Bibliometric Analysis of COVID-19 Publications in Education Between 2020 and 2022[*]

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ABSTRACT

The COVID-19 pandemic has spurred significant scholarly interest, particularly within the realm of education, prompting researchers to investigate its multifaceted impacts. Despite the global urgency, prior literature reviews have identified a scarcity of bibliographic research addressing the pandemic's effects on education. To address this gap, a meticulous literature review employing bibliometric analysis was conducted, scrutinizing 1,659 publications from the Web of Science database between 2020 and 2022. The study uncovered various characteristics of these publications, including publication type, language, contributing countries, and prevalent keywords. Notably, the United States and China emerged as the leading contributors to research on this subject during the pandemic. Furthermore, all publications predominantly comprised original articles, with Taylor and Francis being the most prolific journal in terms of publication count and citations. The key topics focused on areas like COVID-19 and its impact on education. Additionally, discussions included remote learning, online education platforms, and the psychological toll of the pandemic on both students and educators. The study explored diverse topics, such as distance learning modalities and quality of life concerns. Importantly, the study's findings offer valuable insights for educational administrators, potentially guiding future research endeavors and facilitating informed decision-making within academic institutions. These results not only highlight current trends but also suggest new areas for exploration, making this study a crucial step for continued research on education during the pandemic.

Keywords: Bibliometric analysis, content analysis, COVID-19, education, VOSviewer, Web of Science

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Introduction

COVID-19, originating in 2019, was designated as a global health emergency by the World Health Organization (WHO) in the same year. This disease has spread worldwide, leading to high rates of psychological disorders and deaths. Following the declaration of the pandemic, countries have created emergency action plans and implemented various measures to combat the outbreak. As highlighted by Korkmaz and Altuntaş (2022), this phenomenon has amplified research attention towards COVID-19. An illustrative instance of the extensive influence of the pandemic on societal domains like education includes the widespread adoption of remote learning due to the suspension of in-person classes across numerous countries during the 2019-2020 academic period. As of 2020, schools in many countries worldwide were closed for face-to-face education (Huber and Helm, 2020). Selwyn (2012) and Watson & Murin (2014) note that this period coincided with a time of new technologies and rapid digital developments in education. Therefore, advancements in the digital realm of education were already prominent before the pandemic (Gewerkschaft Erziehung and Wissenschaft, 2020).

The pandemic period has led to shifts towards new education methods (Lake and Dusseault, 2020). However, individual differences in access to educational technologies and the unfamiliarity of educators and students with distance education have initially caused confusion. Additionally, the extended break from in-person instruction has forced families to take on more responsibility for caring for their students (Harris, 2020). The educational impact of COVID-19, coupled with broader social disruption including economic hardship, unemployment, protests against racial injustice, and health threats, has led to more people dropping out of college. This creates a complex situation that makes it difficult to assess student success. As academic publications rapidly increase, staying up-to-date becomes challenging, and accessing existing knowledge and synthesizing past research becomes a complex process. Therefore, literature reviews play a critical role in advancing research fields and supporting evidence-based practices (Rousseau, 2012). Systematic literature reviews, involving both quantitative and qualitative approaches, are a common technique researchers use to examine past studies (Aria and Cuccurullo, 2017).

Bibliometrics has the potential to statistically evaluate activities in the scientific field. This methodology analyzes the production and interaction of scientific knowledge through scientific publications, citations, and other academic indicators. Thus, it enables an understanding of researchers' work, developments in scientific fields, and research trends. Bibliometric analyses provide an objective evaluation of scientific activities and offer a transparent, systematic, and replicable review process. This procedure is crucial for recognizing research that contributes to the advancement of science and for comprehending the factors affecting the spread of scientific knowledge (Broadus, 1987; Diodato, 1994; Pritchard, 1969).

Bibliometrics, as a discipline, enables the impartial assessment of scientific endeavors and offers a more objective and dependable analysis compared to alternative approaches. Alongside new knowledge and conceptual advancements, the increasing availability of data allows for various advantages, such as determining trends over time, defining research areas, monitoring interdisciplinary interactions, and identifying the most effective scientists and institutions (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021).

Examinations conducted on extensive datasets offer a more inclusive perspective on advancements within the scientific community. This constitutes a valuable instrument for grasping

the evolution of scientific knowledge and offering an outline of ongoing research endeavors (Crane, 1972). The use of bibliometric methods emerges as an important tool for identifying, understanding, and addressing issues arising in the context of a pandemic. This research emphasizes the utilization of bibliographic analysis to evaluate the worldwide repercussions of the pandemic, with a particular emphasis on articles investigating educators and the pandemic's effects on education. Bibliometric analyses conducted on published articles serve as a guide for education administrators and researchers to make informed decisions and anticipate future developments. The results of these analyses will contribute to the effective evaluation of studies on pandemics and education, as well as the development of more effective preparation and response strategies in education against pandemics.

This study delves into the significant impact of the COVID-19 pandemic on the education sector and assesses scholarly research in this field through the application of bibliographic analysis techniques. Aimed at understanding the current status and evolution of COVID-19-related publications in education, this study seeks to identify gaps in the literature and provide recommendations. It encourages academics in the education field to easily access current information on COVID-19 and stay updated on developments in this area. Additionally, it aims to reach a broader audience by summarizing the findings of existing scientific publications and raising awareness on this topic. In line with these objectives, the research question is formulated as "What is the current knowledge structure and development of publications related to education and COVID-19?"

1. What is the breakdown of research conducted from 2020 to 2022?
2. In which nations are the highest number of publications originating?
3. Which journals, publications, authors, and countries receive the most citations?
4. Which journal boasts the highest number of publications?
5. To what extent do authors and countries collaborate?
6. What are the predominant themes and concepts explored through keyword analysis in research?

