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Research Article

Mapping Global Research on Early Childhood Special Education: A Bibliometric Analysis

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Abstract: Early childhood special education is a scientific field that is gaining worldwide attention. This study uses bibliometric and social network analysis methods to analyze early childhood special education research published in international journals. Therefore, the articles in the WoS database were accessed. WoS is a database of the most prestigious journals indexed SSCI, SCI-Expanded, AHCI, and ESCI. A total of 2051 articles meeting the determined criteria were included in the research. We used the VoSviewer software to perform the analyses and then interpreted the results. According to the research findings, the number of works published in the related field has increased significantly. The Journal of Autism and Developmental Disorders has emerged as the most prolific publisher of articles on this topic. The United States stands out as the most productive country. Dawson, G. is the most effective and cited author. The most frequently used word in the studies examined was autism. It appears that political developments in the field of early childhood special education may contribute to this increase. In addition, the analysis revealed that a certain number of leading countries and researchers have made significant contributions to the field. İnfluential journals in the field of early childhood special education studies, it is noted, focus on special education.

Keywords: Early Childhood, Special Education, Bibliometric Analysis

1. Introduction

Early childhood special education research has an essential place in the scientific literature of the 21st century (Odom & Wolery, 2003). Based on the theoretical foundations of special education and preschool education, this field draws from numerous disciplines, including psychology, social services, child development, sociology, pediatrics, and the health sciences. Therefore, although research on early childhood special education does not have a long history, it has made progress in a short period and gained a prominent position in the scientific literature regarding quantity and quality (McLean et al., 2016; Safford et al., 1994). In recent years, we have observed an increased use of early childhood special education, particularly in policy and scientific research discourses. This shift reflects how many nations adopted the concept of early childhood special education in their social, health, and education policies during the 20th century (McLean et al., 2016; McWilliam, 2016).

The period between the ages of 0 and 6 encompasses early childhood, which is crucial to an individual's development. In addition, the pertinent literature indicates that the age range in early childhood special education practices spans 0 to 8 years (Bowe, 2007; Dunlap, 2005). Early childhood special education, on the other hand, refers to all services provided to children with developmental disabilities or disadvantages at this age and their families. Early childhood intervention focuses on factors influencing an infant's overall biological, social, and academic abilities. The primary objective of early childhood intervention is to provide services that mitigate the adverse effects of the situation faced by young children with special needs who are at risk in terms of development and family stability. In the service delivery procedure, steps are taken to ascertain the situation, evaluate it, and provide suitable services (Oser & Cohen, 2003).

While other countries' legislation presents different classifications, early childhood special education is defined as an umbrella concept that includes early intervention for children aged 0-36 months and preschool special education services for those aged 36-72 months (Dunst & Espe-Sherwindt, 2016). This classification appears in direct practices, especially in the United States (Odom & Wolery, 2003). Two

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federal programs were outlined in 2004. Individuals with Disabilities Education Act provides services and support to individuals with special needs. Part B includes regulations concerning formula grants, which aid states in delivering a free, adequate public education in the least restrictive environment for children with impairments aged three to 21. Part C of the Individuals with Disabilities Education Act covers services for children birth to three years of age (2004). Providers commonly deliver these services, known as Early Intervention (EI), in homes or childcare settings, focusing on a family-centered approach (Bruder, 2016). The primary objective of EI services is to equip families with intervention and development support skills for children with disabilities (McWilliam, 2016). The three-year-old transition from Part C to Part B services (Individuals with Disabilities Education Act 2004). We commonly refer to this phase as Early Childhood Special Education (ECSE), and programming shifts from a family- and home-centered to a child- and school-centered system (Bruder, 2016).

Policymakers have also been affected by the shift in perspective and approach toward individuals with special needs, particularly during the middle of the 20th century. This has led to the establishment of crucial legal regulations. Examining the scientific studies reveals that there has been a significant increase in scientific studies since the enactment of legislation in the relevant field (Odom & Wolery, 2003). When analyzing the historical development of early childhood special education, the political, economic, and scientific conditions of the period during the developmental stages are highlighted.

Although early childhood special education has an interdisciplinary feature, it also has a dynamic structure that constantly renews itself (Guralnick, 2005). Due to this, it represents a significant advancement in scientific writing at the end of the 21st century. Today, both political and scientific interest in the field is burgeoning. Therefore, it takes more and more time and effort for researchers to access relevant studies in this field. Determining what kind of progress has been made in the literature and what scientific trends are can help provide readers and stakeholders with perspective and insight into the field's developments. Although early childhood special education has an interdisciplinary feature, it also has a dynamic structure that constantly renews itself (Guralnick, 2005). Due to this, it represents a significant advancement in scientific writing at the end of the 21st century. Today, both political and scientific interest in the field is burgeoning. Therefore, it takes more and more time and effort for researchers to access relevant studies in this field. Evaluating the advancements achieved by the literature and what scientific trends are can help provide readers and stakeholders with perspective and insight into the field's developments. From this perspective, it can be said that the current study will provide a significant competitive advantage to researchers, institutions, and countries by accessing accurate information promptly. Recently, interest in early childhood special education research has grown exponentially. As statistical findings have accumulated, academics have analyzed and summarized the published papers to give researchers, educators, and policymakers an overview of the field's present status and developments. To date, researchers have mostly explored this topic through literature reviews and content analysis of scholarly publications. These analyses examine and characterize the conceptual frameworks, theoretical perspectives, and paradigms underlying early childhood special education literature. Numerous authors interested in the field have provided extensive reviews in various ways, such as meta-analysis and systematic review, in studies that conceptualize early childhood special education areas, discuss their different dimensions, and attempt to identify effective practices (e.g., Banerjee et al., 2018; Bonuck et al., 2011; Gül-Olcay & Diken, 2009; Öncül, 2014; Sender & Sheehan, 1983; Yıldırım & Akçamete, 2014; Virués-Ortega, 2010). Such systematic literature reviews, meta-analyses, meta-synthesis studies, and content analysis compilations have undoubtedly significantly contributed to the field. However, due to the nature of these methods, studies involving them necessitate substantial investments of time and resources, resulting in a limited number of publications to be reviewed. In addition, the interpretation of the studied information is highly subjective, limiting the generalizability of these studies' findings. Bibliometric studies offer an alternative to systematic literature research and content analysis by increasing the number of studies

that researchers can examine while reducing the time and effort needed for data processing (Hernández-Torrano, 2020). Bibliometric studies employ coded bibliographic data from databases to map and identify a study topic's current state and evolution by examining publication and citation trends. In addition, it evaluates efficiency rankings for journals, countries, institutions, and authors, as well as the detection of similarity and collaboration trends among academics (Andrés, 2009).

