

# Bibliometric mapping of research trends in education, physical education, and sports for the disabled

Yunus E. Karakaya<sup>1</sup>, Melih Dikmen<sup>2</sup> & Aykut Şahin<sup>3</sup>

## Abstract

*In this study, a relational systematic map of research trends in education, physical education, and sports for disabled people was prepared with the bibliometric mapping method. Scientific data obtained from the Web of Science (WoS) was used in the research. After the search in the WoS database, 423 studies were accessed, and 415 of these were included in the final analysis by applying the exclusion criteria. The VOSviewer (Visualization of Similarities) program was used for the bibliometric analysis. The results of the research demonstrate that the number of studies in the field has increased from the 1980s to the present day. The studies included in the research were published in 50 different countries, in 133 different journals and were carried out by 770 authors working in 409 different universities/institutions. According to the findings, most of the research, the highest number of citations, and the most influential authors were based in the United States of America. The results showed*

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<sup>1</sup> Firat University, Faculty of Sport Sciences, Department of Physical Education and Sports, Elazig, Turkey. ORCID: 0000-0002-9858-2103.

<sup>2</sup> Firat University, Department of Educational Sciences, Elazig, Turkey. ORCID: 0000-0001-7015-6236.

<sup>3</sup> Munzur University, Faculty of Sport Sciences, Department of Physical Education and Sports, Tunceli, Turkey. ORCID: 0000-0003-3654-6550.

Correspondence to: Yunus E. Karakaya, Assoc. Prof. Dr., Firat University, Faculty of Sport Sciences, Department of Physical Education and Sports, TR23100, Elazig, Turkey.

E-mail: [emrekarakaya@firat.edu.tr](mailto:emrekarakaya@firat.edu.tr).

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*that the most cited author in this field works collaboratively with many national and international researchers. The results of the research may provide practical information for politicians, practitioners, and lecturers to draw their attention to new research trends and opportunities regarding education, physical education and sports for individuals with disabilities.*

**Keywords:** Disability; Education; Physical education; Sports; Bibliometric analysis; Web of Science.

## 1. Introduction

Disability has been viewed as a health problem in societies throughout history and today it has evolved into a phenomenon that concerns and includes society besides being considered a health problem (Yuker, 1988; Barton, 1993; Namatoğlu & Tasa, 2018). The occurrence of a negative social perception through attitudes and behaviors, such as marginalization, exclusion, ridicule, contempt, underestimation, pity, and discrimination in social life and relationships, affects the daily life of disabled individuals (Findler, Vilchinsky, & Werner, 2007). This perspective of societies on the disabled, on welfare systems, and on the levels of development of countries also affects the social policies and services created for these problems experienced by people with disabilities. The ability of people with disabilities to participate in social life and their social integration is important for each society (Crawford & Stodolska, 2008; Darcy, Lock, & Taylor, 2017; Ives, Clayton, Brittain, & Mackintosh, 2019; Tellioglu, 2019).

### *1.1. Current status of the literature on education for individuals with disabilities*

The education and inclusion of people with disabilities in educational environments are among the main issues addressed during social and educational policy planning at an international level (Campos, Ferreira, & Block, 2014; Pocock & Miyahara, 2018; Hutzler, Meier, Reuker, & Zitomer, 2019).

Although educational institutions are structured in such a way that students, teachers, and administrators can interact with each other to shape students' educational and social experiences (Turkkahraman, 2015), it remains unclear whether the educational format of schools proactively meets the learning needs of students with disabilities. Although all children have the right to educational equity, it appears that most children with disabilities are not enrolled in special education schools that serve their needs and, in most countries, these students are educated in regular public schools (Majoko, 2019). In this respect, Grant-Lewis (2019) stated that in countries with low and middle socio-economic levels, an average of 33 million disabled students did not attend school, and they were less likely to complete primary, secondary, and further education.

Although many studies have been conducted regarding educational research for the disabled, in-depth educational studies remain scarce. For

example, even though it is a human-oriented field of study, research has highlighted that students studying in the field of health do not have positive attitudes towards the disabled because of the effect of experience and professional environment (Tervo & Palmer, 2004). Studies stating that the level of education makes a difference in the attitude towards disabled people indicate that positive attitudes towards the disabled increase in general as the level of education increases. In addition, some studies reveal that the education provided especially at universities makes a difference in terms of the approach to disabled people. There are also studies demonstrating that people who major in social sciences, such as teaching and psychology, have more positive attitudes towards disabled people than those who study in other fields (Lifshitz & Glaubman, 2002; Alghazo, Dodeen, & Algaryouti, 2003; Aulagnier, Vergeri, Ravaud, Souville, Lussault, Garnier *et al.*, 2005). On the other hand, the research by Ferri (2001) on teachers with learning disabilities revealed feelings of isolation and incapacity due to their removal from the classroom. In Riddick's (2003) study of the experiences of 13 teachers, including five prospective teachers with dyslexia, the author reported that all teachers stated that they used coping strategies effectively as a result of their disabilities. On the other hand, Ferri and colleagues (Ferri, Connor, Solis, Valle, & Volpitta, 2005) provided evidence that when teachers with disabilities are given the freedom to explore their talents, they can see themselves as competent teachers.

### *1.2. Current status of the literature on physical education and sports for individuals with disabilities*

Today, besides the awareness of the benefits of sports for the social, physical, and psychological health development of all individuals, it is also known that these benefits play a more important role for disabled athletes. In addition to its positive effects, sports for the disabled are also seen as a means of rehabilitation and socialization (Albrecht, Elmoose-Østerlund, Klenk, & Nagel, 2019; Richard, Burlot, Duquesne, & Joncheray, 2021). Physical leisure activities can make a valuable contribution to the emotional and physical development of people with disabilities and are very effective in supporting their quality of life (Badia, Orgaz, Verdugo, Ullán, & Martínez, 2011; Sarol & Çimen, 2015).

Research has also demonstrated that leisure activities provide opportunities for people with disabilities to have positive social interactions, to develop social and communication skills, to build friendships, and to

develop a sense of belonging to the society (Lieberman & Stuart, 2002; Han, Kim, & Kim, 2019). In their research, Coates and Vickerman (2008) arrived at the following conclusions. First, the physical education experience of students with disabilities remained limited due to an apparent lack of training of physical educators to teach students with disabilities. Second, the authors suggested that physical education curricula should be made more appropriate to include the needs of people with disabilities. Lastly, while students with disabilities stated that they enjoyed physical education in the literature, discrimination by classmates and adults threatened their ability to fully participate in the classroom. Tenenbaum and Eklund (2007) reported that the biggest problem in the participation of disabled people in sports was their lack of time and motivation.