Method

The bibliometric methodology employs quantitative techniques to systematically analyze bibliometric data, encompassing publications and citations. Key among these techniques is citation analysis, which examines how often articles are cited within a field to assess their impact and influence (Broadus, 1987; Pritchard, 1969). This analysis helps identify seminal works, influential authors, and prominent journals, offering insights into the dissemination and reception of research findings over time. Co-authorship analysis explores collaborative patterns among researchers, revealing networks of collaboration and the geographic distribution of scientific contributions (Huang & Chang, 2011; Talan, 2021). Additionally, co-word analysis examines relationships between terms in publications, uncovering thematic trends and the evolution of research discourse (Bağış, 2021). Together, these bibliometric techniques provide a robust framework for understanding the dynamics of scientific research, facilitating insights into research trends, collaborative networks, and emerging topics within a field.

Research Model

This research employed bibliographic analysis methods alongside document review methodology to accomplish its research objectives and address the research inquiries. Document review is particularly valuable when extensive interviews and observations are impractical. It involves a comprehensive examination of documentary sources, offering insights into the phenomenon or event under investigation. The study integrated bibliographic analysis techniques with document review methodology to provide a robust framework for analysis.

Bibliometric Analysis and Document Review

Document review is considered an important research method in cases where concrete data collection is not possible. In this context, written sources were meticulously examined to obtain and analyze the necessary data for the research objectives (Güçlü, 2014). According to Şimşir (2021), bibliometrics is a type of analysis that provides significant facilitation in identifying studies representing a particular topic. By scrutinizing the attributes of publications within a specific field, this approach unveils diverse insights concerning scientific output. These findings encompass elements like publication volume, researched topics, affiliations of contributors, and keywords (Çiftçi et al., 2016). Bibliometric research serves as an important tool for understanding developments in scientific fields and research trends. Donthu et al. (2021), Çiftçi et al. (2016), and Şimşir (2021) note that bibliometrics offers an effective way to understand the qualitative and quantitative characteristics of scientific production in a specific field. By analyzing factors influencing the dissemination of scientific knowledge, this method provides researchers with a broader perspective. Various bibliographic methods were employed in this study. Citation analysis assesses the influence of articles, authors, journals, and countries based on the number of citations received (Bağış, 2021; Erdoğan, 2021). Coauthorship analysis investigates instances where multiple authors contribute to a publication, shedding light on collaboration among authors (Huang & Chang, 2011; Talan, 2021). Conversely, co-word analysis explores relationships between terms found in titles, abstracts, or keywords of studies within a research field (Bağış, 2021). This form of analysis is specifically suited for keyword co-occurrence examination, offering deeper insights into conceptual trends and relationships within the research domain.

Data Collection/ Research material

The study utilized data sourced from the Web of Science Core Collection (WoSCC) database, encompassing pertinent publications spanning from January 1, 2020, to December 31, 2022. A literature search was conducted employing the keywords "education" (all fields), "Novel Coronavirus Infection (COVID-19)," and "Pandemic". The selection of these keywords facilitated a focused examination of the relationship between education and the pandemic. The research results indicate access to 1659 publications, including original articles indexed by the Social Science Citation Index (SSCI) between 2020 and 2022, published in English. All bibliographic data were transferred to an Excel spreadsheet from the Web of Science database. This electronic spreadsheet facilitated easier analysis of the data and served as a foundation for comprehensive bibliometric analysis of the research.

Data Analyses

This research employed two distinct methodologies to analyze the data: descriptive content analysis techniques and bibliographic content analysis. Descriptive content analysis was conducted on the Web of Science Core Collection (WoSCC) platform, followed by an in-depth examination of the gathered outcomes. This analysis aimed to uncover descriptive characteristics by examining various attributes of the publications (such as publication years, languages, most cited first publications or journals, etc.). On the other hand, bibliometric analysis was carried out using the VOSviewer software tool for mapping and visualization. In this analysis process, descriptive characteristics such as the distribution of publications by years, languages, and most cited first publications or journals were examined, and tables and figures were created based on this information. These two distinct analytical approaches facilitated a thorough organization of the study and an in-depth analysis of the acquired data. The VOSviewer software was employed to visually represent relationships and collaborative networks among publications, journals, authors, and countries. Additionally, this software was used to visualize the frequency of co-occurring terms in keywords. VOSviewer is an effective tool for visualizing the relationships and collaboration networks among publications, journals, authors, countries, and keywords, as well as the frequency of co-occurring terms in keywords.

Applied Procedures

The procedures applied in this research encompassed several critical steps. Initially, data retrieval was conducted through a systematic search of the Web of Science Core Collection (WoSCC) database, utilizing specific keywords to extract bibliographic data from January 1, 2020, to December 31, 2022. During the data processing stage, the retrieved bibliographic data were transferred into an Excel spreadsheet for preliminary analysis. The data were then organized by attributes such as publication years and languages, followed by thorough cleaning and validation to ensure accuracy and completeness. Descriptive content analysis was performed using the WoSCC platform to gain an overview of publication trends. This involved identifying key attributes, including publication volume, languages, and highly cited journals. For a more in-depth bibliometric analysis, VOSviewer was employed. This software facilitated citation analysis to pinpoint influential articles, authors, and journals; coauthorship analysis to explore collaborative patterns, and co-word analysis to investigate keyword co-occurrence and emerging conceptual trends. Visualization of the data involved creating visual maps with VOSviewer to illustrate the relationships and networks among publications, authors, and keywords. These visualizations helped provide a comprehensive understanding of the collaborative and conceptual landscapes within the research domain. During the interpretation phase, these visual maps and tables were

analyzed to derive insights into publication trends, collaboration networks, and research themes, thereby offering a deeper understanding of scientific output and its dissemination patterns. Ethical considerations throughout the research were paramount, including ensuring the accuracy and integrity of the data, respecting intellectual property rights, and properly citing all sources used in the analysis. Adhering to these ethical principles was crucial for maintaining the credibility and reliability of the research findings. Overall, these meticulous procedures ensured a thorough and systematic examination of the bibliometric data, enabling the study to effectively achieve its research objectives.

Ethics committee approval process

Since this study involves bibliometric analysis, ethical committee approval was not required. Bibliometric studies are conducted through the systematic analysis of existing literature and publications, and do not entail direct research involving human or animal subjects. Consequently, ethical committee approval is typically not necessary for such studies (Aria & Cuccurullo, 2017).