Despite the growing interest in early childhood special education research, no study has used bibliometric methods to summarize the available literature. This study aims to fill this gap by providing a comprehensive overview of the current state and development of research on special education for young children over the past 46 years. In this context, the primary objective of this study is to present the findings of a bibliometric analysis of early childhood special education articles published in the Web of Science (WoS) database between 1982 and the present (2021, March). The current study aims to identify trends among active researchers, countries, institutions, and groups by revealing the bibliometric characteristics and social network structure of early childhood special education studies. As a result, in this study, we will identify the frequently studied topics, prolific authors, countries, institutions, and primary reference sources in early childhood special education.

2. Method

Using metadata from the Web of Science (WoS) database, this study aimed to analyze and map early childhood special education literature over the past 46 years using bibliometric methods. Bibliometric analysis is a quantitative method for analyzing the informational content of large data sets (White & McCain, 1998; Zupic & Cater, 2015). Although this analysis method is widely utilized in other fields, it has only recently begun to be implemented in education (e.g., Hallinger & Kovaevi, 2019; Hernández-Torrano, 2020). Moreover, when specifically investigating the field of special education, we find that studies employing this methodology are scarce.

This study section will describe data sets and data analysis methods. Due to the readership's unfamiliarity with the bibliometric analysis method, the subheadings provide detailed information on the creation of data sets, the data analysis process, and the mapping and synthesis of information.

2.1. Creation of the database

In accordance with the study's primary purpose, we conducted a systematic search in the WoS Core Collection database, which contains high-quality and scientific research in more than 250 scientific, social, and humanities disciplines. The analysis incorporated the Social Sciences Citation Index (SSCI), the Arts & Humanities Citation Index (A&HCI), the Emerging Sources Citation Index (ESCI), and the Science Citation Index- Expanded (SCI-Expanded), which are the four fundamental indexes in the cited database.

Bibliometric analyses and science mapping are based on the analysis of scientific content extracted from digital databases like WoS, Scopus, and Google Scholar (Halinger, 2020). In this study, we selected the WoS database for several essential reasons. First, a well-known fact that WoS is the most published and

authoritative database used in bibliometric analysis (Grosseck, Tîru, & Bran, 2019; Meho & Yang, 2007; Mongeon & Paul-Hus, 2015). In addition, WoS has multidisciplinary content that presents data related to early childhood special education in more than 20,000 different disciplines and research areas. Compared to other databases, WoS data includes citation information for studies published in broader historical contexts (Liu et al., 2019).

In the systematic review processes for providing data documents, we adhered to the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)" (Moher et al., 2009) recommendations. Figure 1 represents using the PRISMA methodology. In addition, the present study

followed the steps suggested by Zupic and Cater (2015) for mapping studies. These five stages are research design, bibliometric data collection, data analysis, data visualization, and interpretation.

Initial research in the WoS database for data collection focused on two main areas. The first of these we use in the title, and the second in the topic area. We conducted an advanced search to identify targeted studies in the two areas. Such advanced scanning options in the WoS database allow for criteria specification and combination creation. In this study, researcher used the keywords "Early Childhood Special Education," "Early Intervention," "Young Children," and "Early Childhood Intervention" in the title area for scanning. They used the keywords "Special Education," "Inclusion," "Mental Retardation," "Autism," "Disability," and "Down Syndrome" in the topic area. This related dataset obtained was combined using AND. We specified no date range in the review. Thus, we aimed to reach all the studies indexed in the WoS database, starting from the oldest article in this field until the search date of March 30, 2021. As a document type, we included only article studies in the search. We did not limit any research area and included studies in all areas in the data collection process. The inclusion criteria used in the study are presented in Table 1.

