



Twice Exceptionality with RStudio: A Bibliometric Analysis*

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Article Information	ABSTRACT
Received: 20.01.2021	Twice-exceptionality is used to describe individuals who display giftedness along with at least one type of disability. The present study aimed to conduct a bibliometric analysis of publications on twice-exceptionality. Publications indexed in the Web of Science and Scopus databases were analyzed by using bibliometric methods via the RStudio program. The Bibliometrix 3.6.3 package was utilized for social network visualizations. Publications were examined in terms of the author(s) affiliations, number of publications, language, writing genre, most active journals on the subject, countries where the research was conducted, number of citations received, sources used, and keywords. Analyses revealed that a total of 272 publications were available on twice-exceptionality appeared between 1968 and 2020. The publication language is generally English (n = 259). The highest number of publication contributions to the field was made by the University of Iowa and the University of Connecticut. The most active journals in the field are Roeper Review and Gifted Child Quarterly. Researchers interested in twice-exceptionality can benefit from the results of the present study. Keywords: Giftedness, special education, bibliometric analysis, social network analysis
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1. INTRODUCTION

Twice-exceptional individuals are those who are gifted but, at the same time, inadequate in one or more developmental areas (Neihart, 2008; Reis, Baum, and Burke, 2014). These individuals may have hearing and/or visual impairments, speech disorders, physical or emotional disorders; however, they can display a relatively high cognitive performance despite having one or more cognitive handicaps, such as autism spectrum disorder (ASD), attention deficit and hyperactivity disorder (ADHD), learning disabilities (LD), or any other persistent health problem (Nielsen, 2002). The National Commission for Twice-Exceptional Students defines twice-exceptionality based on existing research as follows (Reis, Baum and Burke, 2014, p. 222):

"Twice-exceptional learners are students who demonstrate the potential for high achievement or creative productivity in one or more domains such as math, science, technology, the social arts, the visual, spatial, or performing arts or other areas of human productivity AND who manifest one or more disabilities as defined by federal or state eligibility criteria. These disabilities include specific learning disabilities; speech and language disorders; emotional/behavioral disorders; physical disabilities; Autism Spectrum Disorders (ASD); or other health impairments, such as Attention Deficit/Hyperactivity Disorder (ADHD). These disabilities and high abilities combine to produce a unique population of students who may fail to demonstrate either high academic performance or specific disabilities. Their gifts may mask their disabilities and their disabilities may mask their gifts."

The diverse areas of giftedness and inadequacy covered by the term twice-exceptionality diversify the characteristics of these individuals (Baldwin, Omdal, and Pereles, 2015). Because they possess both the strengths of giftedness and the weaknesses deriving from their disability (National Education Association [NEA], 2006), identifying these individuals is a complex process (Lee and Olenchak, 2015; Ronksley-Pavia, 2015). Twice-exceptional individuals can be evaluated in three groups: (a) diagnosed with giftedness, which masks their disability; (b) diagnosed with a disability, which masks their giftedness; (c)

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giftedness and disability mask each other, allowing neither giftedness nor their disability to be recognized, thus they can remain unidentified (Amran and Majid, 2019; Baum, 1990; Brody and Mills, 1997).

Twice-exceptional individuals who are diagnosed as gifted and whose disability is masked by their talent, show high skills in the areas in which they are talented. Therefore, they are perceived holistically, and their areas of disability remain unnoticed (Rothenbusch et al., 2016). In other words, as a result of masking and compensating for areas where they are strong (van Viersen, Kroesbergen, Slot, & de Bree, 2016), they are identified only in their areas of ability and are not supported in areas where they have disability (Brody and Mills, 1997; Trail, 2011). On the other hand, it is the disability that is focused on in twice-exceptional individuals who are diagnosed with a disability that masks their giftedness, so their giftedness goes unnoticed (Amran and Majid, 2019; Besnoy, 2006). Hence, they do not receive support to develop their areas of giftedness (Baum, 1990; Pfeiffer, 2015). Because their giftedness and disability mask each other, the ratio of twice-exceptional individuals whose neither talent nor inadequacy can be noticed or identified is believed to be the highest among the three groups (Brody and Mills, 1997). The masking of giftedness and disability makes it difficult for both to be diagnosed (Baldwin, Omdal, and Pereles, 2015; Maddocks, 2020). It is for this reason neither giftedness nor disability in this third group can be identified (Silverman, 1989; Wang and Neihart, 2015).

