliation. Once the information is classified, certain papers are analyzed from a bibliographic perspective to know and define the position of different authors with respect to the proposed topic.
Key words: Distance Education, Virtual Education, COVID-19.

1. Introduction

The emergence of technology in the world of education opened up many opportunities for more people to have access to professional training. Online courses, originated in the decade of the 90`s in the United States, Australia, New Zealand and United Kingdom, and since then it has begun a continuous race of updates that have allowed making use of platforms designed exclusively for the teaching-learning process created by educational software developers that have served as support in the implementation of strategies proposed by the educational management (Nagles, Mejìa, Chaparro, 2017), such as the MOOC (*Massive Open Online Course*) emerged in 2008, a model proposed by Dave Cormirer and Bryan Alexander in Canada (Lopez-Meneses & Vazques, 2020). This model was proposed by Dave Cormirer and Bryan Alexander in Canada, breaking down the existing barrier that limited access to education only to those who could access it in person.

Within the pedagogical processes contemplated by the universities, in view of the imminent change that distance education by digital means implies, teachers have received constant support from the institutions, through continuous training in technological tools that facilitate the delivery of new knowledge and the interaction between students and teachers. Only through updates and constant training, a continuous improvement in the teaching processes is obtained (Education, 2016) .

On March 11, 2020, the World Health Organization alerted the whole world about the reality of the pandemic generated by the HIV/AIDS pandemic, which forced all people to a mandatory confinement decreed by the states in their eagerness to stop the rapid spread of the disease. Many sectors of the economy saw their processes affected, and education was no stranger to this, transforming its methodology from face-to-face to remote. What was traditionally an option (virtuality) for students, became an obligation for anyone interested in giving continuity to their training process, which undoubtedly, became an obligation for all those interested in giving continuity to their training process(Inter-American Development Bank, 2020) which undoubtedly became a challenge for management in education worldwide, always designing strategies that keep not only trained teachers in their area of knowledge, but in the use of digital tools for the implementation of the curriculum, additionally, maintaining the motivation of both teachers and students to avoid high levels of desertion (Artavia& Castro, 2019). Precisely the motivation and commitment on the part of teachers, constituted a major issue to be addressed by the administration of educational institutions, since only through the above, it can be ensured that the guidelines are followed correctly and all the necessary mechanisms for a successful teaching-learning process are applied (GarcíaAretio, 2020).

Latin America has not been unaffected by the crisis caused by the spread of the virus, which has forced the total confinement of society and has generated traumas in all sectors of the economy. Education was also affected by the health crisis, which also urged educational institutions to use technological means to continue the training processes.

Therefore, it is important to know the bibliographic production related to education during the pandemic generated by COVID-19, since its appearance in the world, so the

present research is developed with the purpose of answering the question: How has been the production of scientific publications related to distance education in times of pandemic during the two semesters of 2020 and the first semester of 2021 in Latin America?

2. General Objective

To analyze from a bibliometric and bibliographic perspective, the production of high impact research papers on the variable Distance Education during the COVID-19 pandemic during the year 2020 and first semester of the year 2021 in Latin American countries.

3.Methodology

Quantitative analysis of the information provided by Scopus under a bibliometric approach on the scientific production referring to Distance Education during the pandemic decreed by the massive contagions of COVID-19 at Latin American level is carried out. Likewise, it is analyzed from a qualitative perspective, examples of some research works published in the area of study mentioned above, from a bibliographic approach to describe the position of different authors on the proposed topic.The period between the two semesters of 2020 and the first semester of 2021, the date on which this research is carried out, is taken into account.

The search is performed through the tool provided by Scopus and the parameters referenced in Table 1 are established.