Results

Descriptive Results

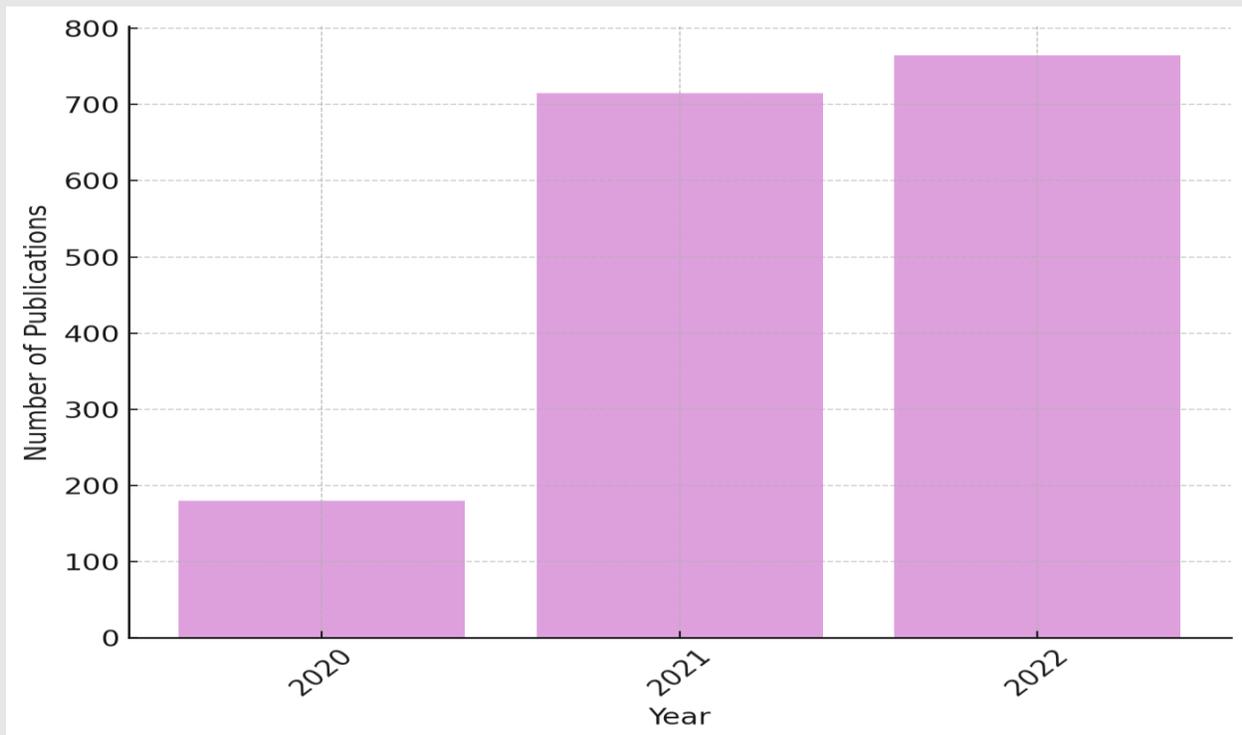Figure 1. Publication graph by years (Source: VOS Viewer)

This figure illustrates the distribution of relevant publications across different years within the Web of Science Core Collection platform. Accordingly, there were 180, 715, and 764 publications in 2020, 2021, and 2022 respectively, totaling 1659 original articles written in English. The number of publications has increased since 2020.
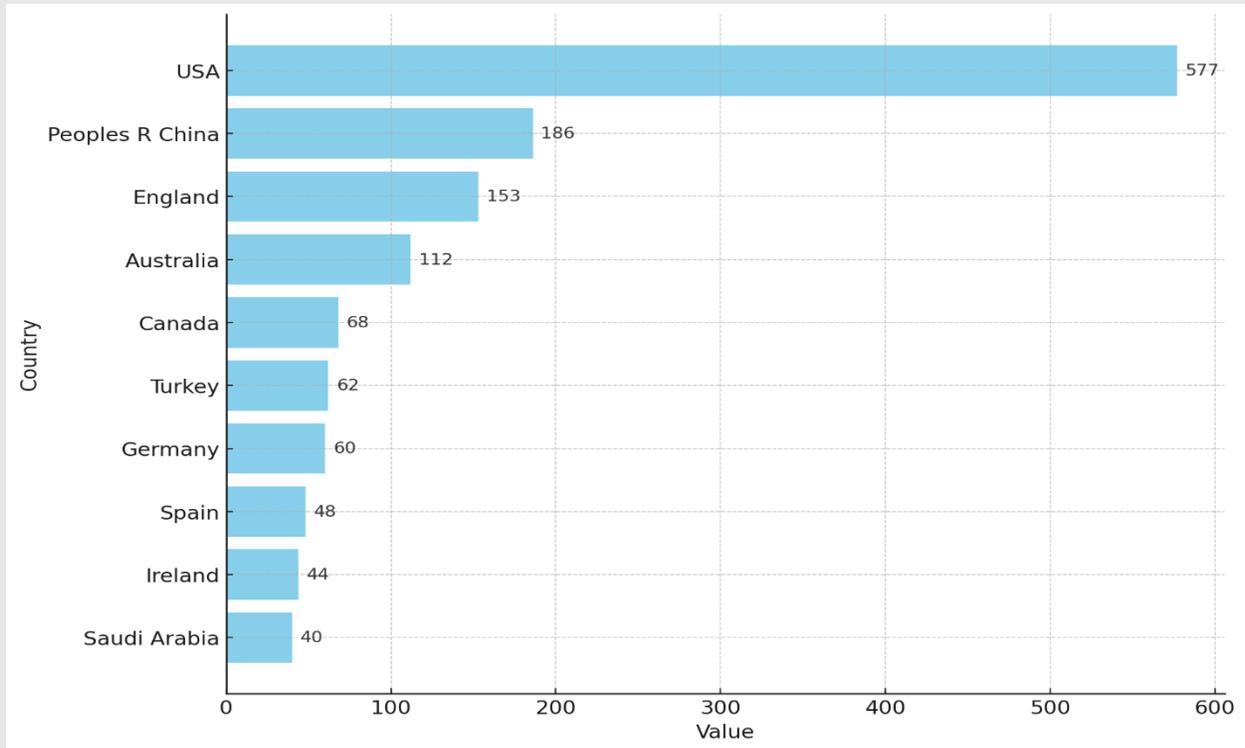
The Global Perspective on Publications