When twice-exceptional individuals are not recognized, their special needs arising from both their giftedness and their disabilities are ignored (Wang and Neihart, 2015). As a result, the fact that twice-exceptional individuals are not correctly identified deprives them of the educational opportunities they need (Trail, 2011). However, twice-exceptional individuals need educational programs suitable for them (Foley-Nicpon, Allmon, Sieck, & Stinson, 2011).

Studies on twice-exceptionality in Turkey have started in recent years and generally focused on student populations (e.g. Kaplan-Sayi, 2018; Sengil-Akar and Akar, 2020). Such studies have focused on the characteristics and educational options of gifted children with ADHD (Bildiren and Firat, 2020b; Kargi and Akman, 2003; Kaplan-Sayi, 2018; Simsek and Karatas, 2019; Yilmaz-Yenioglu and Melekoglu, 2021), students with giftedness and LD (Bildiren and Firat, 2020a; Sekeral and Ozkardes, 2013), students with giftedness and depression and impulse control disorder (Gok, Bas, and Tuncay, 2018) and students with giftedness and ASD (Omur, 2019). Thus, giftedness is addressed from various aspects.

To illustrate, Bildiren and Firat (2020a) studied the characteristics and diagnostic processes of twice-exceptional students. In another study, Bildiren and Firat (2020b) used multiple evaluation tools, including the Weschler Intelligence Scale for Children-IV (WISC-IV) to assess whether a student diagnosed with ADHD was also gifted and concluded that the student may be twice-exceptional with LD. The researchers emphasized that performing the assessment only with an intelligence test can lead to a misdiagnosis and, thus, multiple evaluations are important for accurate diagnosis of twice-exceptional children. Another conclusion that can be traced from the research is that twice-exceptional individuals are prevented from receiving education they need by not being properly diagnosed. However, twice-exceptional individuals need differentiated education (Ministry of National Education [MNE], 2019).

Omur (2019) observed the characteristics and behaviors of twice-exceptional children with giftedness and ASD. She examined how the two diagnoses affected each other. She collected data from three twice-exceptional participants and their parents to create a model that would reveal the characteristics, behaviors, and educational needs that could contribute to the diagnostic criteria for twice-exceptional children. The findings revealed that there were confusion concerning the diagnoses of ASD and giftedness of twice-exceptional children, their characteristics were not understood, they were supported in areas where they showed inadequacy, but their cognitive profiles were not considered, thus indicating that their cognitive skills were not supported.

Other studies on twice-exceptional individuals focused on teachers. For example, Simsek and Karatas (2019) reported that the social-emotional problems that twice-exceptional students experienced the most were lack of self-confidence, a negative perception of their environment, and lack of communication. Duyar (2020) examined the knowledge and self-efficacy of teachers who worked with twice-exceptional students at Science and Art Centers and found that teachers possessed moderate levels of knowledge, whereas they had higher levels of self-efficacy. In addition, it was determined that there was a lower positive correlation between teachers' levels of knowledge and their self-efficacy (Duyar, 2020).

Sengil-Akar and Akar (2020) underlined that twice-exceptional students need to be supported by their families and social environments. They described the daily life experiences of a twice-exceptional student, the difficulties he faced in his education, and what he did in the face of these difficulties. Finally, Yilmaz-Yenioglu and Melekoglu (2021) conducted a descriptive study on twice-exceptional individuals and highlighted the need for more research on twice-exceptional individuals and the limited number of interventions in particular.

As there is a limited number of studies on twice-exceptionality in Turkey, it is important to outline not only the existing literature in Turkey but also international studies addressing this subject. Therefore, the present study aims to synthesize existing studies related to twice-exceptionality. The findings of the present study will provide a general overview of the area and recommendations will be presented for future studies.

Within the scope of these objectives, the following research questions were sought in the present study:

- 1) What is the distribution of the publications in terms of their authors, year of publication, type of publication, language used, the country and institution where they are published, and journals?
- 2) What are the publication charts of the most published journals on the subject?
- 3) Which studies are the most cited in the field of twice-exceptionality?
- 4) What are the most commonly used keywords in the subject area, among the list of keywords, and in abstracts and titles?
- 5) What are the changing and up-to-date trends in the studies carried out in this field?