3.1 Methodological design

	PHASE	DESCRIPTION	CLASSIFICATION
PHASE 1	DATA COLLECTION	The data collection is carried out by means of the Scopus web page search tool.	Published papers whose study variables are related to Distance Education during the COVID-19 pandemic. Research papers published by authors affiliated with Latin American institutions. Research papers published during 2020 and the first semester of 2021. Limited to journal papers only. Without distinction of area of knowledge.
PHASE 2	CONSTRUCTION OF ANALYSIS MATERIAL	The information identified in the previous phase is organized. The	Year of publication Country of origin of the publication. Area of knowledge.

		classification will be made by means of graphs, figures and tables based on data provided by Scopus.	Type of publication
PHASE 3	DRAFTING OF CONCLUSIONS AND FINAL DOCUMENT	After the analysis carried out in the previous phase, we proceed to the drafting of the conclusions and the preparation of the final document.	

Table 1. Methodological design.
Source: Own elaboration (2021)

4. Results

The investigation of the implications that the spread of COVID-19 has had in the world, in this case in education, always points to the implementation of plans and strategies aimed at the continuity of academic training through the virtualization of content. Figure 1 shows the most frequent keywords within the 178 documents identified through phase 1 of the methodological design.

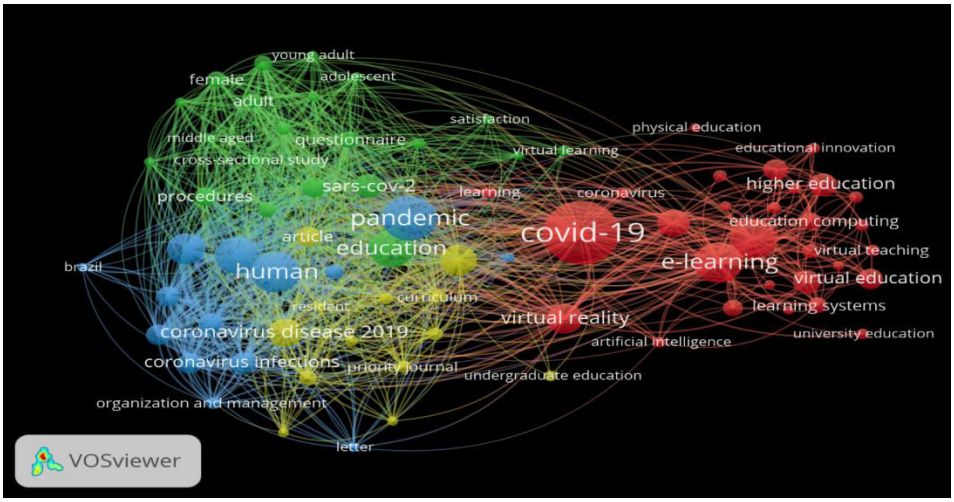

Figure 1. Co-occurrence of words
Source: Own elaboration (2021); based on data provided by Scopus.

COVID-19 is the most studied variable within the research works analyzed, directly related to keywords such as E-learning, Virtual Reality, Virtual Teaching, Higher Education, Learning Systems, Innovation in Education, which allows inferring that everything related to education during the period under study and according to the variable mentioned above, revolves around virtuality and remote access to professional training. This is explained by the latent objective of the educational institutions to continue carrying out the fulfillment of their study plans through the use of technological platforms and programs designed for the execution of classes in real time where the teacher and students establish direct communication.

On the other hand, a group of words is registered within which the words Virtual Learning, Adolescents, Middle Age, Questionnaires and Satisfaction stand out. Therefore, it can be inferred that the research carried out up to the date of preparation of this document is not only evaluating the different mechanisms to carry out the implementation of the academic plan in educational institutions, but also taking into account the students' perception of this modality. This perception is of great importance when designing strategies to reduce the levels of temporary and definitive desertion, which ends up being one of the most latent concerns in university management, since many students have decided to suspend their studies in the hope that they will soon return to face-to-face courses. The latter motivates the administration of educational institutions to maintain the interest of students to continue with their training processes, a commitment in which teachers play an important role by evaluating possible aspects to be improved through feedback and data provided by the technological programs themselves.

