Digital Transformation In The Education Sector Due To The Impact Of Covid-19

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Abstract

A documentary review was conducted on the production and publication of research papers on studying the variable Digital Transformation, Education and Covid-19. The bibliometric analysis proposed in this document aims to know the main characteristics of the volume of publications registered in the Scopus database from 2020 to 2022, achieving the identification of 464 publications in total. The information provided by this platform was organized using tables and figures, categorizing the information by Year of Publication, Country of Origin, Area of Knowledge and Type of Publication. Once these characteristics were described, the position of different authors regarding the proposed topic was referenced through qualitative analysis. Among the main findings of this research, it is found that Spain, with 49 publications, was the country with the highest global production. The area of knowledge that made the most significant contribution to the construction of bibliographic material related to the study of Digital Transformation, Education and Covid-19 was the area of Social Sciences with 253 published documents, and the type of publication that was most used during the period mentioned above was the journal article, representing 54% of the total scientific production.

Keywords: Digital Transformation, Education, COVID-19

1. Introduction

The emergence of the COVID-19 pandemic in today's world has left significant scourges of great impact on the world and affected the different aspects of life, such as health, economy and, of course, education (Orbea et al., 2021). However, unlike other health emergencies recorded throughout history, the Coronavirus or COVID-19 had a determining factor of technological development and access to information of great importance since the use of technological tools and the Internet allowed mitigating many of the problems that arose from the isolation determinations in favor of the contagion of the disease.

Education was an issue to be considered by the great leaders of the different governmental entities since confinement represented a real challenge for the different traditional teaching models that had been taught with great effectiveness for decades. Although technology has already played a fundamental role in education, in many regions of the world, access to it is still scarce due to different socio-economic and cultural factors. The truth is that the application of these technologies as teaching methods is innumerable and allows a more assertive adaptation to the imminent because of the Covid-19 (Viewnext, 2020).

However, the real challenge did not consist in establishing objectives for the implementation of these tools for the delivery of the different education programs at different levels, nor in the work of the teacher in transcending to more modernized means to apply their methods, but in the immediacy demanded by the reality of the pandemic in its state of a health emergency (Rodríguez et al., 2021). Therefore, this problem had to be solved under a generalized uncertainty and in the framework of an unprecedented reality that would give a starting line for beginning policies within educational institutions worldwide to mitigate the risks and cover the failures derived from this nature.

The joint help of all social actors was required under all budgets to face the problems, challenges and links presented along the way in the search for excellence and quality education.

Indeed, it is essential to review how the various educational sectors have taken on the challenge of providing their services, to analyze the efforts to address their own needs, the results of social inequality, the lack of resources in various sectors of the communities, etc. For this reason, it is important to know through bibliographic resources the measures adopted to assume the digital transformation in the education sector due to the impact of COVID-19, so a bibliometric analysis of the scientific production registered in the Scopus database during the period 2020-2022 is proposed to answer the question: How has been the production and publication of research papers related to the study of the variables Digital Transformation, education and COVID-19 during the period 2020-2022?

2. General Objective

To analyze from a bibliometric and bibliographic perspective, the production of research papers on the variable Digital Transformation in the Educational Sector during the Covid-19 pandemic indexed in the Scopus database.

Methodology

Quantitative analysis of the information provided by Scopus is performed under a bibliometric approach on the scientific production related to the study of Digital Transformation in the educational sector due to the impact of Covid-19. Likewise, it is analyzed from a qualitative perspective, examples of some research papers published in the area of the study mentioned above, from a bibliographic approach to describe the position of different authors on the proposed topic.