Figure 2. Universal publication graph (Source: VOS Viewer)

The analysis in the graph focuses on the top 10 countries in terms of studies conducted on education during the pandemic. According to this analysis, the United States ranks first with 577 publications, followed by China with 186 publications. The United Kingdom ranks third with 153 publications, while Australia has 112 publications. Canada follows with 68 publications, and Turkey with 62 publications. During the specified period, the United States recorded the highest number of COVID-19 cases at 45,406,263, followed by India with 34,175,468 cases and Brazil with 21,723,559 cases (News Google, 2021). These statistics highlight significant disparities between the number of publications on COVID-19 in education and the reported cases of the pandemic across different countries.

The Bibliometric View of the Data

The citation view of publications by author, journal, and country

Table 1. Table of publications with the most citations

Number	Title	Author(s)-Year	Journal	Total Citation
1.	Adapting to online teaching during COVID-19 school closure: teacher education and teacher competence effects among early career teachers in Germany	(Konig, J; Jager-Biela, DJ and Glutsch, N,2020)	European Journal Of Teacher Education	338
2.	Projecting the Potential Impact of COVID-19 School Closures on Academic Achievement	(Kuhfeld, M; Soland, J; (...); Liu, J,2020)	Educational Researcher	303
3.	COVID-19 and digital disruption in UK universities: afflictions and affordances of emergency online migration	(Watermeyer, R; Crick, T; (...); Goodall, J, 2021)	Higher Education	303
4.	Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic	Almaiah, MA; Al-Khasawneh, A and Althunibat, A,2020)	Education And Information Technologies	302
5.	The sudden transition to synchronized online learning during the COVID-19 pandemic in Saudi Arabia: a qualitative study exploring medical students' perspectives	(Khalil, R; Mansour, AE; (...); Al-Wutayd, O, ,2020)	Bmc Medical Education	245
6.	Distance learning in clinical medical education amid COVID-19 pandemic in Jordan: current situation, challenges, and perspectives	(. Al-Balas, M; Al-Balas, HI; (...); Al-Balas, B,2020)	Education And Information Technologies	219
7.	The impact of the COVID-19 pandemic on final year medical students in the United Kingdom: a national survey	Choi, B; Jegatheeswaran, L; (...); Mutengesa, E,2020)	Bmc Medical Education	192
8.	COVID-19 and schooling: evaluation, assessment, and accountability in times of crises-reacting quickly to explore key issues for policy, practice, and research with the school barometer	(Huber, SG and Helm, C, 2020)	Educational Assessment Evaluation And Accountability	145
9.	Adaptations to a face-to-face initial teacher education course 'forced' online due to the COVID-19 pandemic	(Moorhouse, BL.,2020)	Journal Of Education For Teaching	144
10.	Factors Contributing to Teacher Burnout During COVID-19	(Pressley, T,2021)	Educational Researcher	142

The table includes two articles with the same number of citations.

The bibliographic analysis commenced with the citation evaluation of publications obtained through the Web of Science Core Collection (WoSCC) platform. Table 1 presents the articles with the most citations in priority order. Out of 1659 publications, 71 of them received at least 40 citations or more. At the top of the list is the study titled "Adapting Online Teaching During School Closure Due to COVID-19: Early Career Teachers' Experiences in Germany" (König et al., 2020; 338 citations). In the second place, there are two articles: "Projecting the Potential Impact of COVID-19 School Closures on Academic Achievement" (Kuhfeld et al., 2020; 303 citations) and (Watermeyer et al., 2021; 303 citations).
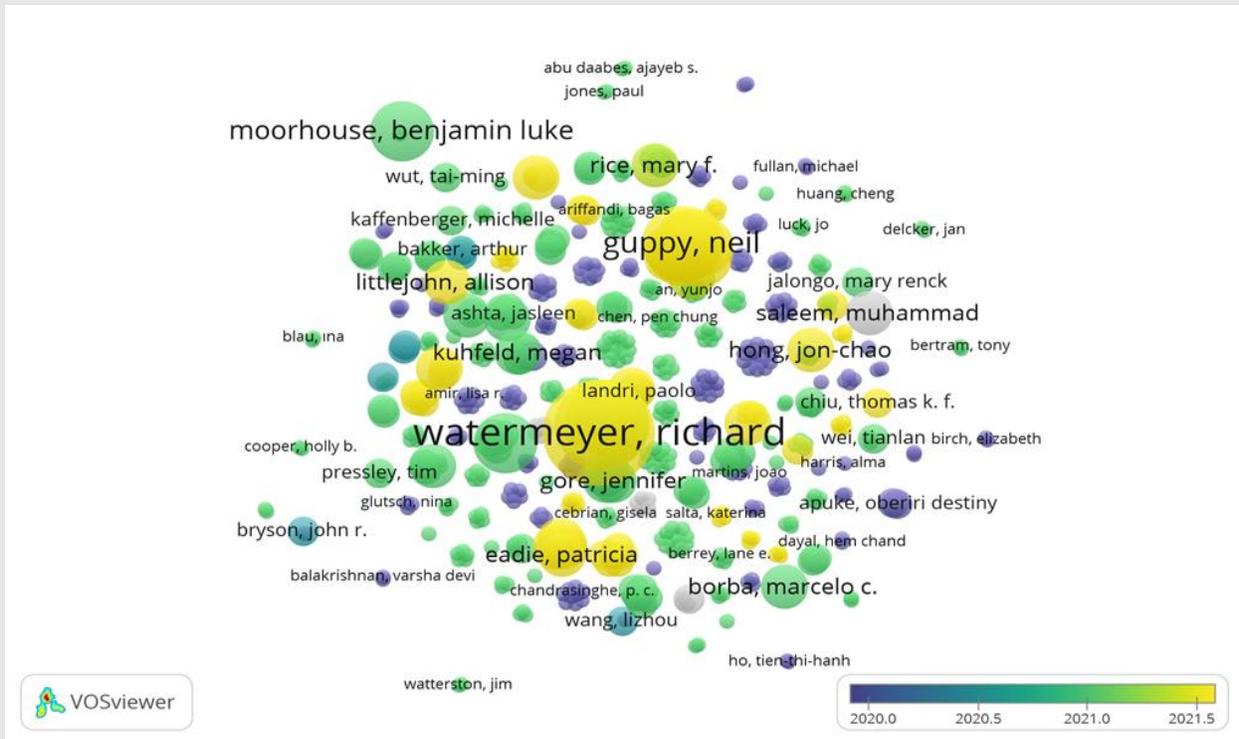