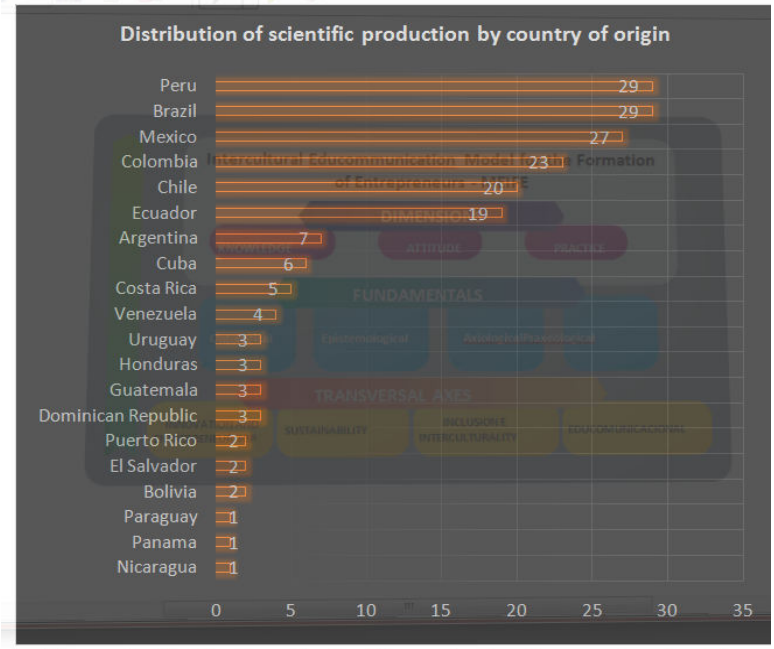

Figure 2. Distribution of scientific production by country of origin.
Source: Own elaboration (2021); based on data provided by Scopus.

As shown in Figure 2, Peru and Brazil occupy the first place with 29 research papers published each. Of the Peruvian publications, the conference paper entitled "*Satisfaction and Intention of Continuity of Learning with Virtual Classes in Engineering Students of Peruvian Private Universities*" (MacHuca, Chong, Dorin, Luna, & Yi, 2021). stands out, which takes into account aspects mentioned above such as student satisfaction and their intention to continue their training process under the new conditions, i.e., the virtual modality. Measuring both aspects allows to make projections to the educational management and in this way to establish strategies in the control of nonconformities on the part of the students. In this study, a survey was made to 126 students of engineering departments of four private Peruvian universities, through which it was possible to establish the most significant variables within the measurement of student satisfaction, among which the following were identified: perceived usefulness, enjoyment, social influence, expectation of effort, trust, shared norm and strength of the bond.

Mexico and Colombia are in third and fourth place with 27 and 23 research papers published, respectively. Of the latter, the publication entitled "*Virtual simulators as fundamental tools for clinical medical education in times of covid-19*" (Martinez & Carmona, 2021). proposes a virtual simulator for the treatment of different pathologies in patients who require uninterrupted medical attention and whose treatment is exposed by the social isolation measures imposed by the government to reduce the rate of contagion. In this way, technology is used for the timely care of patients who require it. The study was applied as an academic exercise among medical students.