Table 1

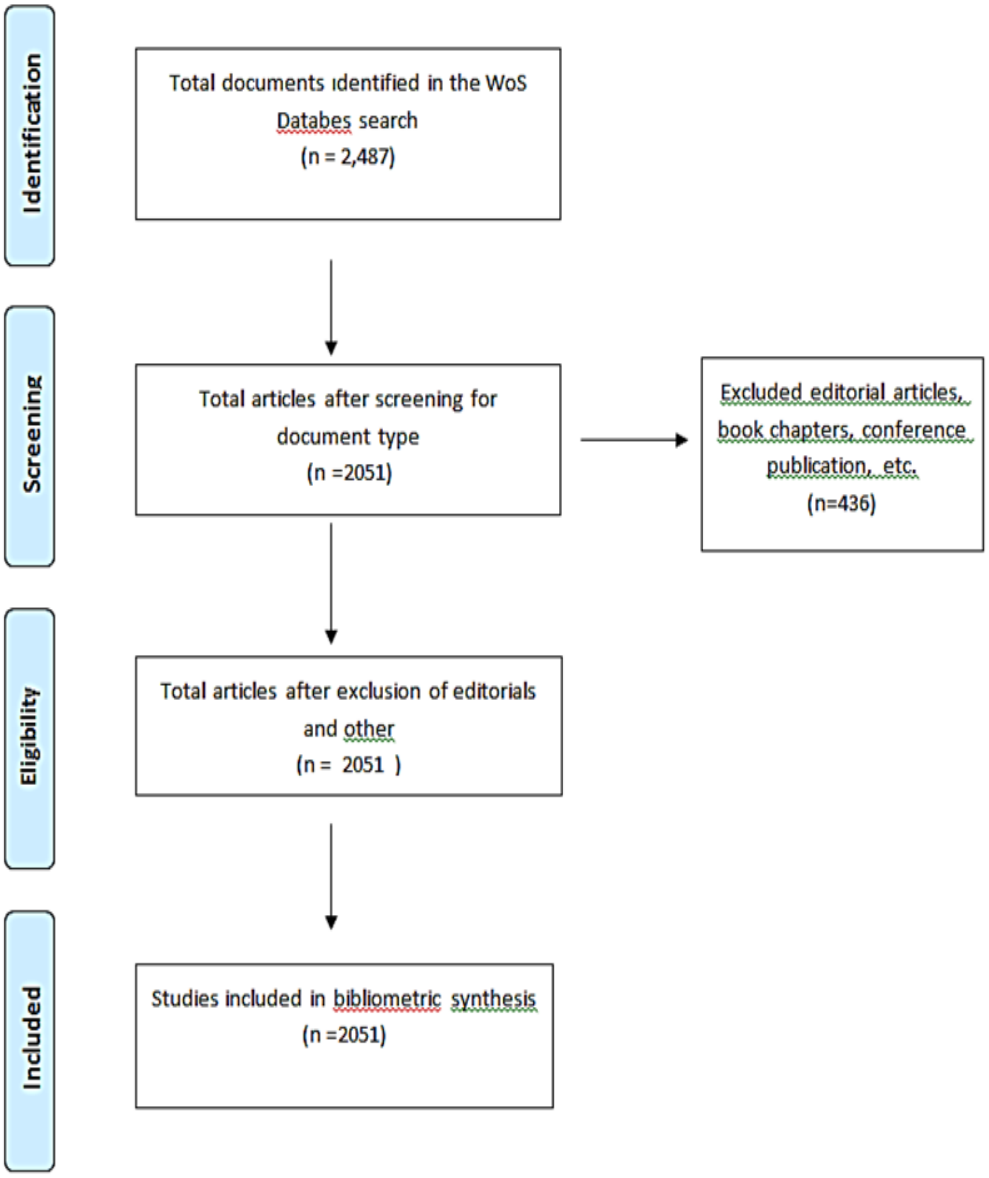
Criteria for the Selection of the Publications

Criteria	Value
Data Source	Web of Science
Search Terms	"Early Childhood Special Education" OR "Early Intervention" OR "Young Children" OR "Early Childhood Intervention" AND "Special Education" OR "Inclusion" OR "Mental Reterdation" OR "Autism" OR "Disability" OR "Down Syndrome"
Country	All Country
Document Type	Article
Citation Index	SSCI, ESCI, A&HCI, SCI-Expanded
Language	All Language
Categories	All WoS Categories

We reached a total of 2,051 articles that met the above inclusion and exclusion criteria. Figure 1 shows the flow of the dataset creation process.

Figure 1

Flow Diagram of Determination and Selection of Publications



2.2. Data analysis

Science mapping employs descriptive statistics, citations, and social network analysis to comprehend a study field's evolution, composition, and intellectual makeup (Zupic & Cater, 2015). In this study, we analyzed descriptive and bibliometric data to offer an overview of the evolution and current status of scientific research in early childhood special education research from the past to the present.

To reveal the evolution and expansion of the subject, we used descriptive statistics to identify the distribution of the number of articles and citations by year, as well as the frequency of citations and publications by the most productive journals, authors, and nations. For this analysis, we conducted the citation analysis. Citation analysis measures the relative importance or impact of an author, an article, or a publication by counting the number of times other works have cited that author or publication. Within the scope of our study topics, we also incorporated the social network analysis method, which is commonly utilized in bibliometric approaches. We used social network analysis techniques to disclose

the word network structure, journal co-authorship analysis network structure, source co-authorships analysis network structure, and author co-authorships analysis network structure in the articles analyzed for the research topics to illustrate the data. Research in social network analysis is becoming increasingly valuable to the social sciences, particularly sociology (Otte & Rousseau, 2002). This method can also explain unknown conditions in the associated area, which is one of the reasons for the increased interest in network research in numerous fields (Kilduff & Tsai, 2008). Approaches to bibliometric network analysis employ diverse ways of analysis (e.g., Co-authorship analysis, Co-citation analysis, Bibliographic coupling, etc.). Citation analysis, Co-author analysis, and co-occurrence were utilized in the current study to obtain relevant solutions to the research questions.

Co-author analysis examines the social structure of a subject or research topic. In co-authorship analysis, networks at the level of institutions and countries emerge. Co-author analysis reveals cooperation in the area (Zupic & Cater, 2015) and displays the intellectual organization of a field (Small, 1973). In the current study, co-authorship network analyses were undertaken to assess the collaboration between authors, institutions, and nations in early childhood special education scientific journals.

Finally, we undertook a co-occurrence analysis of terms to highlight the conceptual framework of early childhood special education. Keyword co-occurrence analysis is a form of content analysis that examines the conceptual structure of a research field (Collan et al., 1983). Co-occurrence analysis of keywords provides insight into the most researched subjects and concepts (Zupic & Čater, 2015).

We evaluated the data using version 1.6.7 of VOSViewer. VOSViewer is software for creating and visualizing bibliometric networks. This software also leverages text mining algorithms to construct and visually display networks of important phrases extracted from datasets (Van Eck and Waltman 2014). In three steps, the software generates bibliometric maps using a distance-based method (Van Eck & Waltman, 2017). First, the software normalizes the disparities across nodes. The second stage produces a two-dimensional map in which the distance between nodes is proportional to their similarity. In the third step, VOSViewer clusters tightly linked nodes (Van Eck & Waltman, 2014).