The search is performed through the tool provided by Scopus and the parameters referenced in Figure 1 are established.
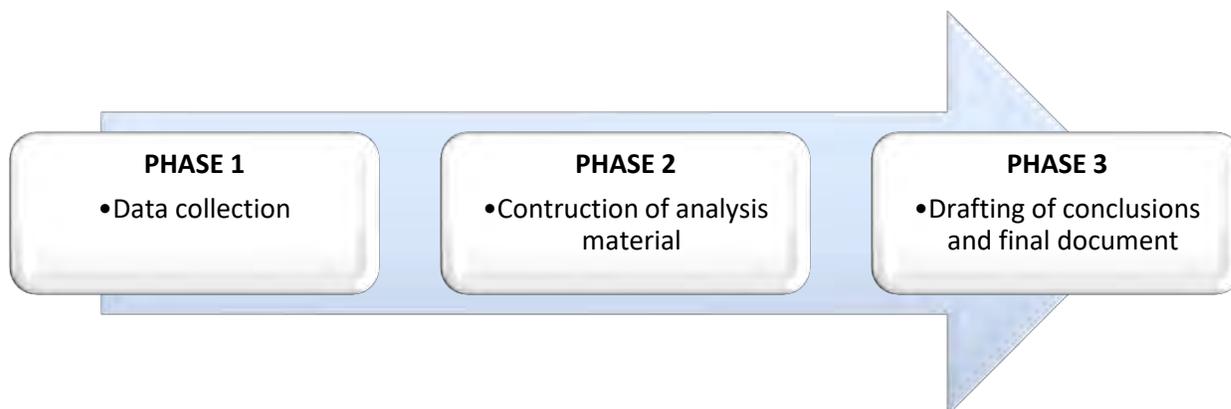
3.1 Methodological design

PHASE 1	PHASE 2	PHASE 3
•Data collection	•Contruction of analysis material	•Drafting of conclusions and final document

Figure 1. Methodological design
Source: Own elaboration

3.1.1 Phase 1: Data Collection

The data collection was carried out using the Scopus web page search tool, through which a total of 464 publications were identified. For this purpose, search filters were established consisting of:

- ✓ Published documents whose study variables are related to the study of the Digital Transformation variable in the education sector due to the impact of Covid-19.
- ✓ Without distinction of country of origin.
- ✓ Without distinction of area of knowledge.
- ✓ Without distinction of type of publication.

3.1.2 Phase 2: Construction of analysis material

The information identified in the previous phase is organized. The classification will be made through graphs, figures and tables based on data provided by Scopus.

- ✓ Word Co-occurrence.
- ✓ Year of publication
- ✓ Country of origin of the publication.
- ✓ Knowledge area.
- ✓ Type of Publication

3.1.3 Phase 3: Drafting conclusions and final document

After the analysis in the previous phase, the next step was to draft the conclusions and prepare the final document.

4. Results

4.1 Co-occurrence of words
Figure 2 shows the co-occurrence of keywords within the publications identified in the Scopus database.

Figure 2. Word co-occurrence
Source: Own elaboration (2022); based on data provided by Scopus.

Covid-19 was the most frequently used keyword in the execution of research associated with Digital Transformation in academic training processes. The Digital Transformation variable turned out to be the central axis of a subset of research related to keywords such as Higher Education, E-learning, Students, Distance Education, Online Education, Learning Systems, Digital Education, Virtual Education, among others, which indicate how the training processes in the different academic novels, were forced to migrate their teaching strategies to the exclusive use of technology to give continuity to the training of students despite the adverse moments experienced due to Covid-19 and the measures that were proposed to mitigate its impact both in terms of numbers of infections and deaths caused by the same disease. On the other hand, research has also addressed issues inherent to the physical integrity of the human being, through variables such as Human, Health Care, Pandemic, associated with words such as Telemedicine, Teleconsultation, Digital Health, show how Covid-19 even impacted the traditional systems of medical consultations in the case of students in health areas who were not only forced to receive their professional training through strategies based on the use of Information and Communication Technologies (ICT).

4.2 Distribution of scientific production by year of publication.
Figure 3 shows the distribution of scientific production according to the year of publication, considering the period from 2020 to 2022.