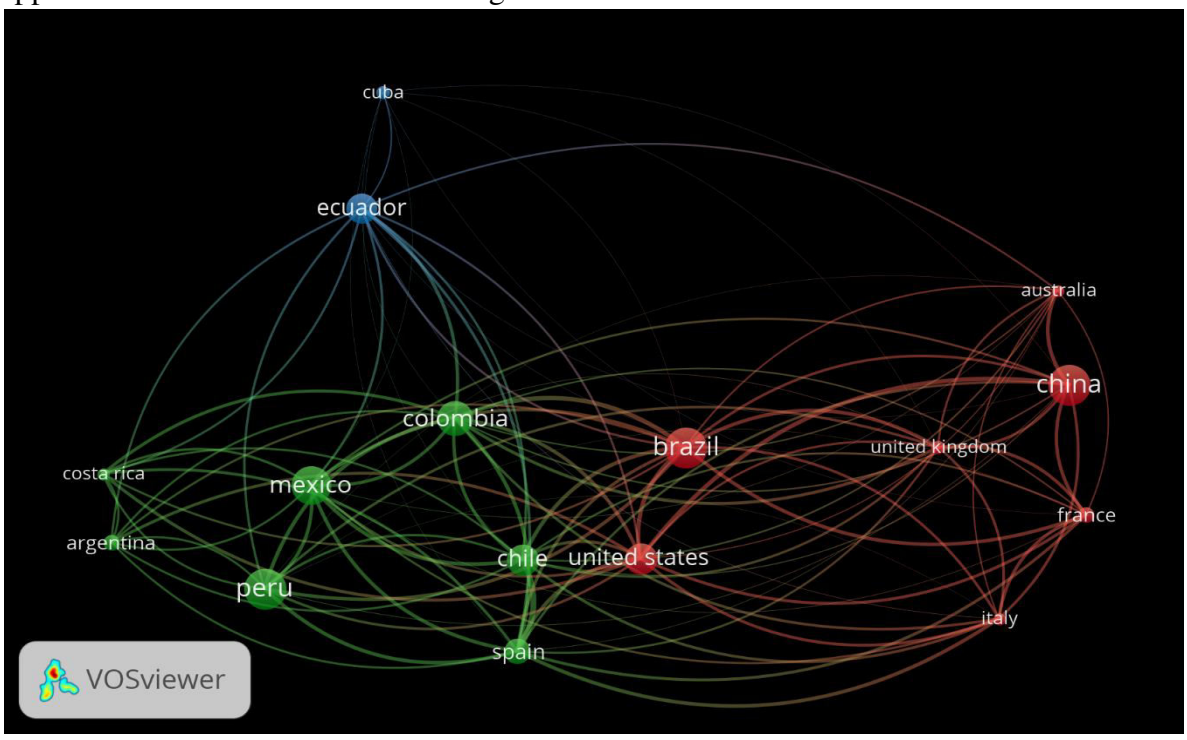

Figure 3. Co-citations between countries.
Source: Own elaboration (2021); based on data provided by Scopus.

Figure 3 shows an important point to analyze, and that is the collaboration between authors affiliated to different institutions in different countries in Latin America and outside this community. It should be noted that there is the possibility of international cooperation in the execution of research work and its subsequent publication. The Figure shows the formation of two groups led by Brazil and Peru. In the case of the co-citations found and the international cooperation with Brazilian authors, the most frequent were with authors from China, the United States, Italy, England, France and Australia. Collaborations were also found with Peru, Mexico, Colombia, Spain, Chile, among other countries.

An example of the above is the paper entitled "*Lifestyle changes in medical students during the COVID-19 pandemic: a multicenter study in nine countries*" (Perez-Dominguez, et al., 2021). in which countries such as Japan, Venezuela, Colombia, Italy, Mexico, Spain, Germany and Brazil participate and whose purpose is to measure the lifestyle implications experienced by medical students from different educational institutions in nine countries. The study conducted a survey of 2,776 students that sought to inquire about the changes experienced in their university study plans and possible alterations in their lifestyle, including habits, as well as mental and physical health. Among the outstanding results of the research, 99% of the students surveyed reported changes in their instructional systems, i.e., their class modality, while 90% reported the transition from face-to-face to virtual classes, and 93% reported the suspension of their practical activities.