Likewise, research conducted in many countries around the world has also shown that people with disabilities have fewer opportunities to participate in sports than the general population (Verdonschot, De Witte, Reichrath, Buntinx, & Curfs, 2009; Chatfield & Cottingham, 2017; Hammond & Jeanes, 2018; Hoekstra, Roberts, van Lindert, Martin Ginis, van der Woude, & McColl, 2019). Furthermore, when the literature is examined, research on physical education has shown that there has recently been a tendency to study the perspectives of students with disabilities, typically focusing on exploring the perspectives of adult stakeholders (Haeghele & Sutherland, 2015). Lingard and Mills (2007) emphasized that in contrast to the conceptual debates about “*special educational needs*” and “*inclusion*,” which are devoted to teaching physical education to students with disabilities and to cover a limited scope of time, it is necessary to put pedagogical practices at the center. Issues, such as the social, physical, and psychological benefits of disabled people’s participation in physical activity, physical education, and sports, are frequently raised by researchers (Oliver, 1990; Block & Obrusnikova, 2007; Grenier, 2007; Coates & Vickerman, 2008; Bryant & Curtner-Smith, 2009a; Bryant & Curtner-Smith, 2009b; Grenier & Kearns, 2012; Martin, 2013; Sarol & Çimen, 2015).

### *1.3. The present study: Bibliometric mapping of research on education, physical education, and sports for individuals with disabilities*

As a worldwide trend, there is scientific interest in the inclusion of students with disabilities in physical education classes and their co-education with non-disabled people (Hodge, Sato, Mukoyama, & Kozub, 2013; Heck & Block, 2019). Haeghele and Sutherland (2015) emphasized the

requirement to explore the needs of students with disabilities in physical education to learn more about appropriate educational practices to be applied. Although substantial research has been conducted on people with disabilities in recent years (Haegele & Sutherland, 2015; Namatoğlu & Tasa, 2018; Haegele, Zhu, & Holland, 2019), less is known about education, physical education, and sports. Such research has been shown to have an influential trend worldwide over the past two decades, as noted above. For example, there is a dearth of literature on the impact of previous contact with people with disabilities, their impact on students' level of competitiveness, and attitudes towards including a partner with a disability. Therefore, after implementing an intervention to raise awareness about the inclusion of students with disabilities in physical education, there is a need to deepen the understanding of how these variables influence the attitudes of students (Ocete, Perez-Tejero, Coteron, & Reina, 2022). Discussions of educational curriculum and disability sports often drift into the field of adapted physical education (Fitzgerald & Kirk, 2009).

In this direction in the literature, the bibliometric mapping method is important to identify research trends related to education, physical education, and sports for the disabled and to produce a new perspective in the field (Van Eck & Waltman, 2014; Zupic & Cater, 2015). Compared to traditional literature reviews, systematic review research is preferred because it is considerably comprehensive, less biased, and more transparent (Andrews, 2005; Hong & Pluye, 2018). In this regard, Fernani (2019) stated that traditional literature research consists of reading relevant articles and includes the subjective judgment of those who carry out the research. It is claimed that this subjectivity can be reduced by a keyword analysis (i.e., bibliometric mapping) as it is based on an automated quantitative analysis using a predefined algorithm. Reviews based on the bibliometric method that include analyses, such as research productivity, citation rankings, and concept or citation association, have the potential to make significant contributions to the literature. In recent years, the literature on the bibliometric mapping method has focused on fields, such as education (Begeny, Levy, Hida, Norwalk, Field, Suzuki *et al.*, 2018; Hallinger, Gümüş, & Bellibaş, 2020; Hernandez-Torrano & Ibrayeva, 2020; Ayanoğlu, Demir, & Erdoğan, 2021), physical education, and sports (Palazón, Ortega, & García-Angulo, 2015; Müller, Ansari, Ebrahim, & Khoo, 2016; Chamberlain, Edwards, Lai, & Thwala, 2019; Gholampour, Noruzi, Gholampour, & Elahi, 2019; Baier-Fuentes, González-Serrano, Alonso-Dos, Inzunza-Mendoza, & Pozo-Estrada, 2020; González-Serrano, Jones, &

Llanos-Contrera, 2020; Jiménez-García, Ruiz-Chico, Peña-Sánchez, & López-Sánchez, 2020; Lis, 2020; Tomanek & Lis, 2020; Chiu, Fan, Nam, & Sun, 2021; Contreras-Barraza, Madrid-Casaca, Salazar-Sepúlveda, Garcia-Gordillo, Adsuar, & Vega-Muñoz, 2021; Iermakov, Yermakova, Wnorowski, & Bensbaa, 2021; Kirkendall & Krustrup, 2021; Lis & Tomanek, 2021). When examining the content of these studies in these fields, it is seen that they are conducted under various restrictions, such as databases, countries, or universities where the research is carried out (Shilbury, 2011; Xianliang & Hongying, 2012; Belfiore, Iovino, & Tafuri, 2019; Gümüş, Gençoğlu, & Şahin, 2020; Smolina, Khafizov, & Erlikh, 2020). However, as regards the scope of this research, no bibliometric analysis studies on education, physical education, and sports for the disabled were found in the literature, to the best of our knowledge.

## 2. The scope and significance of the current study

Disability as a topic has constituted a crucial area of research interest over the past years. In this context, the aim of the present study was to reveal and understand research on education, physical education, and sports for the disabled by investigating them in depth. The significance of the present study was to ensure adequate visibility of disability in academic research. In this study, we wanted to underline the point of view that *“there are studies in the context of education, physical education, and sports for disabled people”*. This research was also important to support bibliometric analyses for people with disabilities by revealing current research trends and providing researchers and practitioners working in this field with insights into the diversity of subject areas. The bibliometric research in this study was performed considering publication and citation data obtained from the Web of Science (WoS: SSCI, SCI-Expanded, AHCI, and ESCI) database (from 1975 to February 2022) to provide a perspective on the current status and development of research on disability, education, physical education, and sports and to fill the knowledge gap in the literature. In addition to the dynamic growth of publication and citation data from the studies conducted, the research also outlined the most frequently used keywords in this field, the most effective studies, the most cited authors, and the notable journals and countries involved. Furthermore, scientific cooperation networks between authors, institutions, and countries contributing to research on disability, education, physical education, and sports were also presented.

### 3. Methods

This research provides an overview of all the studies published on people with disabilities in the field of education, physical education, and sports within the scope of “*Web of Science Core Collection (WoS)*” by utilizing bibliometric analysis and relational mapping methods. In the research, studies on “*education,*” “*physical education*” and “*sports*” in the “*disabled*” were examined using the scientific data provided by WoS for the years between 1975-2022. The analysis of international studies searched in WoS indexes was carried out using the bibliometric mapping analysis method. As a result of the scan, the research data obtained from the field was analyzed by using the bibliometric analysis method with the relational maps of the most frequently used keywords, the most cited publications, journals, countries, and the most cited authors.

#### 3.1. Creating the dataset

The dataset was constructed by selecting publications from 1975 to 2022 and the search query was scanned on the database on February 20-25, 2022. In this study, seven citation indexes in the Web of Science (WoS) database were used: *Conference Proceedings Citation Index-Social Science & Humanities (CPCI-SSH)*, *Conference Proceedings Citation Index-Science (CPCI-S)*, *Social Sciences Citation Index (SSCI)*, *Emerging Sources Citation Index (ESCI)*, *Science Citation Index Expanded (SCI-Expanded)*, *Arts & Humanities Citation Index (A&HCI)*, and *Book Citation Index-Social Sciences & Humanities (BKCI-SSH)*. The WoS database is considered one of the most accurate and well-known international databases and provides reliable data with detailed information on important research and researchers. Therefore, it can be said that it is the most suitable database to conduct bibliometric research (Wang, Fang, & Sun, 2016; Zhai, Cui, Shao, Wang, Chen, Wei *et al.*, 2017). As a result, the study was carried out by including the research in the WoS database to ensure that the data was accurate and reliable.