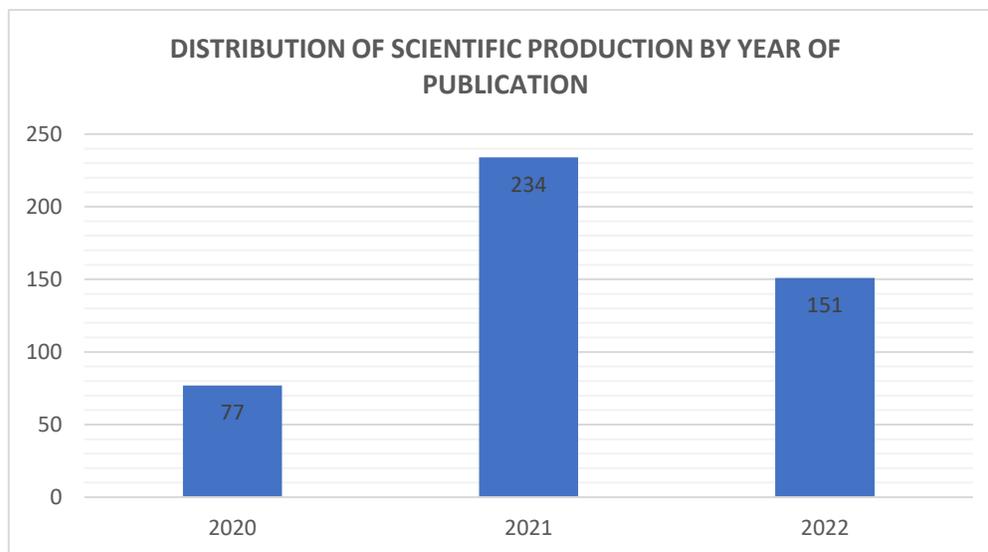**DISTRIBUTION OF SCIENTIFIC PRODUCTION BY YEAR OF PUBLICATION**

Figure 3. Distribution of scientific production by year of publication.
Source: Own elaboration (2022); based on data provided by Scopus.

The temporal delimitation of the present study adheres to the reports in Scopus of research papers framed about Covid-19. That is, the existing samples have been taken since the disease was the subject of research and publication of scientific findings in journals indexed in the same platform until those published at the date of writing this document (September 2022) in order to obtain a more general view of the positions of researchers during and after the health emergency. It can be seen in the Figure above how in the year 2020, the total production was 77 documents related to the impact of Covid-19 on education and how this caused the virtualization of academic contents to give continuity to school and professional training. By 2021, this Figure reached 234 published papers, understanding that by that time, the data could be complete and the measurement of impact could be more holistic. Finally, in 2022, 151 publications have been registered, with the last quarter of the year still to come, so the number of publications is expected to be higher than in the previous year. Among the most recent and high-impact publications is the article entitled "COVID-19 and the key lessons of digital transformation for higher education institutions in South Africa", whose objective was to investigate and identify ten key lessons of digital transformation for higher education institutions in South Africa (Mhlanga et al., 2022), whose objective was to investigate and identify ten critical digital transformation lessons from COVID-19 for South African higher education institutions. The researchers took into account the issues generated by the mandatory closure of educational institutions and the need to resort to the use of technological tools to follow the academic calendar set by educational management. One of the data of most significant impact identified by the authors narrate how a country like South Africa still has inequality gaps in terms of access to digital devices and internet connectivity, so the virtualization of academic content represents a complex problem within a large number of families who do not have access to such tools; therefore, the study urges governmental actors to invest in the generation of digital competencies in parents and students, and of course in guaranteeing access to technological resources to comply with a fundamental right such as education, in times of crisis such as the one experienced due to Covid-19.