Figure 3. Network graph of researchers with the most citations

The related visual depicts a network graph of authors with the most citations. Out of the set of 5959 authors, 640 with 20 or more citations have been examined. Each distinct cluster is represented by its color. Larger and more prominent clusters belong to authors with higher citation counts. Clusters in yellow and green represent authors with a significant number of citations. Additionally, the legend in the bottom right corner indicates the colors according to the years and periods of publication by the authors. The author with the most citations is identified in the central circle, including names such as Watermayer, Richard, Guppy, Neil, Eadie, Patricia, and Thomas K.F. It is observed that these authors were predominantly published in 2021.

Table 2. Most prolific prestigious journals

Name	Number of publications
Taylor and Francis	642
Springer Nature	504
Sage	143
Wiley	113
Elsevier	96
Emerald Group	34
Oxford University Press	20
Athabasca Univ Press	11
Amer Physical Soc	8
Guilford Publications	7

Source: VOS Viewer

This table presents prominent journals with the highest volume of publications. Among the 10 specialized journals listed, 1,659 articles were published across various domains. Notably, Taylor and Francis lead with 642 publications, establishing itself as the most prolific journal in the field. Following closely, Springer Nature secures the second position with 504 publications, while Sage ranks third with 143 publications according to Table 2.

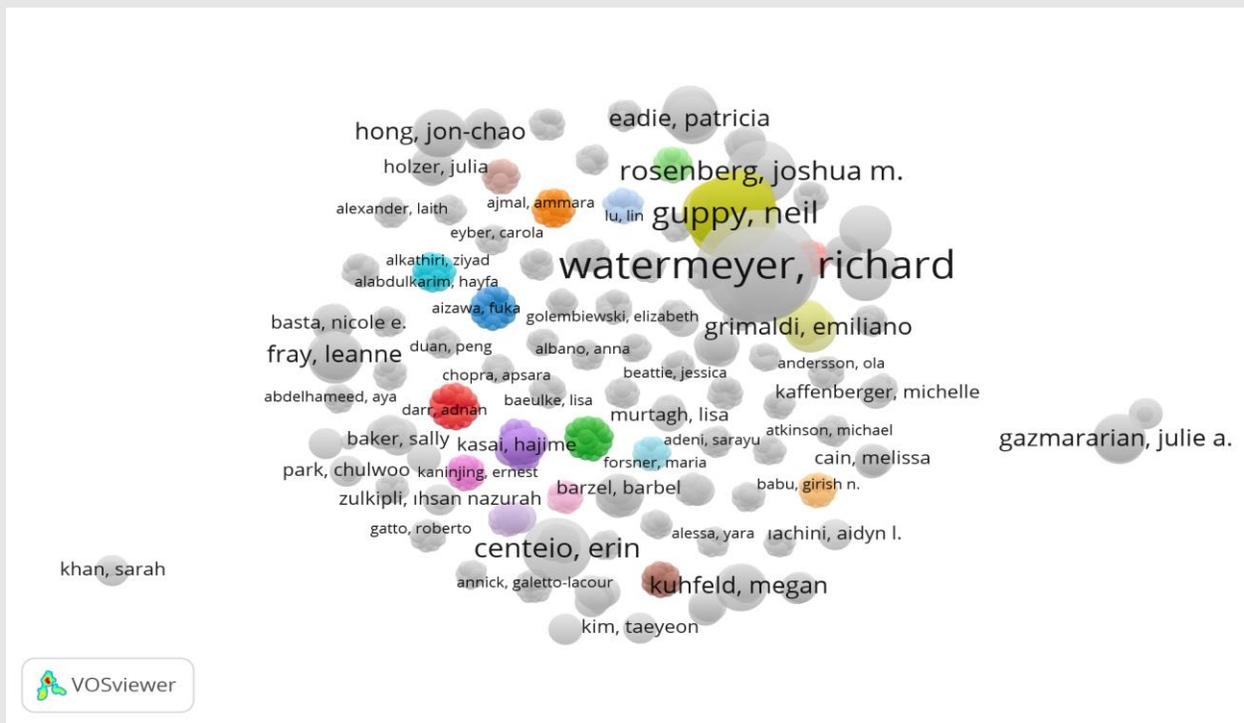**Analysis of Collaborative Work by Authors and Countries**

Figure 4. Collaborative authorship table graph

Figure 4 displays the graph obtained from the VOSviewer application, showing collaborative authors and citation networks among them. Out of 5959 authors, 640 authors with at least 20 citations were selected. Networks with the highest collaboration and denser publications