3. Findings

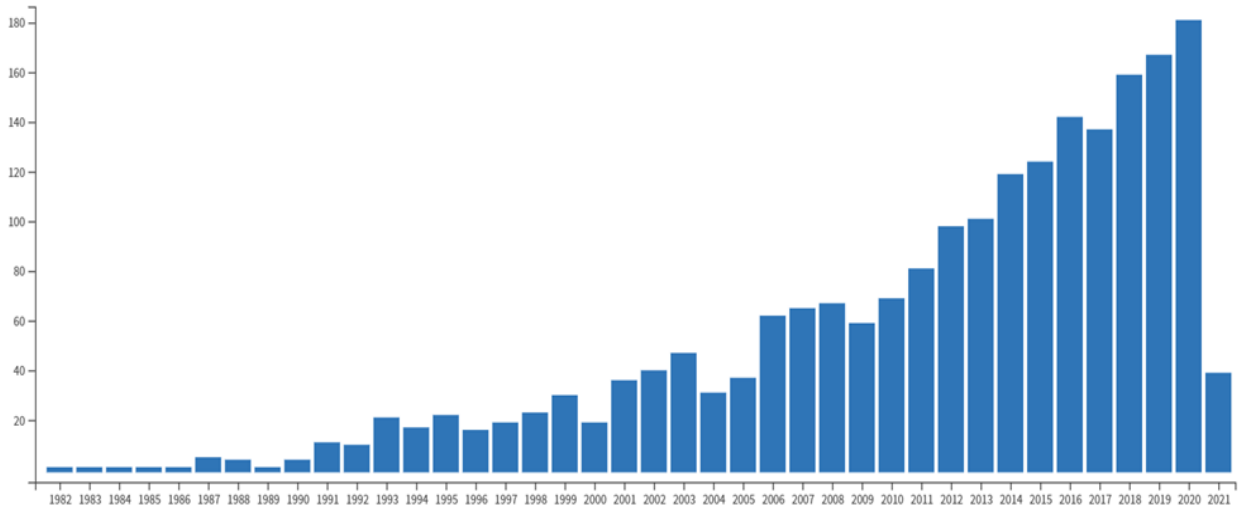
This section presents the findings of bibliometric and network analyses to answer the research questions. First, the number of articles and citations of early childhood special education studies is provided. Then, the leading journals in the field and the most cited articles are listed. Third, the authors, institutions, and countries leading the field are presented. Finally, analyses of author collaboration, institutions, countries, and the network of conceptual change in the work from the past to the present are described.

3.1. Publication and citation trends

The number of publications and citations correctly measures the growth and development of a scientific field. The data set derived from early childhood special education studies reveals that 2051 papers were published between 1982 and March 2021. The data set derived from early childhood special education research indicates that 2051 papers were published between 1982 and March 2022. From 1982 to March 2021, Figure 2 demonstrates the dynamic growth trajectory of scholarly articles in early childhood special education. In the 39 years after the initial publication in 1982, there has been a progressive and consistent increase, as seen in Figure 2. The years can be divided into three parts: a period of emergence (1982–1992), during which the number of publications rose slowly; a period of development characterized by a remarkable increase (1993–2005); and a period of growth, during which the number of studies published in the relevant field increases annually (2006-2020). These periods represent typical phases of a new field of study. 2020 saw the greatest number of publications, with 181 articles (Eck & Waltman, 2014).

Figure 2

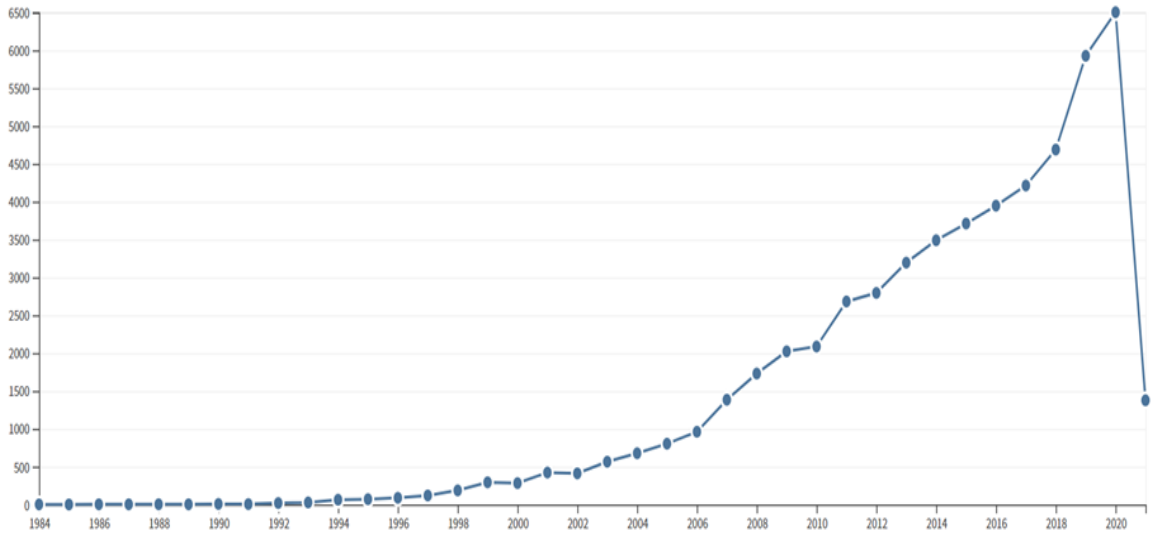
Number of Publications by Year



Similarly, the number of citations to research on early childhood special education has increased annually. All associated articles garnered 54,886 citations in total. While the average number of citations per article is about 26,5, the average number of citations per year is 1,444.37. Figure 3 depicts the distribution of citations for relevant publications by year. The number of citations increased somewhat at precise intervals from 1984, when the first citation was made, through 1996, as depicted in Figure 3. Since 1996, there has been a notable increase in citations. Since 2006, the quantity of citations has climbed gradually. The year with the highest number of citations was 2020, with a total of 6512. The growth in publications and citations indicates congruence.