No language and year restrictions were applied during the search in the bibliometric analysis. To access all studies in the literature, scientific studies on disability were analyzed. As a result, the scan was carried out by considering the disabled and disability definitions/keywords used in the studies on disability and disability types. The keywords used in the search and the scope of the search are presented in Figure 1.



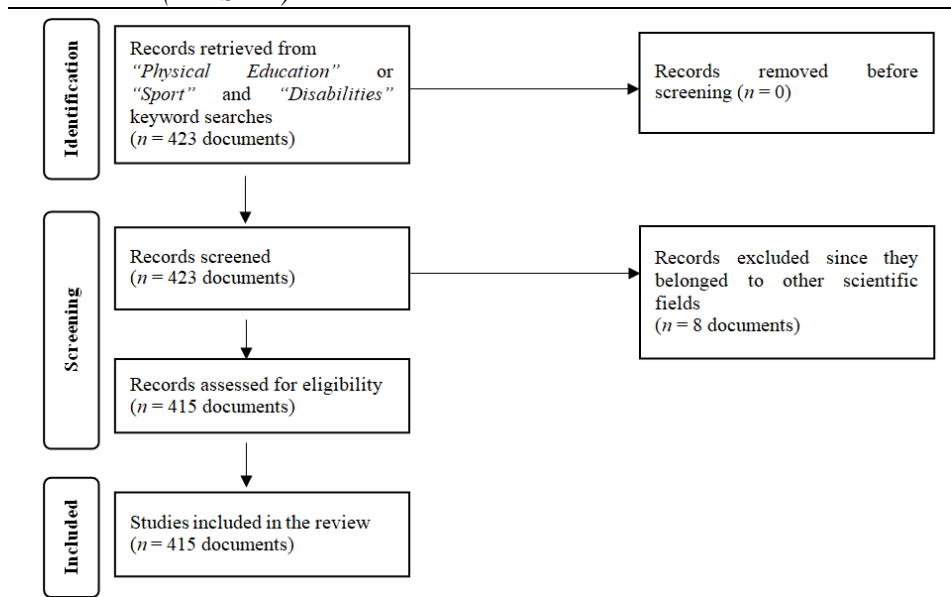
Figure 1 – Search query string

Type	Search Query and Results	Database	Results
Current session			
Search	<div style="border: 1px solid gray; padding: 5px;">           "disability" OR "disabled" OR "disabilities" OR "blind" OR "dual sensory loss" OR "deaf" OR "hearing loss" OR "down syndrome" OR "cerebral palsy" OR "multiple sclerosis" OR "autism" OR "visually impaired" OR "amputation" OR "neurological disorders" OR "visual impairments" OR "hearing impairments" OR "attention deficit and hyperactivity" OR "sensory" (Title) and "Physical education" OR "sport" (Title) and "learning" OR "education" OR "training" OR "instruction" OR "teaching" (Title)         </div>	Web of Science Core Collection	423
		Show editions v	
10:21 PM			

### 3.2. Data analysis

A total of 423 published documents were accessed by scanning the titles according to the concepts determined in the present research. After these queries were examined in detail, 415 studies were included for final examination, excluding eight publications that were not pertinent to the field (Fig. 2).

Figure 2 – Flowchart of phases for identifying and selecting documents (PRISMA)



The data obtained was downloaded as “tab limited file”, “excel”, and “txt” files. First, the data of the publications was uploaded on the program “VOSviewer (Visualization of Similarities)”, a world-renowned and widely used free bibliometric analysis software. VOSviewer was employed to

analyze and visualize the relationships between authors, countries, journals, citations, and keywords (Van Eck & Waltman, 2014; Yu, Li, Zhang, Gu, Zhong, Zha *et al.*, 2020). The author, journal, and country names in the data file to be used in the analyses were corrected and standardized. According to the findings, 415 studies were conducted by 770 authors working in 409 different universities/institutions from 50 different countries, and the studies were published in 133 different journals.

## 4. Results and discussion

### 4.1. Descriptive results

The distribution of the studies according to their publication type, publication language, countries, WoS categories, and WoS index is presented in Table 1. As Table 1 illustrates, most of the publications concerning education, physical education, and sports in the WoS database consisted of articles ( $n = 294, f = 70.84\%$ ) and abstracts/full-text papers ( $n = 67, f = 16.14\%$ ). The studies were published predominantly in English ( $n = 344, f = 82.89\%$ ) followed by Spanish ( $n = 41, f = 9.88\%$ ). The highest number of studies was conducted in the USA ( $n = 204, f = 49.16\%$ ) followed by Spain ( $n = 44, f = 10.60\%$ ), Brazil ( $n = 28, f = 6.75\%$ ), and the UK ( $n = 21, f = 5.06\%$ ). When the number of studies conducted in this field was examined according to the WoS categories, it emerged that education research ( $n = 160, f = 39.00\%$ ) and sports sciences ( $n = 132, f = 32.00\%$ ) constituted the majority. Finally, the number of studies according to the WoS index demonstrated that the Social Sciences Citation Index ( $n = 208, f = 50.12\%$ ), Emerging Sources Citation Index ( $n = 179, f = 43.13\%$ ), and Science Citation Index Expanded ( $n = 114, f = 27.47\%$ ) were pioneering indexes.

Table 1 – *Distribution of studies by document type, document language, countries, WoS category, and WoS index*

<i>Document type</i>	<i>n</i>	<i>f(%)</i>
1 Articles	294	70.84%
2 Abstracts and Full-Text Papers	67	16.14%
3 Editorial Materials	27	6.51%
4 Book Chapters and Reviews	19	4.58%
5 Compilations	8	1.93%