are represented by larger and denser circle networks of the same color. In Figure 4, larger circles represent more publications, while smaller circles represent fewer publications. In this context, it can be stated that authors in the particularly gray-colored cluster have more publication and authorship collaborations.
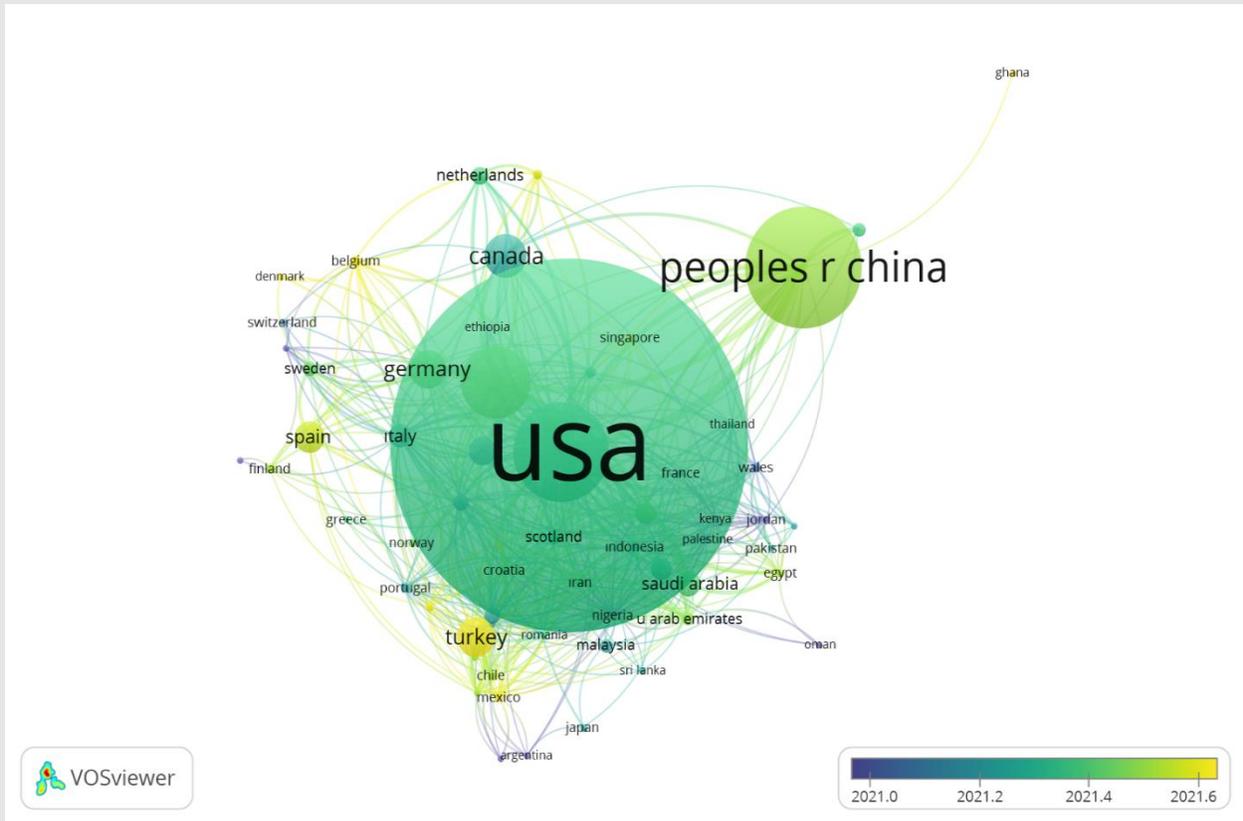

Figure 5. Citation status and relationships among countries graph

Figure 5 depicts a network graph illustrating the citation performance of each country based on the number of papers published. Notably, 62 out of 110 countries have contributed five or more papers. The United States emerges as the leading country in terms of publication citations, followed by China, Germany, Turkey, and Canada. The graph showcases clusters of various colors, indicating connections between countries in terms of publications. This highlights a robust publishing network particularly evident among countries such as the United States, Canada, the Netherlands, Italy, and Germany within the same cluster. Essentially, Figure 5 serves as a network diagram illustrating the collaborative and co-authorship analysis between countries concerning educational research during the pandemic. These clusters of different colors signify the proximity between nations, reflecting enhanced cooperation and communication within the field. Moreover, countries with the highest citation rates are represented by larger clusters compared to others. In this context, countries such as the United States, China, Germany, Turkey, and Canada are among those with higher citation rates. While closer and deeper collaborations are observed between China, Thailand, Singapore, and Wales, similar collaborations exist between the United States, Canada, the Netherlands, and New Zealand. Similarly, closer and tighter collaborations are observed among countries such as Turkey, Greece, Finland, Norway, Brazil, and Portugal. It is noticeable that publications from these countries were particularly concentrated in the year 2021.
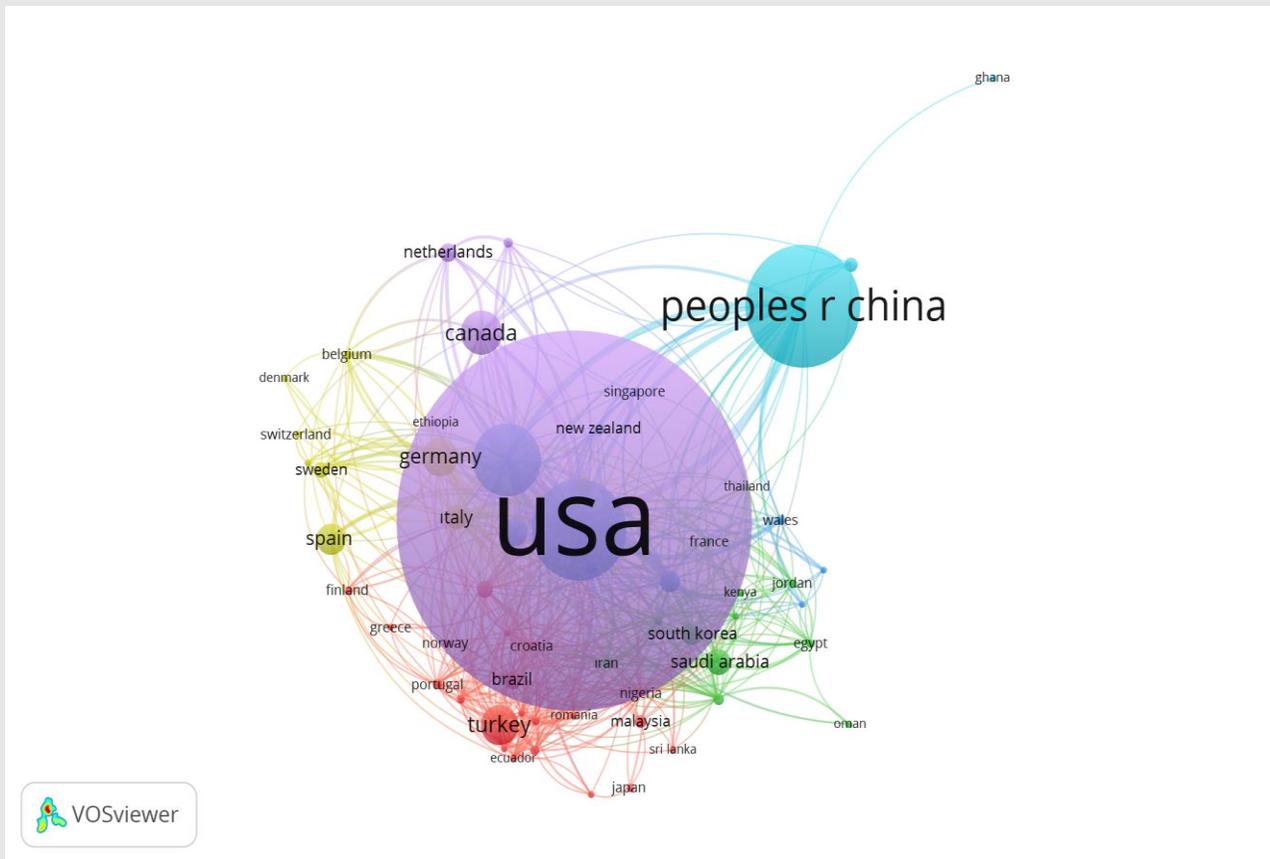
Figure 6. International collaboration network graph