Figure 3

Number of citations by year



3.2. Core journal and publications

The reviewed 2051 papers were published in 655 journals. Given the number of journals that publish articles, it is essential to emphasize that early childhood special education research is generally

recognized by journals in various fields. Additionally, only 36 of 665 journals have published ten or more relevant publications. According to this perspective, most early childhood special education studies are published in journals linked to the topic. Table 2 displays the ten journals that publish the most research on early childhood special education. Also included in Table 1 are the total number of citations and the connection strengths. These are the major journals in the field of early childhood special education.

Table 2

Most Highly-Cited Journal on Early Childhood Special Education on WoS Citation Analysis, 1982–2021 (n = 655)

Rank	Journal	Number of Documents	WoS Cites	Total Link Strength
1	"Journal of Autism and Developmental Disorders"	160	8192	562
2	"Topics in Early Childhood Special Education"	81	1840	218
3	"Infants & Young Children"	74	1251	156
4	"Journal of Early Intervention"	67	1327	199
5	"Autism"	63	1542	238
6	"Research in Autism Spectrum Disorders"	63	1269	191
7	"Research in Developmental Disabilities"	47	1574	145
8	"Journal of Developmental and Physical Disabilities"	28	472	44
9	"Autism Research"	26	386	67
10	"Journal of Intellectual Disability Research"	23	1077	58

With 160 articles, the "Journal of Autism and Developmental Disorders" has the most amount of early childhood special education publications. In addition, the same journal has the maximum number of citations (8192) and link strength (727) relative to the number of publications. "Topics in Early Childhood Special Education", with 81 articles, and "Infants & Young Children", with 74 articles, are the two journals that rank second and third, respectively, in terms of the number of articles published. The remaining articles in the collection are dispersed throughout numerous periodicals in diverse fields, including health, psychology, and sociology.

Table 3 lists influential publications in the early childhood special education discipline based on the number of citations. This table displays the top ten most cited publications in the data set obtained from the WoS database. Between 2000 and 2006, nine journals published the ten most influential articles. The total number of citations to these publications is 4564, representing 8.3% of all citations in the data set. "The Journal of Child Psychology and Psychiatry" has published two of the most-cited papers.

Table 3

Most Highly-Cited Early Childhood Special Education Publications on WoS Citation Analysis, 1982–2021.

Rank	Title	Authors	Journal	Year	Citations
1	"Identifying infants and young children with developmental disorders in the medical home: An algorithm for developmental surveillance and screening"	"Duby et al."	"Pediatrics"	2006	772
2	"Brain structural abnormalities in young children with autism spectrum disorder"	"Sparks et al."	"Neurology"	2002	581
3	"Changing illness perceptions after myocardial infarction: An early intervention randomized controlled trial"	"Petrie et al."	"Psychosomatic Medicine"	2002	540
4	"Long-term effects of an early childhood intervention on educational achievement and juvenile arrest - A 15-year follow-up of low-income children in public schools"	"Reynolds et al."	"Journal Of the American Medical Association"	2001	433
5	"Joint attention and symbolic play in young children with autism: a randomized controlled intervention study"	"Kasari et al."	"Journal of Child Psychology and Psychiatry"	2006	429
6	"Sensory Experiences Questionnaire: discriminating sensory features in young children with autism, developmental delays, and typical development"	"Baraneck et al."	"Journal of Child Psychology and Psychiatry"	2006	404
7	"Randomized trial of intensive early intervention for children with pervasive developmental disorder"	"Smith et al."	"American Journal on Mental Retardation"	2000	404
8	"The behavioral phenotype in fragile X: Symptoms of autism in very young children with fragile X syndrome, idiopathic autism, and other developmental disorders"	"Roger et al."	"Journal of Developmental and Behavioral Pediatrics"	2001	348
9	"Age and IQ at intake as predictors of placement for young children with autism: A four- to six-year follow-up"	"Harris and Handleman."	"Journal of Autism and Developmental Disorders"	2000	330
10	"Neural correlates of face and object recognition in young children with autism spectrum disorder, developmental delay, and typical development"	"Dawson et al."	"Child Development"	2002	323

3.3. Leading authors and countries

The data set contains 2051 articles authored by 6917 people from 101 countries and 1973 institutions worldwide. Table 4 shows the ten authors with the earliest childhood special education publications. Dawson G. is the leader with 28 publications. All 28 studies have a total of 2,768 citations. Roger S. J. follows this author with 27 papers and Matson J. L. with 19 articles. Notable is the fact that fifty percent of the authors are from the same country (USA). Given the list's geographical information, it is evident that South America, Africa, and Asia are not included. Lastly, as demonstrated in Table 3, the number of publications and citations do not correspond numerically. Matson J.L. has 430 citations despite having the most papers, whereas Lord C. gets 933 citations despite having just 14 articles.

Table 4

Top Most Prolific Authors Ranked by Total Number of Publications

Rank	Author	Country	Number Of Publications	Number Of Citations
1	Dawson, G.	USA	28	2768
2	Rogers, S.J.	USA	27	2444
3	Matson, J.l.	USA	19	430
4	Barton, E.	USA	15	248
5	Bruder, M.	USA	15	457
6	Mcconachie, H.	England	15	507
7	Gillberg, C.	Sweden	14	345
8	Lord, C.	USA	14	930
9	Ingersoll, B.	USA	13	692
10	Keen, D.	Australia	13	194

2051 documents in which published early childhood special education studies are sourced from a total of 101 countries worldwide. Table 5 shows the ranking of the top ten countries according to the number of publications. As well as the most prolific author ranking, the United States is the most productive country, leading early childhood special education research with 1,281 articles. In the United States, articles produced for the relevant discipline account for 62.422% of all publications. There has been a total of 38186 citations for these studies. This represents more than fifty percent of all article citations. This makes the United States the leader in early childhood special education. Australia, with 200 studies, and England, with 147 research, come in second and third, respectively, after the United States. The top four countries in the ranking all speak English. In addition, the table includes OECD members, including Austria, Canada, Germany, and the Netherlands.