2. METHODOLOGY

2.1. Research Design

The study employs a descriptive research design. Descriptive studies are those in which the researcher describes the target through various methods (Gravetter and Forzosa, 2018). To describe the current status and development of research in the field of twice-exceptionality, the present study searched and identified studies conducted on twice-exceptionality. Subsequently, bibliometric methods were utilized to make analyses and interpretations.

2.2. Data Collection

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guide was used in the process of collecting data in the research conducted to examine studies in the field of twice-exceptionality. The PRISMA guideline provides systematic progress in scanning studies in the literature (Moher, Liberati, Tetzlaff, and Altman, 2009). The data were scanned using the Web of Science (WoS) and Scopus databases on January 1, 2020. Two databases were utilized to scan the data as both WoS and Scopus have databases that provide citation information. Hence, the WoS and Scopus databases were searched with the keywords "twice exception*", "twice-exception*", "dual exception*", "gifted handicapped*", "gifted*", and "disability*". The search parameters used when collecting data are presented respectively for WoS and Scopus databases.

TOPIC: ("twice exception*" OR "twice-exception*" OR "dual exception*" OR "gifted handicapped"
OR "gifted" AND "disability")

Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI

Figure 1. WoS database search query

TITLE-ABS-KEY ("twice exception*" OR "twice-exception*" OR "dual exception*" OR "gifted
handicapped" OR "gifted" AND "disability")

Figure 2. Scopus database search query

The studies achieved are limited by applying inclusion and exclusion criteria, as shown in the PRISMA guideline given in Figure 3. In this context, the inclusion and exclusion criteria applied to the studies found are explained in detail.