The graph in Figure 6 illustrates the density of international collaboration networks obtained from the VOSviewer application. A total of 60 countries with at least 5 studies and at least 20 citations are represented in the graph. Networks between the countries with the highest collaboration are depicted as larger and denser. Hence, stronger and deeper collaboration is observed among China, Thailand, Singapore, and Wales, while a similar level of collaboration exists among the United States, Canada, the Netherlands, and New Zealand. Similarly, closer and tighter collaboration is observed among countries like Turkey, Greece, Finland, Norway, Brazil, and Portugal.

Figure 7. Network graph of keywords

Figure 7 illustrates the density of the keyword network based on co-occurrences, along with word clouds generated using the VOSviewer application. This diagram provides insights into the most frequently used keywords and their interrelationships. The size of each circle denotes the prominence of the respective keyword, with the purple region indicating the current topic. The proximity of words within the graph signifies their co-occurrence within studies, while lines connecting words indicate their association within the same study. Keywords appearing at least five times were included in the analysis. Notably, the central position of the term " COVID-19" underscores its prevalence as the most frequently used keyword. Other notable keywords include "online learning," "quarantine," "pandemic," and "digital literacy," among others, which are analyzed alongside other clusters. Current topics encompass areas such as "Online Learning," "Adapting to the Process," "Impact on Teachers and Students," "Impact of Closure on Academic Achievement," "Digital Disruption," "Online Transition," and "Opportunities," among others. Noteworthy topics include "Challenges in distance education" and "The impact of COVID-19 on teacher burnout." Additionally, a word cloud was generated to visualize the frequency of synonym usage, with the central placement of " COVID-19" indicating its high frequency of occurrence.

Discussion, Conclusion, and Suggestions

Due to the sudden emergence and swift worldwide dissemination of the COVID-19 pandemic, researchers across various disciplines, including education, have undertaken numerous studies to examine its impact on the field of education (Gewerkschaft Erziehung and Wissenschaft, 2020). As the pandemic escalated starting in the year 2020, the number of publications has steadily increased. It is evident that more research was conducted in this field in the years 2021 and 2022 (Huber and Helm, 2020). Researchers have shown particular interest in topics such as the COVID-19 pandemic, online learning, quarantine, and digital literacy (Balaman and Tiryaki, 2021). As the pandemic prolonged and its impact intensified, scholars in the field of education embarked on research endeavors to analyze the effects. In this context, it is understood that research in the field of education has continued to increase between 2020 and 2022 (Kuhfeld, M., Soland, J., Tarasawa, B., Johnson, A., Ruzek, E., & Liu, J. (2020). Erdoğan (2021) emphasizes that the most common publications of countries, authors, or journals provide valuable information about their productivity. The United States leads in terms of publications regarding the pandemic's impact on education, followed by China (UNESCO, 2021; Huber & Helm, 2020; Lake & Dusseault, 2020; National Science Board, 2022). The heightened volume of publications from these nations could stem from their heightened vulnerability to the pandemic's effects. The extensive morbidity and mortality rates witnessed in the United States during the pandemic are also reflected in scientific research (World Health Organization [WHO], 2020; National Science Board, 2022). For instance, by October 2021, the United States had reported 45,406,263 confirmed COVID-19 cases and 735,964 deaths, making it the most severely affected country at that time (CDC, 2021; WHO, 2021). According to the World Health Organization's data as of February 16, 2024, there have been 103,436,829 confirmed cases globally, resulting in 1,144,877 deaths (WHO, 2024). This situation may explain the higher volume of research conducted in countries with acute case and mortality rates. Moreover, the substantial budget allocation for research and development (R&D) in countries like the United States and China, coupled with their capacity for innovation and technological advancement, influences the volume of research produced in these countries (National Science Board, 2022; Gewerkschaft Erziehung und Wissenschaft [GEW], 2020)

Citation analysis offers valuable insights into the most renowned and frequently referenced research findings, authors, and publishing institutions. Hence, our study prioritizes the examination of the most frequently cited publications (Garfield, 1972; Van Raan, 2005; Waltman & Van Eck, 2012). Accordingly, the most cited publication on the subject of pandemics and education is the study conducted by Konig et al. (2020). This research delved into teachers' perspectives on distance learning activities during the period of class suspension due to the pandemic (Reimers & Schleicher, 2020; Bao, 2020; Hodges et al., 2020). Another notable study by Kuhfeld et al. (2020) explored the impact of school closures on academic performance. Additionally, a study by Watermayer et al. on managing digital disruption, challenges, and opportunities during the pandemic emerged as a highly cited topic. Based on the findings of citation analysis, several authors have garnered significant attention for their contributions to education-related research on the pandemic, including Watermayer, Richard, Guppy, Neil, Eadie, Patricia, Zhongchao, and Thomas K.F. These studies generally address the significant changes brought about by the pandemic, which forced schools to close and transition to distance learning activities, presenting various challenges alongside opportunities (Al Lily et al., 2020). For example, they discuss the significant functional impairment and discomfort experienced by academics due to the transition to online platforms (Tondeur et al., 2023; Kop, 2011).