4.3 Distribution of scientific production by country of origin.

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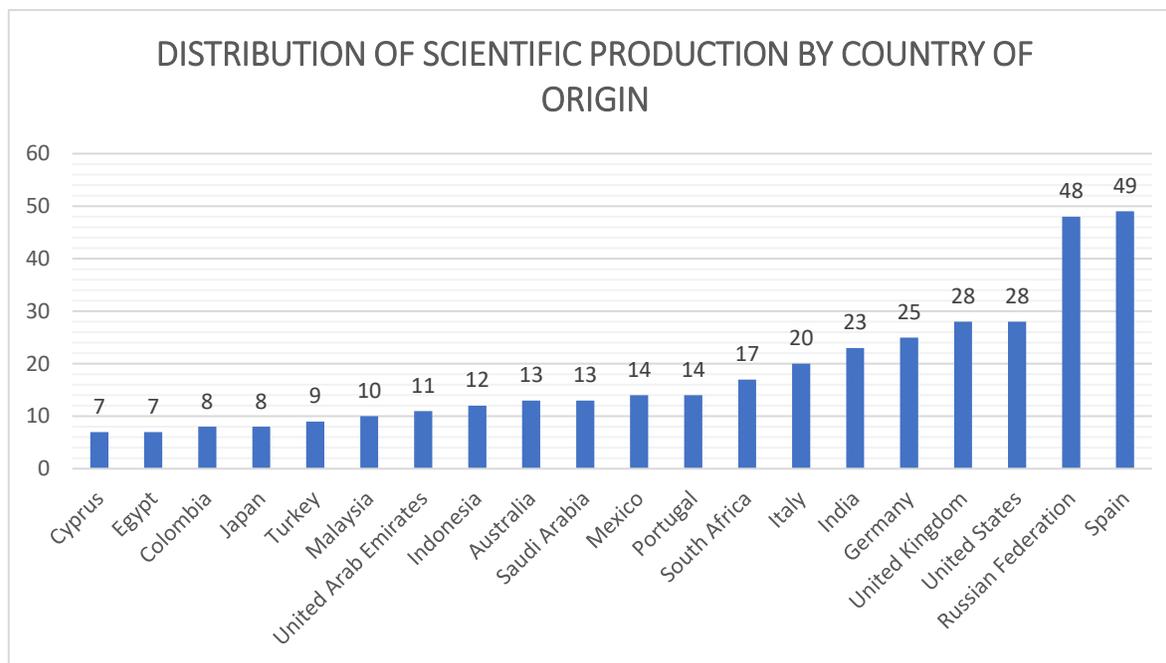

Figure 4. Distribution of scientific production by country of origin.
Source: Own elaboration (2022); based on data provided by Scopus.

Spain was the country with the highest number of publications carried out in journals indexed in Scopus related to the study of Digital Transformation in the education sector because of Covid-19 with a total of 49 publications, followed by Russia with 48 documents and the United States and the United Kingdom each with 28 publications. On the other hand, Mexico was the Latin American country with the highest number of publications registered in Scopus with a total of 14 documents, among which was the article entitled "Implementation of active learning as a digital education strategy during COVID-19" (Suarez-Escalona et al., 2022), whose purpose was to show the methodology used in a public university in northeastern Mexico for the transformation of the face-to-face modality to the digital modality based on the health contingency of COVID 19. This methodology was called Design Thinking, which consists of six steps: the presentation of the contents of the subject, the asynchronous seminar-type session for the discussion of the topics presented, the development of the integrative learning product PIA divided into advances with their respective comments. The suggested tools were the Microsoft Teams, Forms and Turnitin platforms, and the didactic strategies proposed were the inverted classroom, active learning and inquiry-based learning. The above was an excellent adaptation to the methodological changes presented by the virtualization of academic content caused by the measures imposed to reduce the number of infections and deaths due to Covid-19.

At this point, it should be noted that the production of scientific publications, when classified by country of origin, presents a particular characteristic: collaboration between authors with different

affiliations to both public and private institutions. These institutions can be from the same country or different nationalities, so the production of an article co-authored by different authors from different countries of origin allows each country to add up as a unit in the overall publications. This is best explained in Figure 5, which shows collaborative workflow from different countries.
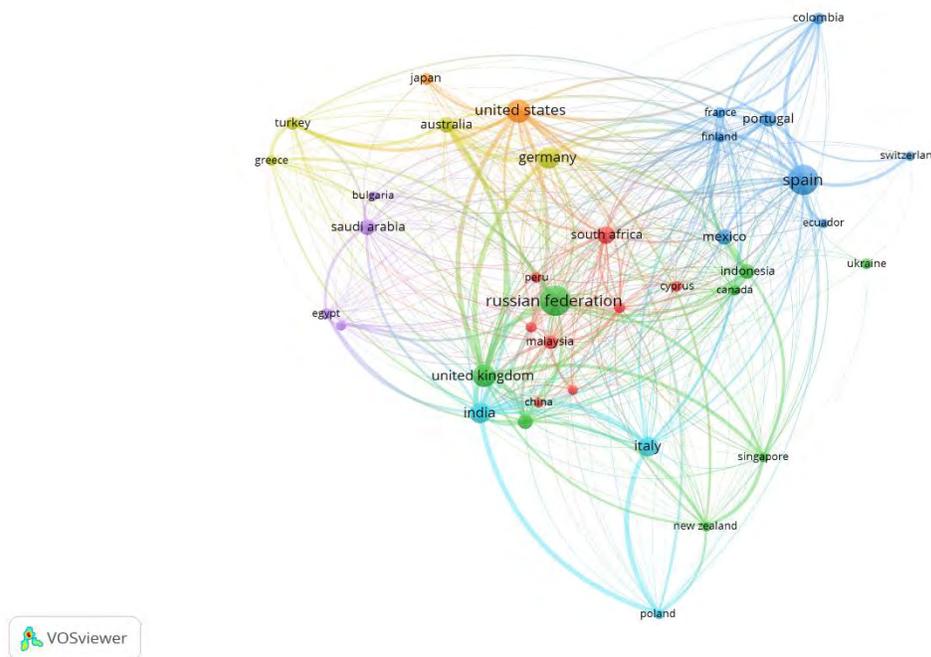