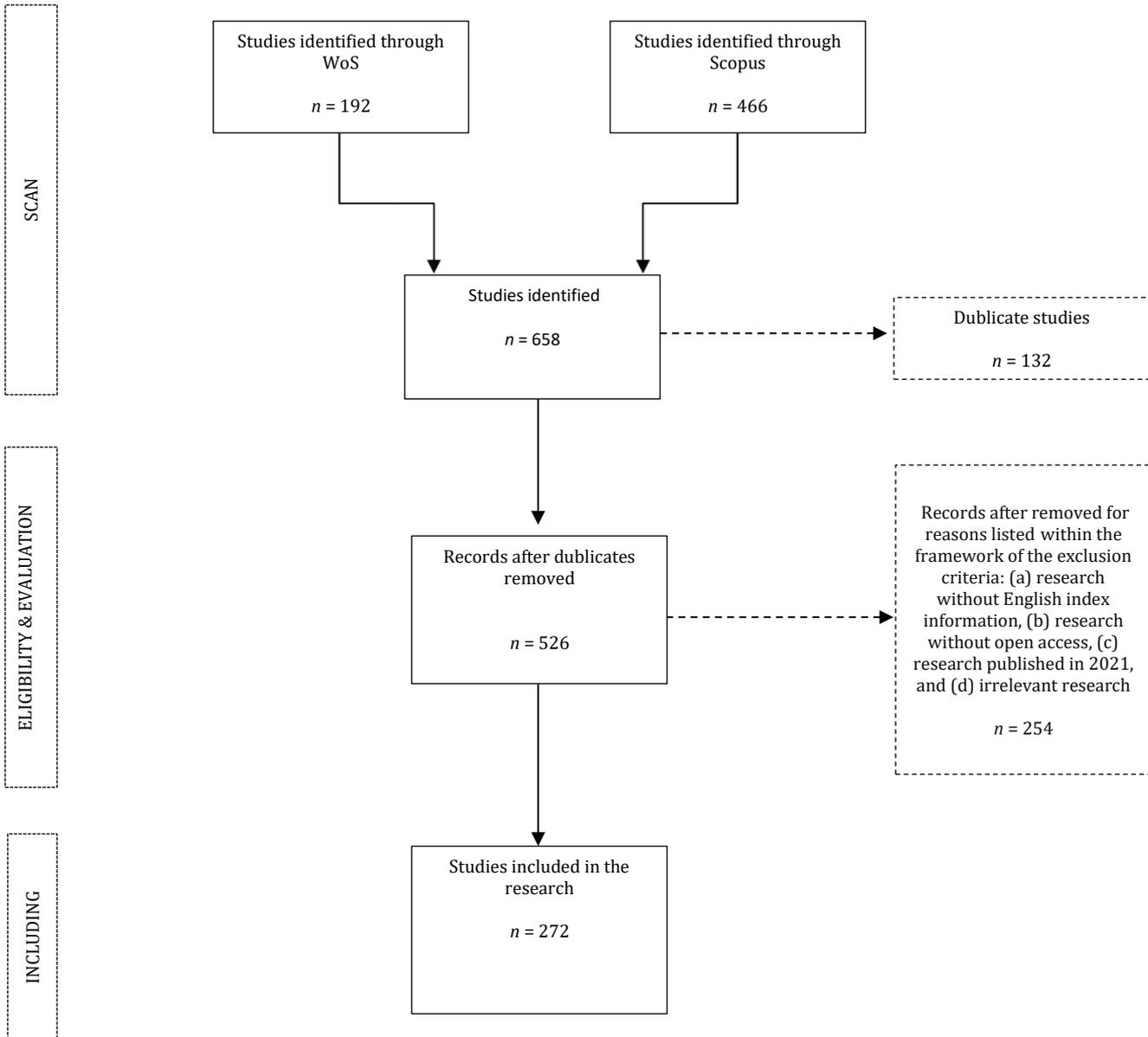


Figure 3. Flow diagram of studies selection process used in the study

2.2.1. Inclusion and exclusion criteria

Criteria for inclusion in the study were as follows: (a) the WoS or Scopus database search query, (b) research published before 2021, (c) open access research, (d) research having English directory information, and (e) research on twice-exceptionality. On the other hand, the exclusion criteria were research (a) not containing English directory information, (b) without open access, (c) published in 2021, and (d) irrelevant topic. As a result of scanning the databases by keywords, 192 studies were obtained from the WoS database and 466 from the Scopus database. No restrictions were set for the publication year when collecting the data. Because the first academic study on the subject was published in 1968, the beginning of the time interval was taken from this year. The year 2021 was not included in the study as the number of studies and citations would vary. As a result, the study was limited to research published between 1968 and 2020. Similarly, no language or publication type restriction was imposed. At this point, the studies accessed were examined according to the type of publications, namely article, book section, editorial material, review article, full-text paper, abstract, congress presentation, and book. The language analysis of the full-text publications revealed the following languages: English, Spanish, Czech, Portuguese, French, and Russian. After omitting the redundant studies in both databases, 526 studies were included in the main review process. The index information for these studies was downloaded from the databases and saved as a Microsoft Excel file. The titles and abstracts of 526 studies were independently analyzed by two researchers for their compliance with the subject. The studies that were found to be suitable were coded as "S (Suitable)", and those found not suitable were coded as "NS (Not Suitable)". The rate of agreement between the coders was calculated by using the formula 'number of agreements between coders / (number of agreements + number of disagreements between coders) x 100' (Houten and Hall, 2001). Using this formula, the agreement between the codings of the two researchers was calculated as 100%. After this process, 27 articles for WoS and 227 articles for Scopus were determined to be irrelevant. After these studies were eliminated, 272 studies remained to be analyzed.

2.3. Analysis of Data

Bibliometric analysis was used to analyze the studies on twice-exceptionality. Bibliometric analysis is a method by which publications from a particular period in a given field and the relationships between them are analyzed numerically (Rey-Martí, Ribeiro-Soriano, and Palacios-Marqués, 2016). Bibliometric methods have been frequently used in recent years to examine various characteristics of academic studies by using various statistical methods (Ding, 2011). As a result, the general perspective of the designated research area can be determined and inferences can be made (Bornmann and Mutz, 2015; Merigó and Yang, 2017). In the present study, detailed information (publication year, publication type, publication language, title, author name, author's country, number of citations, abstract, keywords, and bibliography) of 272 publications were obtained. Frequencies for the number, type, language, and citation analyses of research published in the field of twice-exceptionality were determined in the WoS and Scopus databases. Subsequently, data were transferred to RStudio, and social network analysis was performed with Bibliometrix. RStudio is a development environment integrated with R, a programming language used to perform statistical calculations and create graphics (Gandrud, 2013). Bibliometrics is one of the bibliometric analysis programs used to reveal, understand, and interpret changes in network structures and related fields among studies (Aria and Cuccurullo, 2017). Bibliometrics is a flexible tool as it is programmed in R, and the program, which is very useful for making scientific maps, provides quantitative data on scientific trends related to the field of study (Aria and Cuccurullo, 2017).