Table 5

Top Countries by Number of Publications in the Dataset

Rank	Country	Documents	Citations
1	USA	1281	38186
2	Australia	200	4.057
3	England	147	5.076
4	Canada	108	2945
5	Sweden	55	1879
6	Netherlands	52	912
7	Italy	44	1266
8	Germany	37	791
9	People S R China	36	340
10	Israel	36	1158

3.4. Research collaborations between authors, institutions, and countries (Co-authors analysis)

In this section, we utilized co-authorship analysis to discover scientific collaboration networks between scholars, institutions, and countries in early childhood special education. Figures 4, 5, and 6 depict author, institution, and country co-authorship networks in early childhood special education.

The nodes shown in the social network analysis reflect the units of analysis (authors, institutions, and countries). The number of broadcasts corresponds to the size of the nodes. The relationship between nodes is defined by their distance apart. When the distance between two nodes decreases, a strong link is deemed to exist. The color of the nodes is used to distinguish across clusters and denotes which cluster the node belongs to. The thickness of the networks that comprise the connections is indicative of the relationship's strength (Van Eck & Waltman, 2014).

Figure 4 shows collaborative networks among authors with at least five published works (n=94). This map revealed a network of five or more researchers who contributed to the advancement of the field. The map shows a total of 36 clusters. Authors in the red, blue, and green clusters established the most extensive collaboration network. These clusters of seven scholars each represent an international research group. Other massive clusters are yellow and purple, each containing six researchers. These clusters serve as the point of connection for numerous other researchers.

Figure 4

Map of Scientific Collaborations Between Researchers

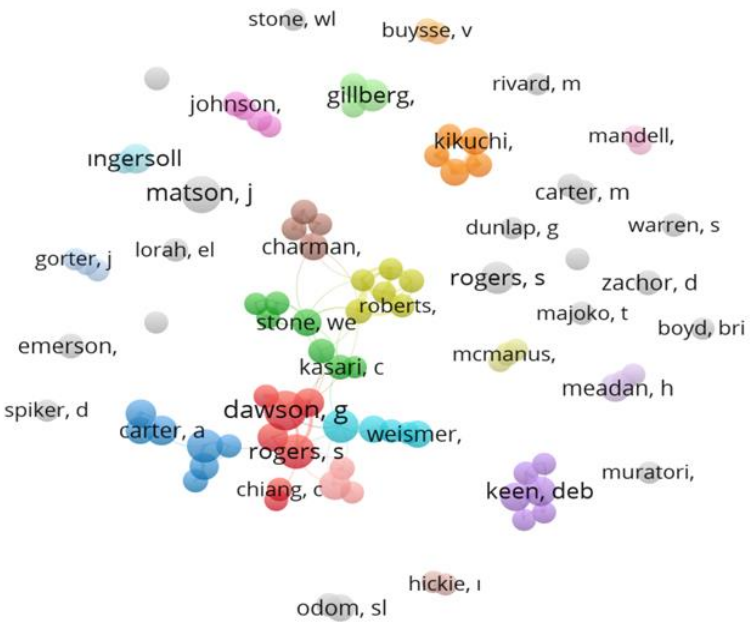


Figure 5 maps scientific networks among institutions that have published 15 or more articles in the dataset (n=42). The map is divided into 6 clusters. Institutional cooperation networks are generally formed within national borders and geographically close institutions. Clusters in the map's central horizontal region link institutions in the United States and Canada (red, blue, green). Inter-cluster connections are also seen high in the mentioned areas. Interestingly, despite its remote location, Tel Aviv University appears to collaborate with institutions in the United States. Additionally, while several links arise between institutions within the same cluster, the density of linkages between institutions from other clusters drops.

Figure 5

Map of Scientific Collaborations Between Institutions

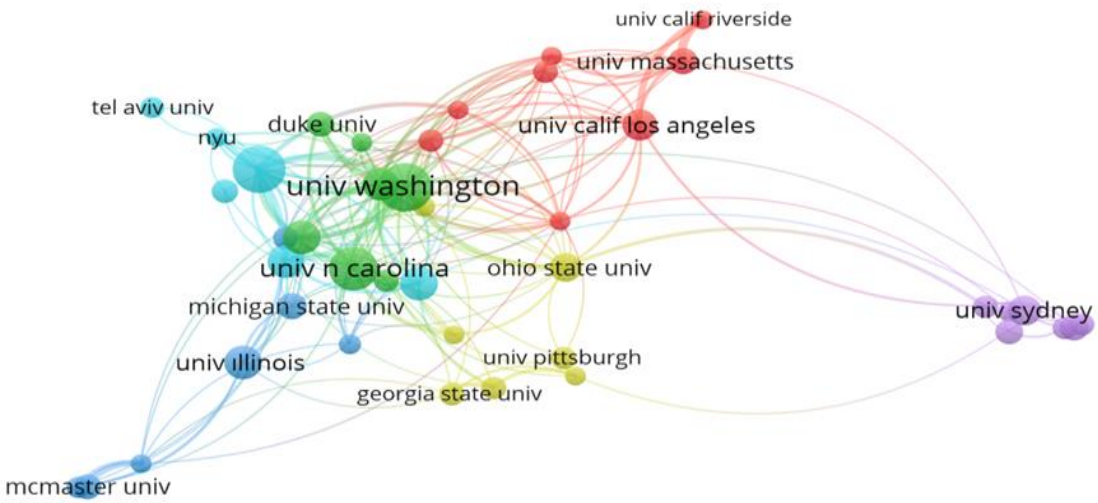
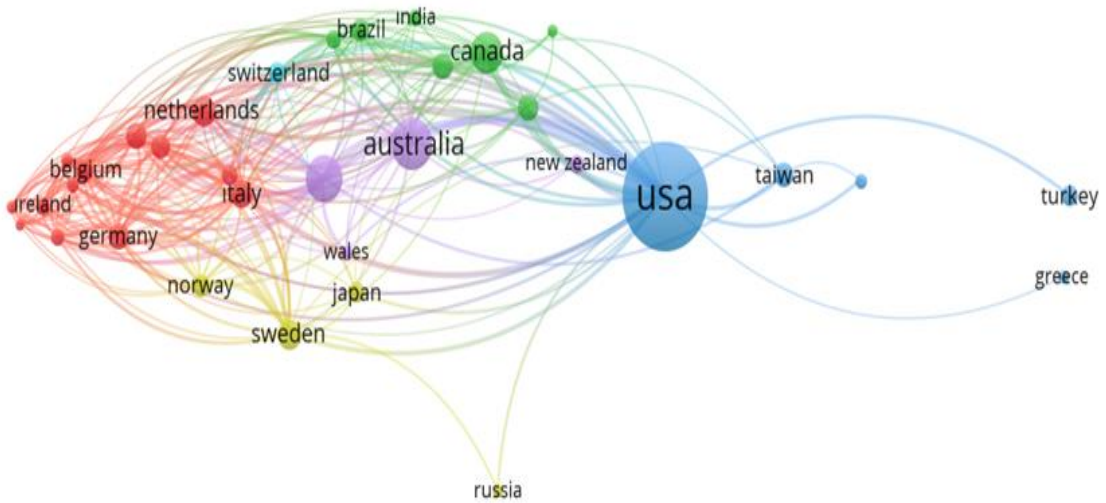