Figure 5. Co-citations between countries.
Source: Own elaboration (2022); based on data provided by Scopus.

The Figure documented above shows the interaction between authors affiliated with institutions in different countries, thus highlighting the interaction between authors from Spain and Portugal, France, Switzerland, Ecuador, Colombia, and Mexico, among others. Russia, which ranks second in the list of countries with the highest number of publications on digital transformation in the education sector due to the impact of Covid-19, shows works published in co-authorship with researchers affiliated with institutions in the United Kingdom and Singapore. Australia, Germany, Germany, Turkey and Greece also form a subset of countries that have participated in joint research. From the above, it can be inferred that due to the generality found in a variable such as Covid-19, whose scope was worldwide and whose consequences are still perceived in some economic sectors.

4.4 Distribution of scientific production by area of knowledge

Figure 6 shows how the production of scientific publications is distributed according to the area of knowledge through which the different research methodologies are executed.
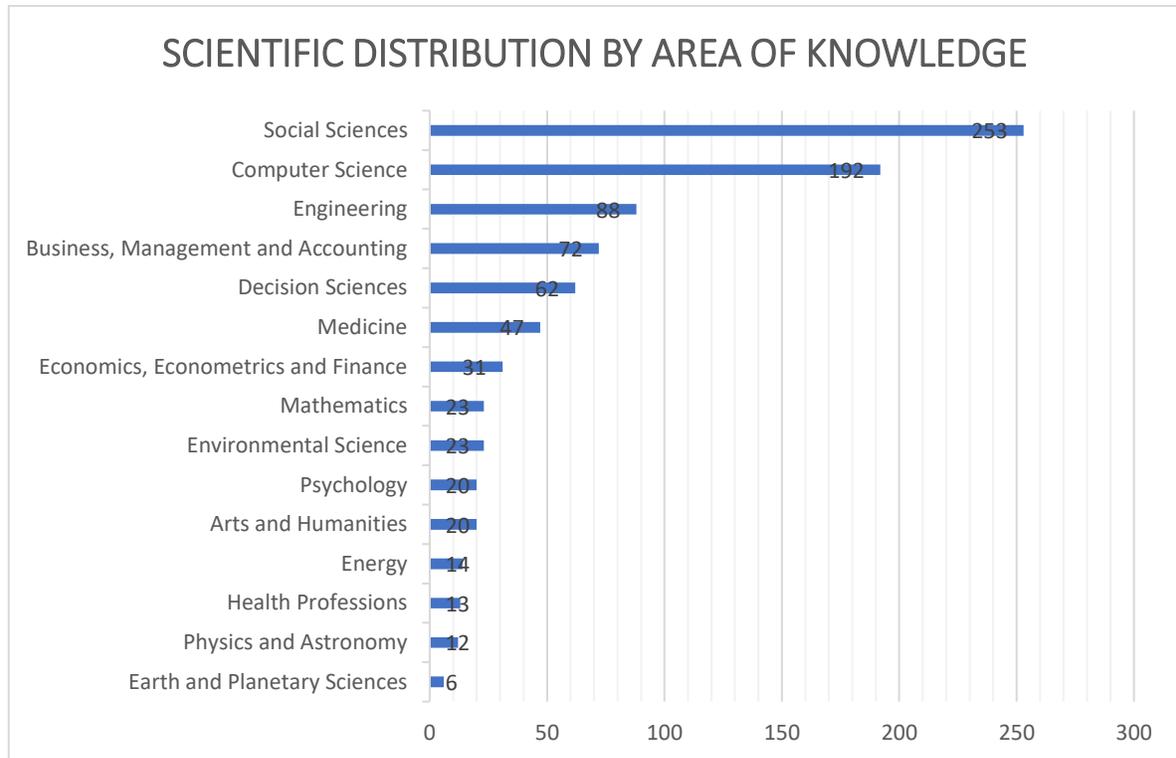
Figure 6. Distribution of scientific production by area of knowledge.
Source: Own elaboration (2022); based on data provided by Scopus.