3. FINDINGS

When presenting the research findings, the number of publications on twice-exceptionality are given according to the publication year, publication type, language, country of publications, country of citation numbers, and distribution of publication numbers according to institution (university/institute) tags. Afterward, the distribution of publications in the field of twice-exceptionality based on journals, publication graphics of the journals published on this subject was presented; the most productive authors, the most cited studies, the most commonly used keywords, abstracts of publications, and the most commonly used words in their titles were also presented. Finally, the changing trends were stated. The distribution of 272 publications published on the twice-exceptionality between 1968 and 2020 is shown in Figure 4.

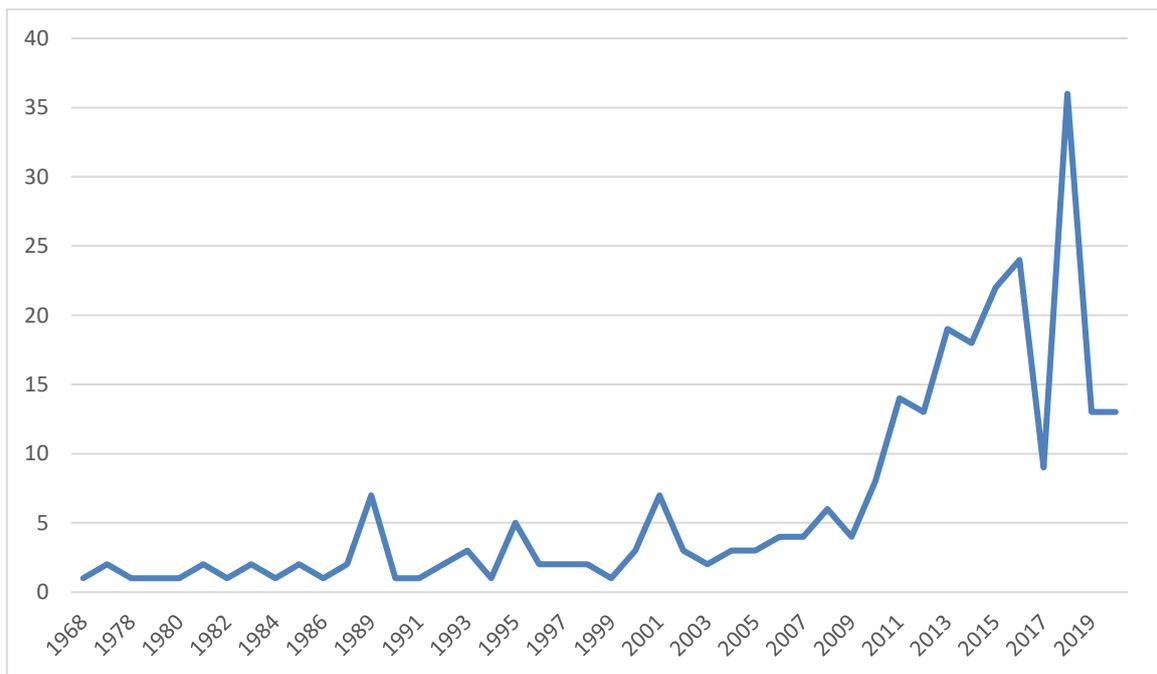


Figure 4. Number of publications by year.

According to Figure 4, the years with the highest number of publications were 2018 with 36 publications, 2016 with 24 publications, and 2015 with 22 publications, respectively. Although the number of publications increased from 2010 and on, there was a dramatic decrease in 2017. The distribution of 272 publications by type is shown in Figure 5.