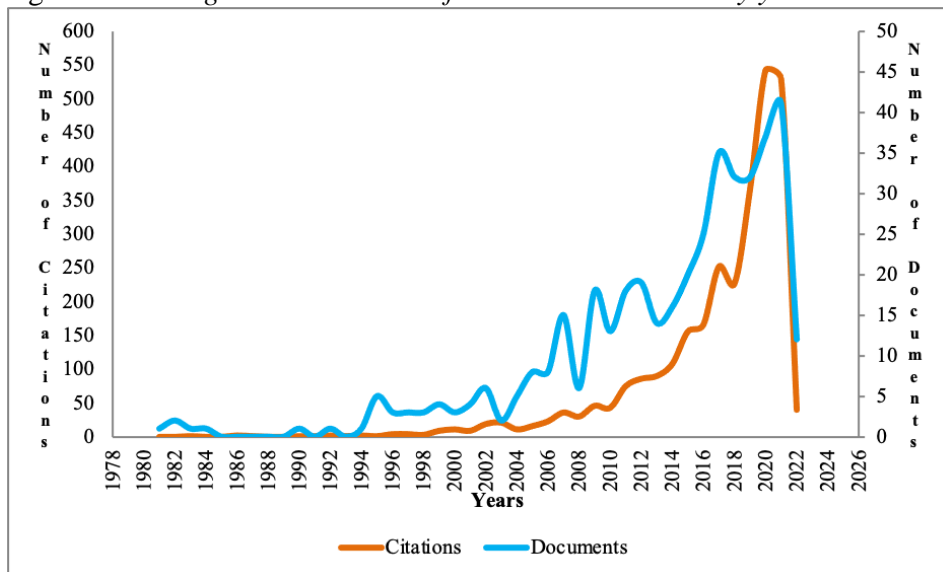
<i>Document language</i>		<i>n</i>	<i>f(%)</i>
1	English	344	82.89%
2	Spanish	41	9.88%
3	Portuguese	17	4.1%
4	Russian	7	1.69%
5	French	3	.72%
6	Czech	1	.24%
7	Latin	1	.24%
8	Ukrainian	1	.24%
<i>Countries (the most cited 10 countries)</i>		<i>n</i>	<i>f(%)</i>
1	United States of America	204	49.16%
2	Spain	44	10.6%
3	Brazil	28	6.75%
4	United Kingdom	21	5.06%
5	China	18	4.34%
6	Czech Republic	15	3.61%
7	Turkey	14	3.37%
8	Australia	9	2.17%
9	Canada	9	2.17%
10	Portugal	8	1.93%
<i>WoS category (the most cited five categories)*</i>		<i>n</i>	<i>f(%)</i>
1	Education and Educational Research	160	39%
2	Sports Sciences	132	32%
3	Hospitality and Leisure Tourism	103	25%
4	Rehabilitation	73	18%
5	Applied Psychology	58	14%
<i>WoS index**</i>		<i>n</i>	<i>f(%)</i>
1	Social Sciences Citation Index (SSCI)	208	50.12%
2	Emerging Sources Citation Index (ESCI)	179	43.13%
3	Science Citation Index Expanded (SCI-Expanded)	114	27.47%
4	Book Citation Index-Social Sciences & Humanities (BKCI-SSH)	10	2.41%
5	Conference Proceedings Citation Index – Social Science & Humanities (CPCI-SSH)	8	1.93%
6	Conference Proceedings Citation Index – Science (CPCI-S)	5	1.2%
7	Book Citation Index – Science (BKCI-S)	1	.24%

\* The number of documents by WoS category appears to be more than the total number of studies as it includes research involving more than one category/field simultaneously.

\*\* The number of documents according to the WoS index seems to be more than the total number of studies since it includes research published in more than one index simultaneously.

The changes in the number of studies conducted by year and the changes in the total number of citations for each year were also examined. When the changes in the number of studies by year were examined, it emerged that the first research in this field was conducted in 1981 (blue line, Fig. 3).

Figure 3 – *Changes in the number of studies and citations by year*

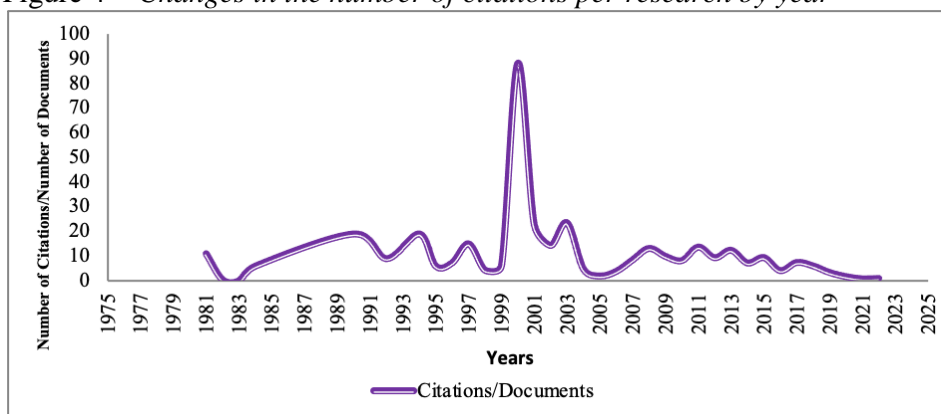


The number of studies carried out between 1981 and 2006 increased but displayed a low momentum. The highest increase with a rising slope started from 2007 until 2022. As can be seen in the figure, the greatest amount of research was done in 2020 with 37 studies. As the number of studies increased, during the years, the researchers concentrated their focus on the problems, solutions, and educational adaptations experienced by students with disabilities in physical education or sports teaching (Kurková, 2020; Roth, 2020; Felzer-Kim, Campbell, Vallabheneni, Peterson, & Hauck, 2021; Giese, Ruin, Baumgärtner, & Haegele, 2021; Hall-López, Ochoa-Martínez, Alarcón-Meza, & Teixeira, 2021; Tarabrina & Wilczewski, 2021; Wu, Chang, Chen, & Chang, 2021; Swenson & Haegele, 2022) and by teachers who teach students with disabilities (Cascone, de Cesar, & D'Elia, 2020; López & García, 2020; Wang, Liu, Wei, & Block, 2020; Dillon, Corcoran, Bailey, Davis, & Columna, 2021; Pérez-Contreras, Bahamonde-Pérez, Pardo-Tamayo, Merino-Muñoz, & Aedo-Muño, 2022). Regarding the changes in the total number of citations per year, the number of studies cited between 1981-2022 varied; the slope was upwards although not as

significantly as the changes in the number of studies conducted per year between 1994 and 2003 (orange line, Fig. 3). From 2004, the total number of citations showed a constant increase (Fig. 3). Moreover, when the years depicting peak points in the graph were considered, it was seen that 543 citations were identified in 2020 and 529 citations in 2021.

The graph of changes in the number of citations per document according to the years of the studies is depicted in Figure 4. The graph shows that the highest citation/document ratio was reached in 2000. The 264 citations were received by only three studies conducted in 2000 and were responsible of the graph produced. Thus, these three studies (Goodwin & Watkinson, 2000; Lieberman, Dunn, Van der Mars & McCubbin, 2000; Vogler, Koranda, & Romance, 2000) made important contributions to many studies, which were conducted after the year 2000.

Figure 4 – *Changes in the number of citations per research by year*



#### 4.2. Bibliometric results

The number of publications in the field by the authors of the study, the number of citations they received, the Total Link Strength (TLS)<sup>4</sup> and the CT/DOC (i.e. the number of citations per document) were also investigated in the study (Tab. 2). For the scope of the research, we considered authors who conducted research in the relevant indexes and who figured with at least 100 citations. Justin A. Haegele stood out as the most cited author ( $n = 384$ ) in this research field, with the highest number of documents ( $n = 40$ )

<sup>4</sup> According to the VOSviewer manual, each link has a strength, represented by a positive numeric value. The higher this value, the stronger the link. The total link strength feature refers to the total strength of a given researcher's co-authorship connections with other researchers.

and the highest TLS ( $n = 797$ ; see Tab. 2 for more details). The authors who followed according to the citations received were Lauren J. Lieberman ( $n = 292$  citations), Samuel R. Hodge ( $n = 265$  citations), and Donna L. Goodwin ( $n = 182$  citations). When the TLS values were examined, it emerged that the most cited authors generally also presented the highest TLS values (but see also Xihe Zhu in Tab. 2). This can be explained by the fact that these authors created a diversity of connections because they were highly quoted by different authors. As regards the CT/DOC, the author with the greatest ratio was identified as E. Jane Watkinson ( $n = 166$ ). Although the author only published one document in the field, she drew attention with 166 citations.