Due to the nature defined in the interaction of the variables that seek the explanation and analysis of the response by a sector such as education to the impact generated by a health crisis of the magnitude of Covid-19, it is possible to consider that the area of knowledge that has had the most significant influence in the execution of research projects is the Social Sciences since the scope identified can be measured under the social impact that the digital transformation has generated within the educational methodologies due to the aforementioned disease. This area of knowledge allowed the publication of a total of 253 scientific publications indexed in Scopus between 2020 and the year 2022, followed by Computer Sciences that supports the study of the technological component within the digital strategies to migrate the face-to-face methodology to the virtual one and everything that involves the adaptation and virtualization of academic content in order to give continuity to the academic objectives despite the social isolation measures imposed to mitigate the impact on the transmission of the Covid-19 virus. Furthermore, within the total of 192 publications carried out based on theories inherent to Computer Science, the article entitled "Digital Transformation - New approaches and challenges in education" was identified, whose purpose was to explain the process of adaptation and virtualization of academic contents in order to give continuity to academic objectives despite the social isolation measures imposed to mitigate the impact of the Covid-19 virus transmission (Softic et al., 2022), whose purpose was to explain the process of adaptation of both teachers and students to the virtualization of academic content arising from the declaration of the pandemic because of Covid-19 and show how the digital transformation is one of the main objectives to be pursued by the academic management, not only to face moments of crisis as mentioned above but to increase the

levels of competitiveness and educational quality to meet the needs of all stakeholders related to education.

4.5 Type of publication

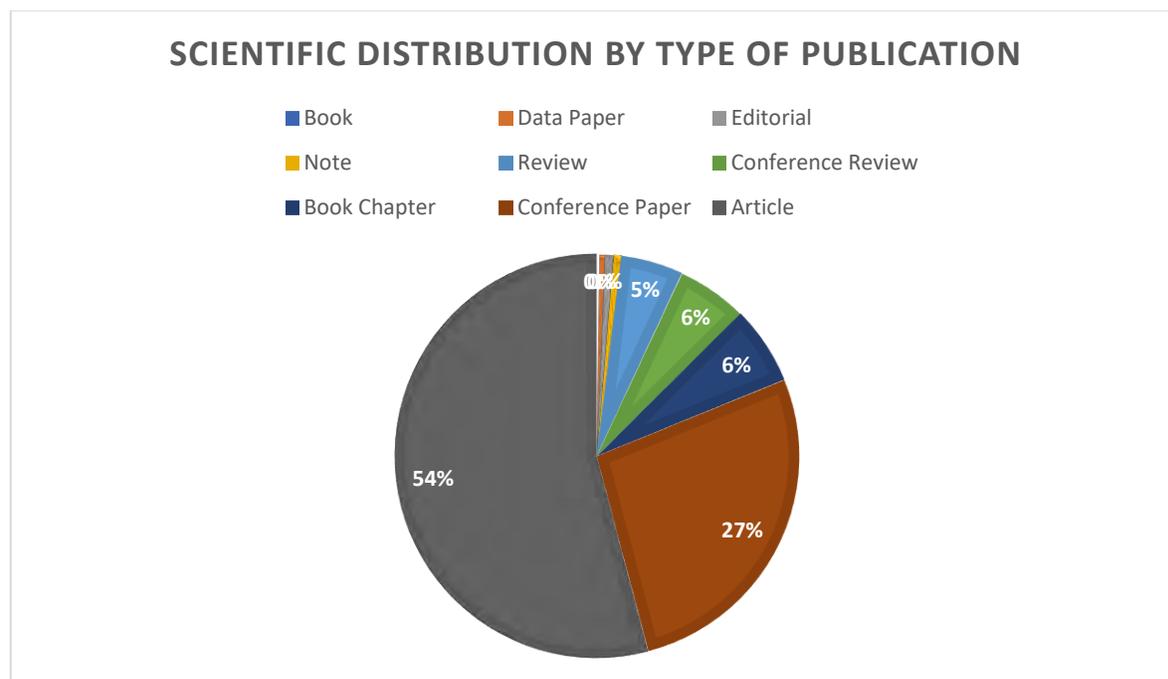Figure 7 shows how the bibliographic production is distributed according to the author's chosen publication type.