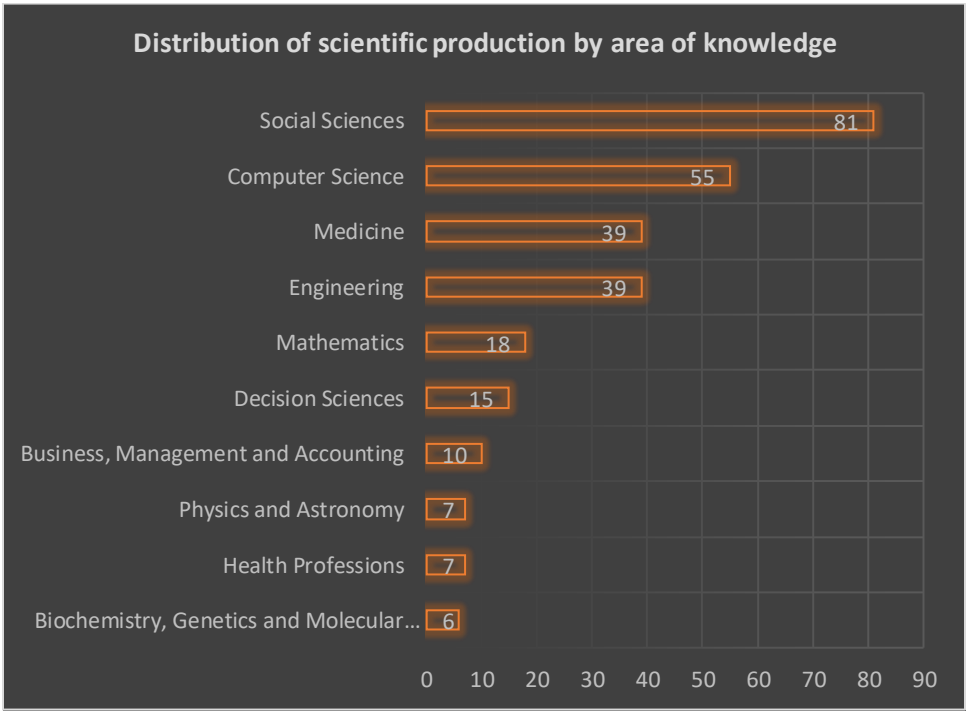

Figure 4. Distribution of scientific production by area of knowledge.
Source: Own elaboration (2021); based on data provided by Scopus.

Figure 4 shows the areas of knowledge through which the different publications are being carried out, highlighting the Social Sciences as the main thematic axis in the production of research papers with a total of 81 documents within which we highlight the article entitled "Rapid adaptation and remote delivery of undergraduate research training during the covid-19 pandemic". (Yowler, et al., 2021). which aims to measure the level of adaptation to the virtual strategy to give continuity to undergraduate research. A survey of 170 students was conducted to identify enthusiasm and commitment on the part of the students who, interested in scientific research, have successfully adapted to this virtual strategy.

In second place is Computer Science with 55 published papers, and in third place Medicine with 39, among which we highlight the article "*Impact of the COVID-19 pandemic on the residency program in general surgery in Peru: a cross-sectional study*" (Huamanchumo-Suyon, Urrunaga-Pastor, Ruiz-Perez, Rodrigo-Gallardo, & C., 2020). which measured the perception not only of students, but also of their tutors and teachers, on their opinion of the possible effects that the restrictions decreed to control the advance of COVID-19 infections could have on the training of surgeons during their residency stage, since this is a specific area that requires practice. Among the main findings was that residents felt that the loss of surgical training opportunities during the pandemic would negatively affect their job performance. This can be considered as the greatest impact on the training of future physicians and health professionals in general.

Finally, Figure 5 shows the distribution of scientific production by type of publication, understanding that authors have various mechanisms to publish their research. These can be journal articles (papers), review articles, conference papers, book chapters, books, among others.