Table 2 – *Author rankings (authors with at least 100 citations)*

Number	Author	Documents	Citations	TLS	CT/DOC*
1	Haegele, Justin A.	40	384	797	9.6
2	Lieberman, Lauren J.	24	292	319	12.17
3	Hodge, Samuel R.	17	265	356	15.59
4	Goodwin, Donna L.	2	182	160	91
5	Zhu, Xihe	15	172	413	11.47
6	Block, Martin E.	15	172	197	11.47
7	Watkinson, E. Jane	1	166	144	166
8	Obrusnikova, Iva	8	145	146	18.13
9	Sato, Takahiro	7	141	247	20.14
10	Fitzgerald, Hayley	3	123	85	41
11	Pan, Chien-Yu	5	115	40	23
12	Houston-Wilson, Cathy	2	109	71	54.5
13	Dillon Suzanna, Rocco	9	109	123	12.11

\*Refers to the number of citations per document for each author.

The rankings of the universities of the authors who conducted research on the disabled are given in Table 3 according to the number of citations, the countries where the research was conducted, the number of articles published, the TLS values, and the CT/DOC ratios. The Ohio State University figured as the most cited in this field ( $n = 408$ ), which can be explained by the fact that it employed Samuel R. Hodge, who has many studies and citations in this field. The Old Dominion University ( $n = 354$ ), which ranked second according to the number of citations, ranked first instead in terms of the TLS value ( $n = 440$ ). This result reveals that the university is more preferred for joint research. Justin A. Haegele is

employed at this university. Another notable university, according to the number of citations, was Suny College Brockport, where Lauren J. Lieberman works. The contributions of the studies of these authors on disabled people to the field were substantial according to both the number of citations and the TLS values. Along the same line, the fact that six of the 10 highest-ranking universities are based in the United States of America is another point worth noting.

Table 3 – *University rankings (most cited 10 Universities)*

Number	Education institute	Country	Documents	Citations	TLS	CT/DOC
1	The Ohio State University	USA	24	408	365	17
2	Old Dominion University	USA	38	354	440	9.32
3	Suny College Brockport	USA	19	251	187	13.21
4	University of Alberta	Canada	2	182	104	91
5	University of Regina	Canada	1	166	95	166
6	The University of Virginia	USA	14	159	139	11.36
7	Leeds Metropolitan University	UK	3	123	60	41
8	National Kaohsiung Normal University	Taiwan	4	115	24	28.75
9	Wayne State University	USA	9	107	91	11.89
10	University of Delaware	USA	6	98	86	16.33

The investigation of the studies based on the journals in which research was published revealed that the most influential journal in this field was “*Adapted Physical Activity Quarterly*” (Tab. 4). This journal ranked first with 26 studies and 870 citations in this field. In addition, the TLS value of the journal was higher than the other journals ( $n = 247$ ). Thus, it is clear that the journal has a mission related to the disabled and that its focus is centered on research studies regarding the physical activities adapted to the disabled to ensure their participation in sports, as well as in rehabilitation research. In the ranking made according to the number of citations, the journal “*Journal of Physical Education Recreation and Dance*” ranked second. With 33 studies published, this journal received a total of 173 citations, and the TLS

value was 50. The journal supports research on curriculum, teacher training, coaching, dance, and entertainment in the field of physical education or sports. The journal “*Research Quarterly for Exercise and Sport*” also stood out in terms of number of documents published (53 articles), showing that the journal was interested on research of disabled subjects in sports and exercise.

Another important variable that should be highlighted and that was taken into the consideration was the journal’s impact factor (see Tab. 4 for more details). The highest impact factors were scored by the journals “*Physical Education and Sport Pedagogy*” (IF = 5.830), “*Sports Education and Society*” (IF = 4.119), and “*European Physical Education Review*” (IF = 3.790). Obviously, in the ranking of journals related to the field on which this study was focused, there were only journals for people with disabilities. For example, the “*International Journal of Disability Development and Education*” is concentrated on the education of students with disabilities, the “*Journal of Visual Impairment & Blindness*” deals with all topics related to the visually-disabled, while the “*British Journal of Learning Disabilities*” is interested in research on individuals with learning disabilities.

Table 4 – *Journal rankings (most cited 10 journals)*

Number	Name of Journal	Documents	Citations	TLS	Impact Factor*
1	Adapted Physical Activity Quarterly	26	870	247	2.92
2	Journal of Physical Education Recreation and Dance	33	173	50	.76
3	Sport Education and Society	12	151	54	4.11
4	Research Quarterly for Exercise and Sport	53	149	51	2.50
5	International Journal of Disability Development and Education	8	133	47	1.54
6	Journal of Visual Impairment & Blindness	9	104	42	.798
7	Quest	3	104	55	2.91
8	European Physical Education Review	9	85	56	3.79
9	British Journal of Learning Disabilities	1	66	18	1.36
10	Physical Education and Sport Pedagogy	6	54	48	5.83

\* Values of the journals in 2020 on their websites.



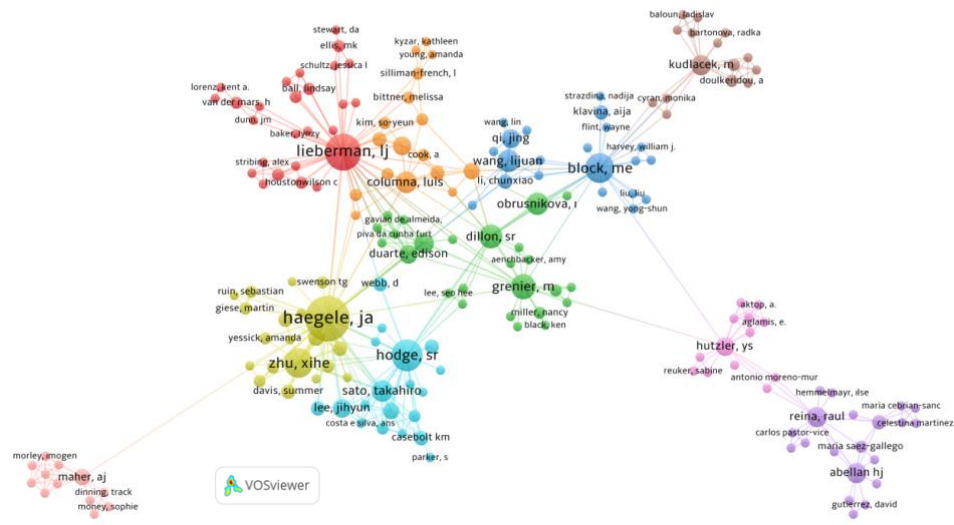
When the studies were examined in terms of the countries where the research was conducted, it emerged that the most cited studies were those performed in the United States (Tab. 5). The 196 studies conducted in this field in the United States provided a clear advantage over other countries with 1571 citations, a 402 TLS value, and 8.02 citations per document. This was confirmed also by the university ranking according to the number of citations in which six universities in the United States of America figured as the top 10 ranks (see Tab. 3 for more details). This rate indicates that 60% of the most cited universities were universities based in the United States. As illustrated in Table 5, the UK ( $n = 298$ ), Canada ( $n = 217$ ), Spain ( $n = 166$ ), and Taiwan ( $n = 119$ ) followed the USA according to the number of citations. Regarding the CT/DOC ratio, Canada ranked first (31.00), which can be explained by the fact that the number of studies focused on disabled people was low but the citations the studies received was remarkably high.