They also emphasize that the transition poses significant challenges in terms of student enrollment, market sustainability, the academic workforce market, and local economies (Watermayer et al., 2021). In terms of both citations and publications, Taylor & Francis leads among the journals where the papers are published, with Springer Nature following closely behind. These journals are prestigious publications indexed in the SSCI, known for their high citation and publication rates. It is believed that the analysis of these journals will contribute to raising awareness among researchers about the implications of the pandemic on education.

Consequently, the journal analysis is expected to guide our study in new research directions. Given the global scale of the COVID-19 pandemic and its widespread impact, collaboration between countries is vital (World Health Organization, 2020; Rosenbaum, 2020; Kupferschmidt & Cohen, 2020). In this context, collaborative research conducted and to be conducted is crucial in overcoming the challenges. Joint authorship analysis shows that authors from China, the United States, the Netherlands, Turkey, Brazil, Canada, and New Zealand have engaged in the most intensive collaborations with other countries. Global collaboration in educational research related to the pandemic is valuable. The topics that educational researchers focused on during this period can be understood through keyword analysis (Otte & Rousseau, 2002; Martín-Martín et al., 2018). According to the keyword analysis, education researchers initially concentrated on the core impacts of the COVID-19 pandemic (e.g., COVID-19, online learning, quarantine, pandemic, digital literacy, etc.) (Rasmitadila et al., 2020; Viner et al., 2020). Subsequently, attention shifted towards examining its psychosocial effects during the pandemic (such as adapting to online learning, the impact of closures, digital disruption, opportunities, teacher burnout, etc.) (Fegert et al., 2020; Kwok et al., 2020). These results are consistent with findings in the existing literature. The advancements in remote learning applications and digital literacy, among other topics, indicate that researchers likely focused on other aspects of the pandemic as well (Yılmaz and Toker, 2022; Doğan and Birişçi, 2022). The results we obtained will shed light on different themes and current issues for researchers, guiding for new and much-needed bibliometric education research. Although this analysis evaluates the research conducted on education during the pandemic through bibliometric methods, there may be some limitations. This analysis represents only a specific aspect of academic discourse. The study solely relied on the Web of Science database and did not incorporate other databases like Scopus, which could be a consideration for future research endeavors. Moreover, the sample exclusively encompasses original articles, excluding other types such as conference papers and editorials from the analysis. Despite these limitations, this study offers a comprehensive evaluation of global educational research about COVID-19, presenting a range of insights and features. For instance, it is believed that identifying the topics focused on in published research, will guide education researchers and encourage them to explore yet unexplored topics during and after the pandemic. Moreover, it assists education researchers in gaining awareness about countries open to collaboration and facilitates the establishment of new collaborations.

The results enable education researchers to assess their journal and publication performance and select research topics. Additionally, this study can pave the way for more comprehensive studies involving different databases such as PubMed and Scopus, thereby laying the groundwork for advanced research. The findings can help education administrators identify and clarify issues related to COVID-19 to be investigated in their institutions (Owusu-Fordjour et al., 2020). Furthermore, they can guide in selecting appropriate journals, identifying suitable countries for collaboration, and obtaining information on studies related to the subject. This study stands out by offering valuable insight into countries' research and publication performance in

education and COVID-19. It can motivate researchers to conduct more research on pandemic education globally, thereby positively contributing to publication performance, both worldwide and on a country-specific basis (Kostoff, 2007; Gargouri et al., 2010).

The comprehensive bibliometric analysis conducted on education-related research during the COVID-19 pandemic has unveiled critical insights into the evolving landscape of scholarly discourse (González-Padilla & Tortolero-Blanco, 2020; UNESCO, 2020). As education systems globally continue to navigate the challenges posed by the pandemic, policymakers are urged to implement evidence-based strategies to address emerging issues and facilitate educational resilience. To this end, it is recommended that policymakers prioritize the following initiatives: Enhancing Digital Infrastructure: Policymakers should invest in robust digital infrastructure and technological resources to support online learning platforms and ensure equitable access to education during periods of disruption (Organisation for Economic Co-operation and Development, 2020; Selwyn et al., 2020). Supporting Educator Well-being: Measures should be implemented to prioritize the well-being of educators, including providing adequate support for professional development, mental health resources, and workload management strategies (Hargreaves & Fullan, 2015; Maslach & Leiter, 2016). Promoting Research Collaboration: Encouraging international collaboration among researchers and educational institutions can foster knowledge exchange, innovation, and the development of best practices in pandemic education response (Galea et al., 2020; Viner et al., 2020). Addressing Equity Concerns: Policymakers should address equity concerns by implementing policies that mitigate disparities in access to education technology and resources among vulnerable populations (UNESCO, 2020; García & Weiss, 2020). Strengthening Health and Safety Protocols: Collaborative efforts should be made to strengthen health and safety protocols in educational settings, ensuring the well-being of students, educators, and staff. These recommendations aim to inform policymaking efforts and guide future research initiatives aimed at addressing the multifaceted impacts of the COVID-19 pandemic on education (Fitzpatrick et al., 2020; Lau et al., 2010). Moreover, to enrich the scholarly discourse on this topic, it is essential to expand the reference base by incorporating a wider range of relevant studies and publications. By leveraging additional references, researchers can provide a more comprehensive analysis and strengthen the theoretical underpinnings of their findings.

Conflicts of Interest

There is no conflict of interest between authors.

Ethics

Since this study involves bibliometric analysis, ethical committee approval was not required. Bibliometric studies are conducted through analyses of existing literature and publications, and do not involve direct research on human or animal subjects. Therefore, ethical committee approval is not necessary for such studies (Aria & Cuccurullo, 2017).

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