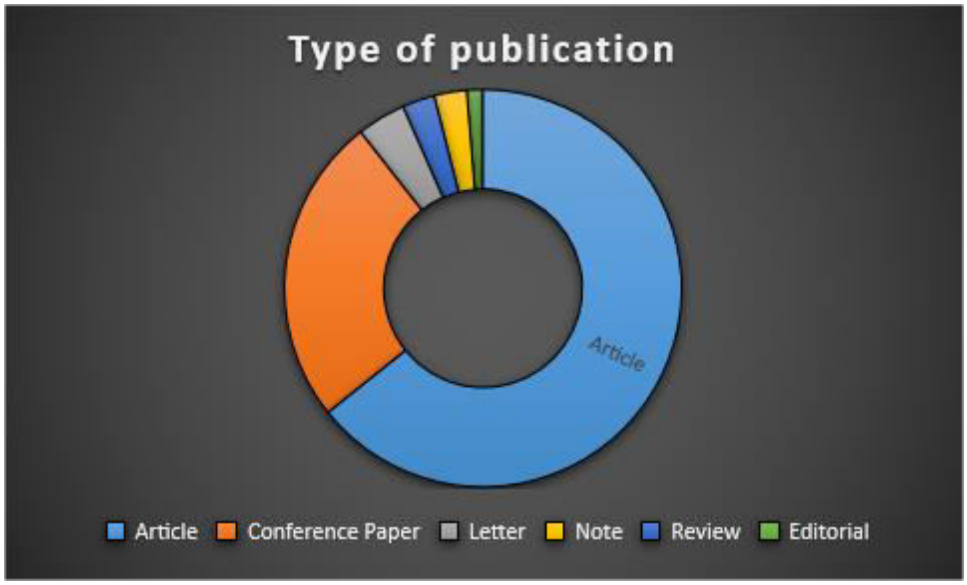

Figure 5. Type of publication
Source: Own elaboration (2021); based on data provided by Scopus.

Of the total scientific production, 64.2% corresponds to journal papers, 25.2% to conference articles, 4% to *Letters,* 2.6% to *Notes* and reviews, and 1.3% to Editorials.

Among the conference papers is the one entitled "*Work in Progress: creation of tools for interactive experiences using classroom role-playing games*", which aims to present a tool designed to enhance learning among students through interactive virtual games that allow participants to experience processes such as decision making from different roles.(Hernandez & Aristondo, 2021) which aims to present a tool designed to enhance learning among students through interactive virtual games that allow participants to experience processes such as decision making from different roles, thus developing creativity and addressing the negative perception that has become widespread among students about distance education.

Another example of the conference papers published corresponds to the one entitled "*Virtual teaching strategies in times of the COVID-19 pandemic*" (Luna, Hidalgo-Leon, & Chong, 2021). whose purpose is to analyze the new didactics in the teaching-learning process and how the migration to virtual modality in a mandatory manner has changed the way in which teachers fulfill their academic objectives, and has undoubtedly constituted one of the most important challenges that education has experienced in recent history.

5.Conclusions

The pandemic generated by COVID-19 has unleashed countless questions and expectations in the scientific community, with Education as the one sector that has been most studied, as the implications of social isolation measures and the compulsory virtualization of academic content are being studied, which in previous years was considered as an option for students.

Peru and Brazil are the Latin American countries with the highest scientific production regarding education in times of pandemic, which allows inferring the great effort that the academic community has exerted on the study of mechanisms that help to cope with isolation measures that allow meeting the objectives set by the administration in educational institutions.

The area of knowledge with the greatest contribution to the bibliographic construction of the topic studied in this paper is Social Sciences, which allows analyzing the impact that the restrictive measures of modality have had on society from the point of view of education. That is to say, it allows measuring the social impact of the virtualization of classes at all educational levels, as well as the students' perception of the quality of education received and possible consequences in the medium and long term. It also highlights the contribution that virtuality has given to areas such as health, where strategies are beginning to be implemented to train future professionals in medical care through technological platforms, which is considered today as teleconsultation, which is very important for patients who require medical assistance periodically for a specific pathology. Therefore, education in the healthcare area registers significant contributions from the design of different platforms created to recreate face-to-face classes remotely. However, there are also negative aspects in areas that necessarily require practice on the part of students and that virtual counseling

is not sufficient, as in surgery training, to which students have reported delays in their training process and possible complications in their future professional development.

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