Figure 7. Type of publication
Source: Own elaboration (2022); based on data provided by Scopus.

Among the different alternatives available to researchers to disseminate their findings on education and digital transformation within the framework of Covid-19, the Journal Article with 54% was the most frequently used, followed by Conference Articles with 27%, Reviews and Book Chapters with 6% and Books with 5%. However, it is essential to consider that the conferences at the world level almost, if not all, had to be developed through synchronous or asynchronous virtual meetings since their face-to-face programming was postponed and, in some cases, canceled indefinitely in response to state ordinances that sought to promote social distancing, self-care, avoid crowds, consequences that of course, the educational sector forced the virtualization of all training strategies for as long as the health authorities considered.

5. Conclusions

Thanks to the bibliometric analysis carried out in this article, it is possible to determine that within the main characteristics in the volume of scientific production related to the study of Digital Transformation in the Education Sector by the Covid-19 Impact, the year in which the most significant number of documents published in high impact journals indexed in Scopus was 2020 with a total of 234 publications. Spain had the highest number of records published worldwide, with 49

documents managed between 2020 and 2022 (up to the date of writing this document), followed by Russia with 48. It is essential to consider that government efforts to reduce the number of infections and deaths due to Covid-19 forced multiple economic sectors, including education, to dispense with any face-to-face activities that were being carried out, which forced educational institutions to migrate their strategies to virtuality supported by the use of digital devices and Internet connectivity. The main strategies were based on the assignment of academic activities under different modalities, virtual synchronous, which is based on the simulation of the dynamics presented in a classroom, but through technical programs, and virtual asynchronous, which involved the fulfillment of academic activities without the need for virtual meetings in real-time, under the setting of schedules and deadlines. The use of technological tools to give continuity to the teaching-learning processes represented a challenge for the educational management since it required not only that students were ready to receive their classes virtually but also to keep the teaching staff updated in terms of the digital skills necessary to continue the quality educational training as it is perceived face-to-face. Aspects such as motivation and continuous training became, for the administration, one of the most critical objectives in everything related to the virtualization of content since teachers needed to have all the necessary skills to transmit confidence to their students and thus maintain the quality of training. Despite all the efforts mentioned above, many authors cited in this article agree with the identification of one of the most latent and evident problems in most countries, and that is inequality and the digital divide, a term coined to explain that hundreds of thousands of families do not have the same possibilities as others, to quickly access technological devices or connectivity to an Internet network that allows students to access virtual education as the only alternative to carry out their academic goals. Therefore, it has been suggested by the scientific community to increase governmental efforts to guarantee access to virtual education by providing these families with technological resources and the Internet, and in this way, achieve the fulfillment of one of the Fundamental Rights, such as education. Finally, this article concludes by highlighting the importance of knowing the current status of publications concerning the study of the impact of Covid-19 on educational management and digital transformation since, through this information, it is possible to generate new knowledge that supports this sector in the search for new and better alternatives to ensure access to education under any circumstances and even in support of a new global trend that speaks of the emergence of Hybrid Education that combines face-to-face strategies with virtual strategies in order to increase coverage in education.

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