Table 5 – *Country rankings (most cited 10 countries)*

Number	Country	Documents	Citations	TLS	CT/DOC
1	USA	196	1571	402	8.02
2	UK	20	268	82	13.40
3	Canada	7	217	76	31
4	Spain	44	166	106	3.77
5	Taiwan	8	119	15	14.88
6	Czech Republic	15	118	73	7.87
7	China	18	94	66	5.22
8	Israel	5	90	63	18
9	Turkey	14	81	33	5.79
10	Ireland	3	72	27	24

#### 4.3. Co-Authorship: Authors

The “Co-Authorship” analysis of the studies investigated is presented in Figure 5. The relational network map of the figure was accessed from the co-authorship according to the authors tab in the VOSviewer program. Studies with 25 or more co-authors were not included in the analysis. Information for a total of 770 authors was obtained by including the authors with at least one publication in the analyses. However, it was not possible to obtain a bibliometric network among all authors but the resulting image was obtained from a network composed of 188 authors.

Figure 5 – *The co-authorship network map*

The clusters formed by the co-authorship networks of the authors were colored according to the co-authorship relationships on the map. The size of the circles belonging to the authors varied in relation to the number of documents. Ten differently colored clusters emerged in the co-authorship networks where relational networks were formed. These clusters were red (item = 26), green (item = 25), blue (item = 21), yellow (item = 20), purple (item = 20), turquoise (item = 19), orange (item = 17), brown (item = 15), pink (item = 13), and lilac (item = 12). In the red cluster, some of the 24 studies Lauren J. Liberman conducted with other authors appeared to have common links with other clusters. The most obvious of these was the co-authorship relationship between Lauren J. Liberman and Justin A. Haegele in the yellow cluster. Three were the studies that these authors carried out jointly and they were conducted on students with visual disabilities (see Haegele, Liberman, Columna, & Runyan, 2014; Liberman, Haegele, Columna, & Conroy, 2014; Haegele & Liberman, 2016). More specifically, their research, which aimed to propose an expanded curriculum supported by physical education teachers for visually impaired students to lead independent lives and be successful, made significant contributions to the field (Haegele *et al.*, 2014). Moreover, in the red cluster, Lauren J. Liberman also had co-authorship connections with the orange, turquoise, and green clusters. Another notable cluster was the green cluster, which

appeared to be associated with many other clusters. In the green cluster, the joint research among the authors S. R. Dillon, M. Grenier, and I. Obrusnikova was clear. In contrast, the brown cluster had a co-authorship association only with the blue cluster, while the lilac cluster had a co-authorship relationship only with the yellow cluster, and finally, the purple cluster had a relational co-authorship only with the pink cluster.

#### 4.4. Co-occurrence: Keywords

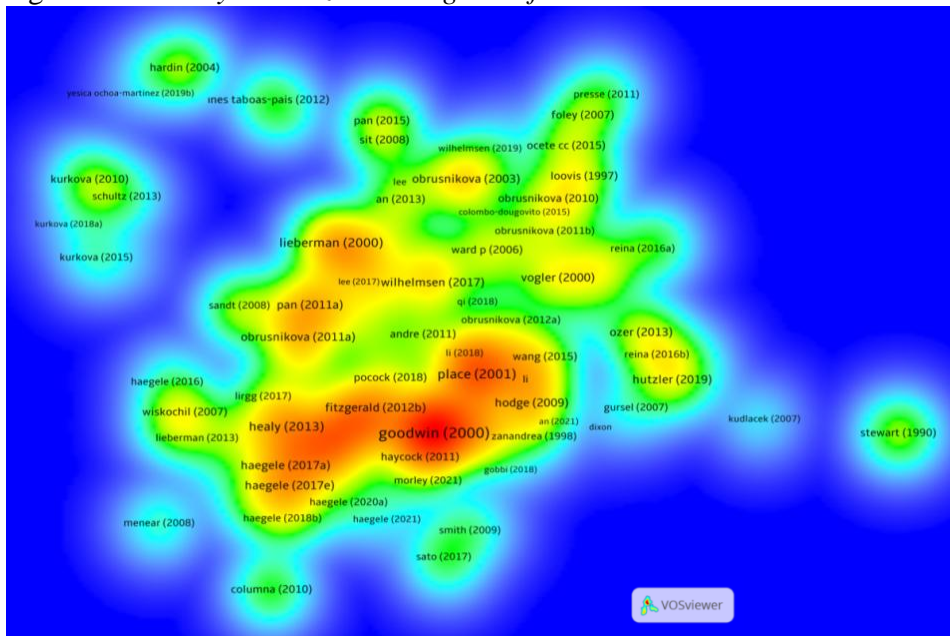
The relational network map created according to the keywords used by the authors in the studies is presented in Figure 6. The keywords in the image (co-occurrence: keywords) were created according to the frequency of the words used at least two times. A total of 106 keywords was used, but a relational network map was constructed only between 99. Six clusters emerged in the visual that was generated, corresponding to six different colors: green, yellow, red, purple, blue and turquoise. The red cluster was more notable than the other clusters since the keywords used were more (item = 29). In this cluster, the keywords “*special education*”, “*attitudes*”, “*students with disabilities*”, and “*inclusive education*” come to the fore. These words were descriptive of the inclusive educational status of students with disabilities and of their special educational needs. Similar words to those adopted in the red cluster were also used in another prominent set: the green cluster (item = 18). Here, the words that were different concerned the scales developed for the special educational needs of disabled students. The most frequently used keywords were located in the blue cluster (item = 16). The keyword “*physical education*”, which was used in the database search stage of our study, became clear in this cluster. In the yellow cluster (item = 12), there were words related to the research methods, such as “*phenomenology*” and “*qualitative research*” and words connected to hearing and autism disabilities, such as “*deaf children*” and “*autism spectrum disorder*”. Thus, there were no words to describe this cluster clearly, but it provided an idea about the research methods used in research for the disabled. The other salient clusters, which were the purple cluster (item = 12) and the turquoise cluster (item = 12), included the words related to health, such as “*physical activity*”, “*exercise*”, “*adolescents*”, and “*health*”, and words concerning different disabilities, such as “*blindness*”, “*intellectual disability*”, and “*autism spectrum disorders*”. More in general, this analysis showed that similar words were used in the clusters with different forms of use. For this reason, it was difficult to make a clear