Figure 6 shows a map of international cooperation in early childhood special education research. This map examines research collaborations (n=35) between countries with at least five publications. The United States represents the largest connecting node in the geographic center. Additionally, it shares cooperative ties with all other countries/regions, forming a cluster with Greece, South Korea, Turkey, and Taiwan. Although there are six clusters on the map, it can be said that international collaborations are generally shaped by geographical and linguistic proximity. For instance, the red cluster has the greatest number of countries (13) and consists of European nations, including France, Germany, Italy, Denmark, Belgium, and the Netherlands. Globally, the data indicate that even though there is some cooperation across different regions of the world, international collaboration networks are still determined by geographic closeness.

Figure 6

Map of scientific collaborations between countries

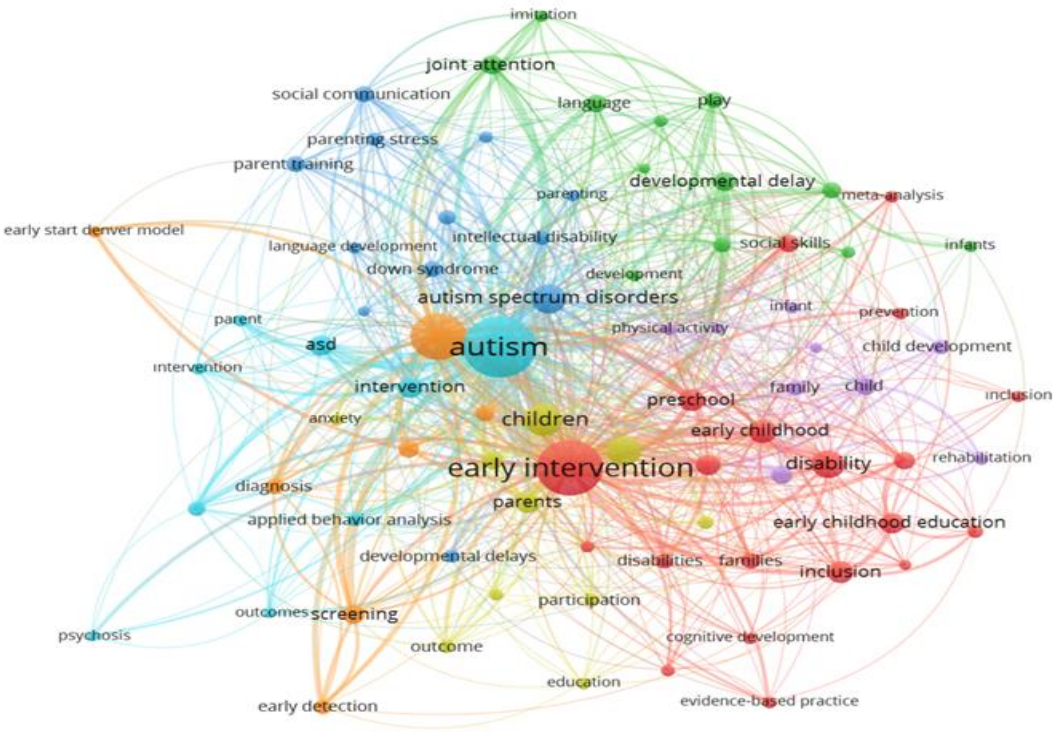


3.5. Topical foci of research on early childhood special education

Figure 7 illustrates the network analysis of the present research that focuses on all article studies in the early childhood special education field between 1982 and March 2021. This study helps us develop a conceptual map by identifying the primary topics of interest to scholars in the relevant subject. The size of the nodes on the map represents the frequency of author keywords within the dataset, while the thickness of the borders represents the co-occurrence strength of keyword pairs. We included seventy-nine words with at least ten co-occurrences in the analysis. The analysis resulted in the formation of seven clusters. Autism is the most widely used keyword, with 390 occurrences. It is followed by "early intervention" formations numbering 93.

Figure 7

Map of topical foci of research on early childhood special education



4. Discussion and Conclusion

Publications and citations have increased progressively during the past 39 years, and their exponential growth over the past 15 years reflects the anticipated growth trajectory of a new field of study. Although the first study in early childhood special education was published in 1982, the number of studies in the field has expanded dramatically since 1992. This growth is proportional to the number of articles and citations. On the other hand, the influence of political developments in the field on scientific literature is evident. As a matter of fact, the 1990s marked the beginning of the legalization of early childhood special education (Bricker, Xie, & Bohjanen, 2018). These laws, which began in 1990 and continue to this day, are considered a turning point in early childhood special education theory and practice.

Another important factor contributing to this dramatic rise in publications and citations is an increase in journals published related to early childhood special education. Today, many international journals aim to publish research on early childhood interventions and special education. In addition, easy access to information and extensive usage of internet databases contribute to the quantitative expansion of the

discipline. Given this information, it is anticipated that the number of early childhood special education studies will continue to rise in the years to come.