However, a relational network occurred only among 178 studies. As depicted in Figure 7, 12 clusters emerged. The gradual change in the blue-green-yellow-red scale of the colors, symbolizing the studies in the figure, was an indication of the high number of citations. The study by Goodwin and Watkinson (2000) was located in the most salient area of the diagram. In this research, the inclusivity feature of physical education courses was dealt with from the perspective of physically disabled students. Likewise, the inclusion of physically disabled students with other students in physical education classes was evaluated in another remarkable study conducted by Place and Hodge (2001). As the authors reported, disabled students rarely interact with other students and communicate more among themselves in physical education classes. Lieberman and colleagues also conducted a remarkable study on the inclusion of visually impaired students in physical education courses (Lieberman, Houston-Wilson, & Kozub, 2002). In this study, the aim was to evaluate the obstacles preventing visually impaired students from participating in physical education classes with other students through the eyes of teachers. In addition, Haegele and Sutherland (2015) systematically examined qualitative research investigating the perspectives of disabled students towards physical education courses. In their study, the authors investigated the value of the positive attitudes of physical education teachers and their importance as a critical feature for disabled students in permanent learning. Another significant study was conducted on the experiences of children with autism in physical education classes. In this research, the individual difficulties experienced by children with autism in physical education classes consisted of sub-themes, such as physical skills, psychological difficulties, and fear of injury (Healy, Msetfi, & Gallagher, 2013). By carrying out an experimental study on individuals who were hearing impaired, Lieberman and colleagues attracted attention in this field (Lieberman *et al.*, 2000). In their research, the aim was to increase the success of inclusive education of the hearing impaired in physical education courses. Another study that is worthy of note, owing to the number of citations reported, analyzed the stories of disabled students concerning physical education lessons (Fitzgerald & Stride, 2012). In this research, the attitudes of three disabled students towards physical education courses were described. When studies that became apparent in the visual were reviewed, it emerged that these studies targeted students with autism (Obrusnikova & Dillon, 2011; Pan, Tsai, Chu, & Hsieh, 2011). Finally, there was a noteworthy study investigating the effects of including a physically disabled fourth-grade student using a wheelchair in a class of non-disabled students

(Obrusníková, Válková, & Block, 2003). In general, although some studies were not obvious, it was established that all the studies in the visual were aimed at different types of disability. Furthermore, it can be argued that the citation networks established among the authors were in the studies that pioneered the research conducted in this field.

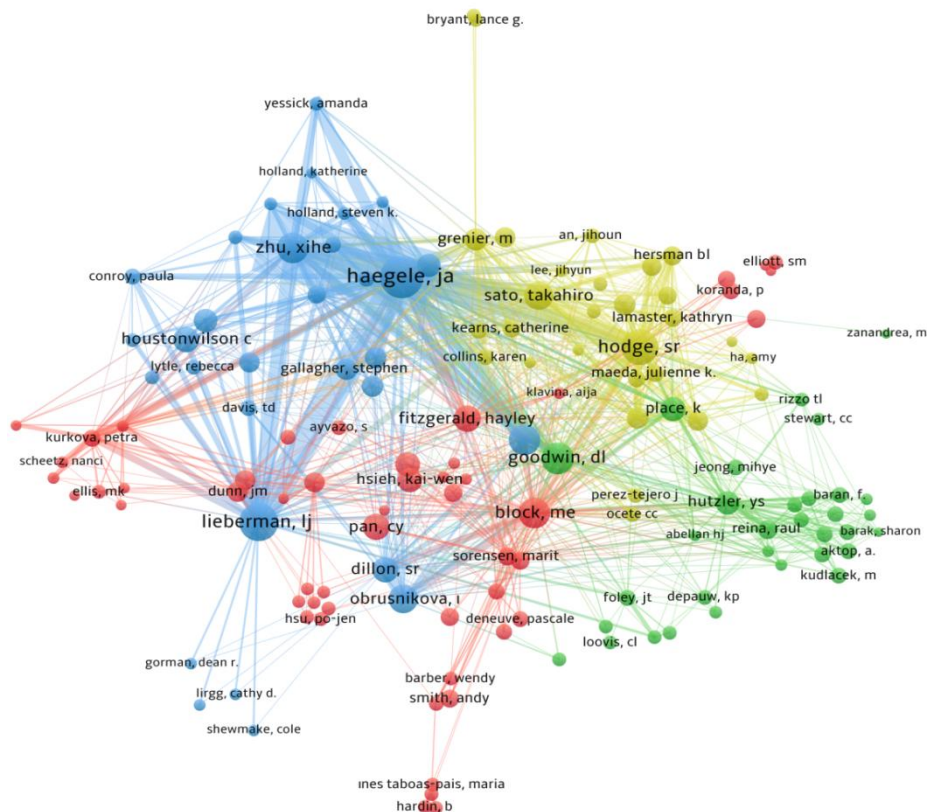
Figure 7 – *Density visualization diagram of the most cited studies*



#### 4.6. Citation: Authors

The most cited authors and the relational network map consequently generated are presented in Figure 8. In this analysis of 770 authors, at least one document and at least 10 citation values were determined as breakpoints to obtain more accurate results in the visual. Thus, the remaining data was drawn by information from 173 authors. However, a relational network map was constructed only between 144 authors. Four clusters, corresponding to four colors (red, green, yellow, blue) that symbolized the authors, emerged on the map (refer to Fig. 8). The larger size of the circles was again an indication of the greater number of citations. In addition, the density of the connecting lines between the authors suggested there were strong associations.

Figure 8 – The network map of the most cited authors



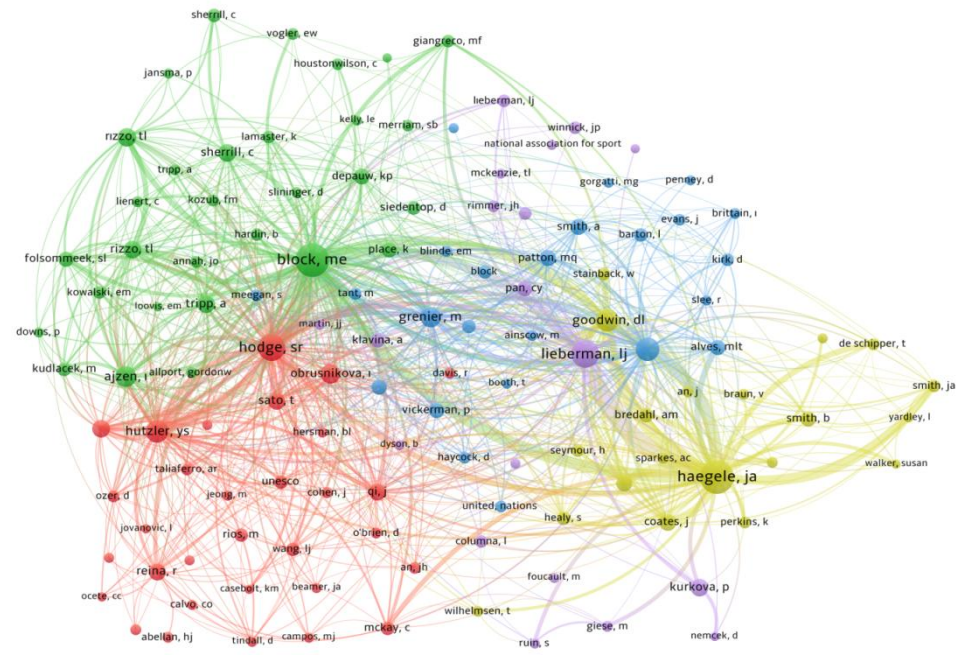
In the red cluster (item = 52), Martin E. Block ( $n = 172$ ), Hayley Fitzgerald ( $n = 123$ ), Chien-Yu Pan ( $n = 115$ ), Kai-Wen Hsieh ( $n = 92$ ), and Chia-Liang Tsai ( $n = 92$ ) were prominent authors in terms of number of citations. In the green cluster (item = 32), Donna L. Goodwin ( $n = 182$ ), K. Place ( $n = 91$ ) and Yeshayahu S. Hutzler ( $n = 90$ ) were authors characterized by high citation numbers. Justin A. Haegele ( $n = 384$ ), Lauren J. Lieberman ( $n = 292$ ), Xihe Zhu ( $n = 172$ ), E. Jane Watkinson ( $n = 166$ ), Iwa Obrusnikova ( $n = 145$ ), and Suzanna R. Dillon ( $n = 109$ ) were authors who stood out in the blue cluster (item = 31). Lastly, Samuel R. Hodge ( $n = 265$ ), Takahiro Sato ( $n = 141$ ) and Michelle Grenier ( $n = 75$ ) were the authors who had more citations in the yellow cluster (item = 29). In the resulting network map, the strongest connection was found between Xihe Zhu and Justin A. Haegele (Links = 95). It is known, in fact, that both authors are employed at the same university (Old Dominion University). When the studies of these authors were examined, it emerged that they were co-authors in 15 studies.