According to the research data, the most productive journal in the field is the "Journal of Autism and Developmental Disorders," with a number of publications and citations. Although the journal is not directly focused on early childhood special education, the results of the analysis show that it significantly impacts the field. Similarly, four journals focusing on autism studies are among the ten most productive early childhood special education research journals. This shows that early childhood studies have an essential place in autism research. Indeed, the importance of early intervention is emphasized in autism research (Koegel et al., 2014; Zwaigenbaum et al., 2013; Webb & Jones, 2009). We can show this situation as one of the crucial reasons early childhood comes to the fore in studies on autism. "Topics in Early Childhood Special Education," "Infant Young Children," and "Journal of Early Intervention" are other journals that publish the most in the field of early childhood special education. The fact that these journals have a framework that directly acquires the field of early childhood special education is considered an essential effect. Even though early childhood special education is a frequent subject of study in various disciplines, the top 10 journals with the most significant number of articles in the field serve a variety of special education subfields.

It is interesting that there is no correlation between those mentioned above and the ten most prominent journals and research based on the number of citations related to early childhood special education. A publication that appeared exclusively in the “Journal of Autism and Developmental Disorders” garnered 330 citations and joined the top ten most-cited papers. Examining the publications reveals that the top nine articles with the most citations have several authors, whereas only one has two. However, it is noteworthy that more than half of the publications are in medical journals. Similarly, we may state that the most cited papers in the early childhood special education field contain information on medical diagnosis and evaluation. This is an important result of the early childhood special education field's complex structure and interdisciplinary nature (McCormick & Brennan, 2001). Aboelela et al., (2007) have suggested that multidisciplinary research is a practical approach to solving complex problems, providing critical answers, and facilitating the application of knowledge in a particular field.

Considering the number of publications and citations, examining the most prolific researchers in the field of early childhood special education reveals that some authors have made substantial contributions to the field. Dawson, G., Rogers, SJ., and Matson, Jl. It has almost half the total number of publications among the top ten authors in the field. Similar findings have been found in bibliometric studies conducted in various disciplines (Cretu & Morandau, 2002). The process of accumulative advantage can explain variations in publication and productivity distributions across researchers in the same field. This technique boosts the output of influential scientists while decreasing the productivity of low-producing scientists due to resource recognition and feedback. Cross-sectional study data demonstrate that increasing career age increases academic production inequality (Allison & Stewart, 1974; Wang et al., 2006).

Early childhood special education is an international topic of study that has sparked political and scientific agendas across different eras and regions of the world, driven by the needs and experiences of local populations (Smith, 2000). Examining the research findings to support this prediction reveals that different countries contribute to the field in question. In addition, research indicates that the United States is the most productive nation in producing information and researching this subject. This finding is bolstered by the fact that seven of the ten most prolific researchers on the subject are American. Three English-speaking nations follow the United States. These are Australia, the UK, and Canada, respectively. One important reason for this finding could be that the searched database only contains English sources. The results show that many Asian and African countries are far behind in productivity. Reasons such as

language barriers, insufficient financial resources for scientific studies, and limited access to data may be the reason (Wang et al., 2006).

There is an increasing research interest based on analyzing research collaboration (Kim, 2006). Even if it is not a direct indicator of quality, research collaboration is an essential and valid method for achieving it. The analysis of co-authorship data in this study revealed the network structure of field collaboration in relation to nations, institutions, and researchers. Research collaboration is viewed as a sign of quality research or a way of reaching quality and a tool to stimulate and support research in places with less developed research infrastructure and capabilities (Katz & Martin, 1997; Kim, 2006).

When we generally examine the findings from this study, some collaborative research networks in early childhood special education research at the researcher, country, and institution level do not seem well-established. According to the analyses, researchers typically work alone or in small groups. Examining international collaboration reveals that the United States is at the center. This circumstance demonstrates a correlation between the number of publications and citations. Additionally, geographical and cultural proximity is another factor that influences cooperation (Zitt et al., 2000).

Examining the social network structure for institutional collaboration reveals that the studies are conducted within national borders. This analysis demonstrates that the networks connecting geographically close institutions are robust. This implies that researchers collaborate with other researchers in their home countries on an individual and institutional level. This network structure is observed in numerous social science disciplines (Mosbah-Natanson & Gingras, 2014).

Keyword analysis gives a conceptual map of research on early childhood special education. Since early childhood special education is an interdisciplinary field of study, many notions have a complicated, variable-size network structure. Autism spectrum disorder, in particular, has the most extensive social network. Additionally, keywords such as parent education, evidence-based practices, developmental delay, language acquisition, and early intervention are commonly used with research in this field.

In conclusion, the present study mapped the existing literature in the early childhood special education field over the past 39 years. According to the results obtained from the data, the field has been growing exponentially, especially in the last ten years. All the same, it is seen that this field is a dynamic scientific discipline that is constantly developing. Although some geographic locations stand out, early childhood special education research is a field that draws global attention. Additionally, improved cooperation between countries, scholars, and institutions in the subject may substantially affect the field's advancement and application.

5. Limitations

Even though bibliometric studies provide a basic overview of the study subject, they cannot capture all the field's particulars. We conducted this investigation within the constraints of certain restrictions. The first constraint is that we limited the search to the WoS database alone. The limitations of the WoS database may also apply to this research. As a result, future analyses should rely on data from numerous sources, such as Scopus. Researchers can expand future studies by using a database in Which different disciplines are scanned, considering the field's interdisciplinary nature. Another limitation is the inclusion of only article-type publications in the current study. The research excluded books, book chapters, conference papers, and other documents that have contributed to the field of early childhood special education. An additional study can be conducted to compile a summary of various scientific documents. Also, in this research, bibliometric data covers articles published until March 2021. Therefore, it can be said that it does not fully reflect 2021. In addition, in analyzing bibliometric data, citation-based indicators also consider the author's or author group's self-citations. The authors' locations, language, and self-citations can all affect citations. All this makes bibliometric studies sometimes biased and manipulable. Funding: No funding source is reported for this study.

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