In other words, these authors had co-citations of their research. When searching for the strong connections on the network map, we observed that Justin A. Haegele was at the center because of the strong connections he has established in his cluster and with other clusters, confirming the conclusion that this author is the most cited in this field.

4.7. Co-citation: Cited authors

The relational network map created for the authors who received the highest number of co-citations in the studies is illustrated in Figure 9. During the analysis, the phrase “minimum number of citations of an author: 10” was entered into the program so that the clusters that would be formed could be shown more clearly. Thus, data was obtained for a total of 125 authors. However, a relational network map emerged only for 124 authors.

Figure 9 – The network map of the most co-cited authors



Five clusters (red, green, yellow, blue, purple) occurred in the visual. The greater size of the circles symbolized a higher number of citations of the authors and the thickness of the lines indicated a strong relationship between them. The cases of studies (cited by two or more studies at the same time) in



the fields of education, physical education, and sports for disabled people were examined in the resulting image. The results that emerged showed that only authors who conducted research in this field were included in the clusters. In the data revealed in this research, analyses were done on the most co-cited authors and the results showed that the authors mentioned here were the same as the most cited authors.

## 5. Conclusions

In the current research, the bibliometric mapping technique was used to determine the research trends in education, physical education, and sports for the disabled. The findings revealed that research in this field has exponentially increased from the 1980s to the present day. When the bibliometric findings were examined, we observed that most publications on disability were carried out in the United States. Moreover, the United States also figured as the country with the highest number of citations in parallel with the number of studies. Another interesting result was that, although the number of publications in Canada was less than in Spain, China, the Czech Republic, Taiwan, and Turkey, the country ranked first in terms of CT/DOC ratio as the citations the studies received was remarkably high. When we examined the most influential institutions where research on education, physical education, and sports for the disabled was conducted, we found that six out of the ten highest-ranking universities were based in the United States. In line with this finding, the most influential authors in this research field were also researchers working in the United States. Thus, it emerged that the United States and the scientists working in the country made important contributions to the development of research on education, physical education, and sports for the disabled. The findings of the study also demonstrated that studies on education, physical education, and sports for the disabled were generally published in journals focusing on the field of the sports sciences. The publication that was cited the most was "*Inclusive physical education from the perspective of students with physical disabilities.*" In this research study, more specifically, the phenomenon of inclusive physical education was aimed to be defined from the perspective of disabled students. The results of the current research demonstrated that the most frequently used keywords in the studies on education, physical education, and sports for the disabled were "*physical education*" and "*adapted physical education*". This finding was in line with the theme of the present research. Moreover, it can be said that adapted physical

education or adapted sports are words that aim for disabled students to lead a healthier life according to their needs. Although the bibliometric results of the current research were not able to clearly explain the reason behind the co-authorship relations, they still showed that authors in the same countries and institutions worked in cooperation with each other. In addition, according to the results obtained in the visuals for citations and authors in the bibliometric mapping, we found that the most cited author in this research field worked in cooperation with many national and international researchers. Finally, the results of the analysis regarding the authors to whom co-referencing was made showed that the studies on education, physical education, and sports for disabled people are recent. From past to the present, it can be said that the existence of studies that focus on the current problems of disabled people in the field of physical education, or sports, and of studies that offer solutions, support their inclusive education, touch their psycho-social and caring rehabilitation processes are limited to the authors, studies, countries, and journals revealed in this research.

### *5.1. Implications, limitations, and future research*

Researchers have recently begun to use bibliometric analysis increasingly to investigate research in the literature. However, to the best of our knowledge no bibliometric mapping research was found regarding research on education, physical education, and sports for the disabled. The current study attempted to examine this by researching the field of disabilities in a broader context. The study focused on published research on education, physical education, and sports for people with disabilities conducted between 1980 and 2022. This research revealed influential aspects of writers, journals, and institutions with numerous citations highlighting recent topics in the field of disabilities. The results of the research may provide fundamental information and potential service for future research to set an agenda for the relevant literature. This study also outlined practical information for politicians, practitioners, and lecturers to better understand the emergence of the concepts of education, physical education, and sports for people with disabilities and to draw their attention to new trends and opportunities in this field.

In addition to the research results, there are some limitations in this study that need to be addressed in the future. The study included only peer-reviewed academic articles. Therefore, other documents, such as related theses and technical reports on education, physical education, and sports for

the disabled, were not included in the current research. We suggest to include these types of studies in future research. Documents and archives can be searched to better understand the studies in this field. In addition, a systematic literature review should be carried out to strengthen and enhance the results of the present research. Another limitation of this study was related to the exclusive use of the WoS database. As mentioned above, even though WoS is considered the most effective tool for bibliometric analysis (Kostoff, del Rio, Humenik, Garcia, & Ramirez, 2001), the use of a single database may cause some important research to be overlooked. However, this limitation was mitigated by the ability of the co-citation analysis in the VOSviewer program to capture research outside the database. Nevertheless, it is difficult to predict to what extent the findings of the current research can be generalized when all databases are taken into account. Future research should thus be promoted to use other databases, such as Scopus, Australian Education Index, British Education Index, and Journals Indexed in ERIC to validate and expand the findings of the current study. In addition, only quantitative indicators were examined in this research, and qualitative indicators were not mentioned. According to Lima and Filho (2019) bibliometric research focuses on the accumulated scientific production of a particular theme or field over a certain time. This time constraint may cause this study to miss some recent publications that have not received a threshold number of citations in the bibliometric analysis. These limitations can be used to suggest new paths for future research.

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