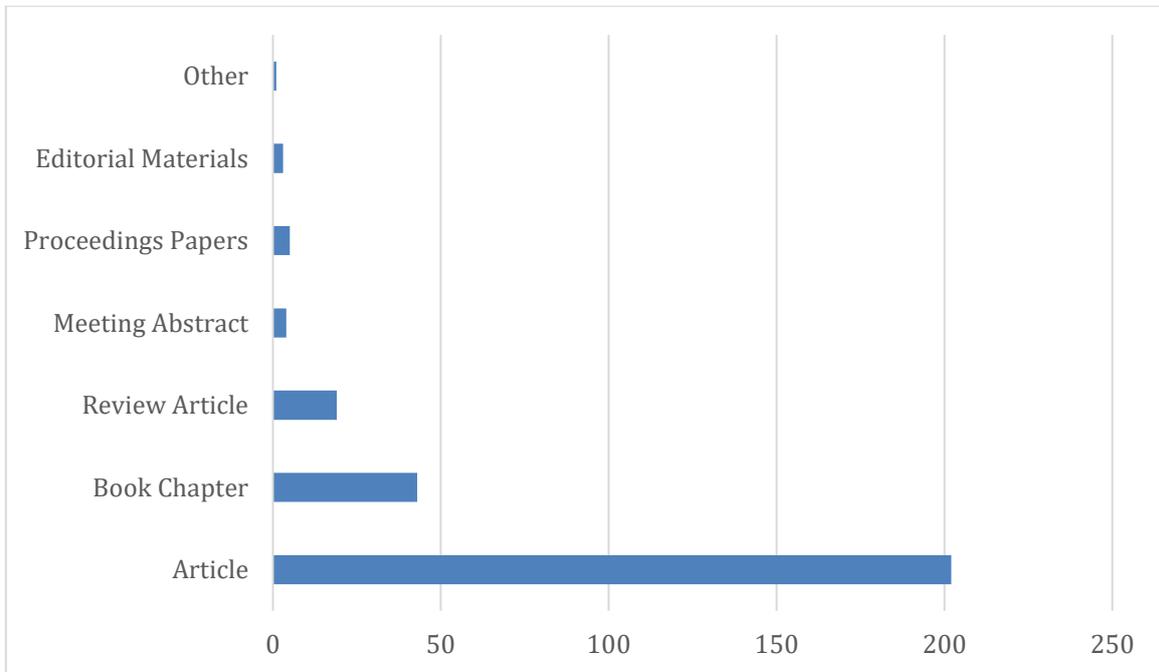


Figure 5. Distribution of publications by type

Because some research were evaluated in databases within the scope of multiple publication types, the rates were calculated from 278 publications. From 1968 to 2020, mostly articles ($n = 202$) and book chapters ($n = 43$) were published. As shown in Figure 6, publications are divided into six according to the language of publication and most publications are in English.

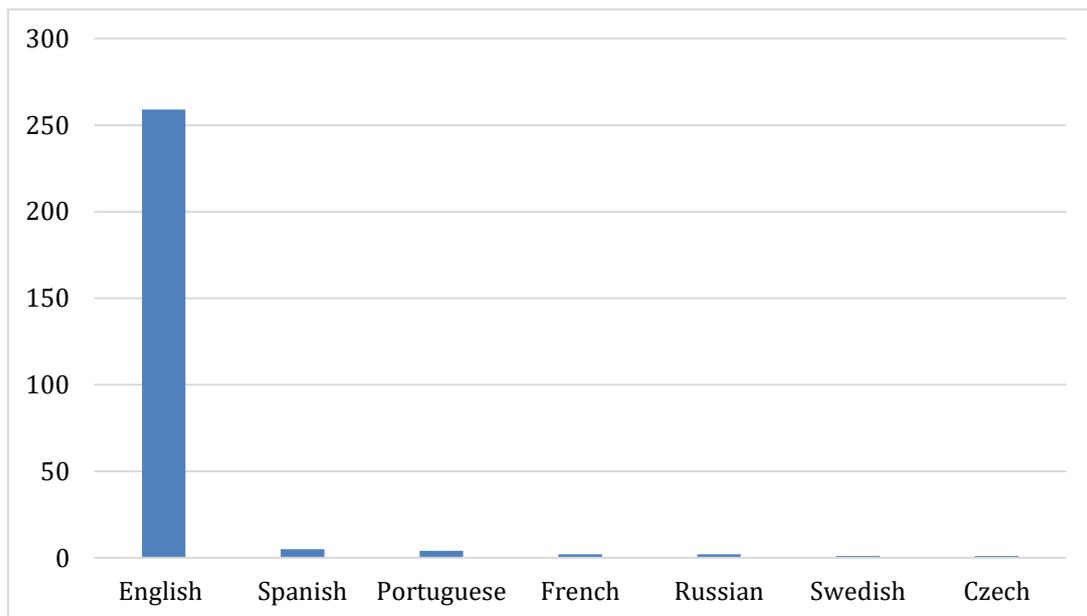


Figure 6. Number of publications by publication language.

($n = 259$, 93.17%). In Figure 7 and Figure 8, the distribution of the publications related to the twice-exceptionality by country is given.

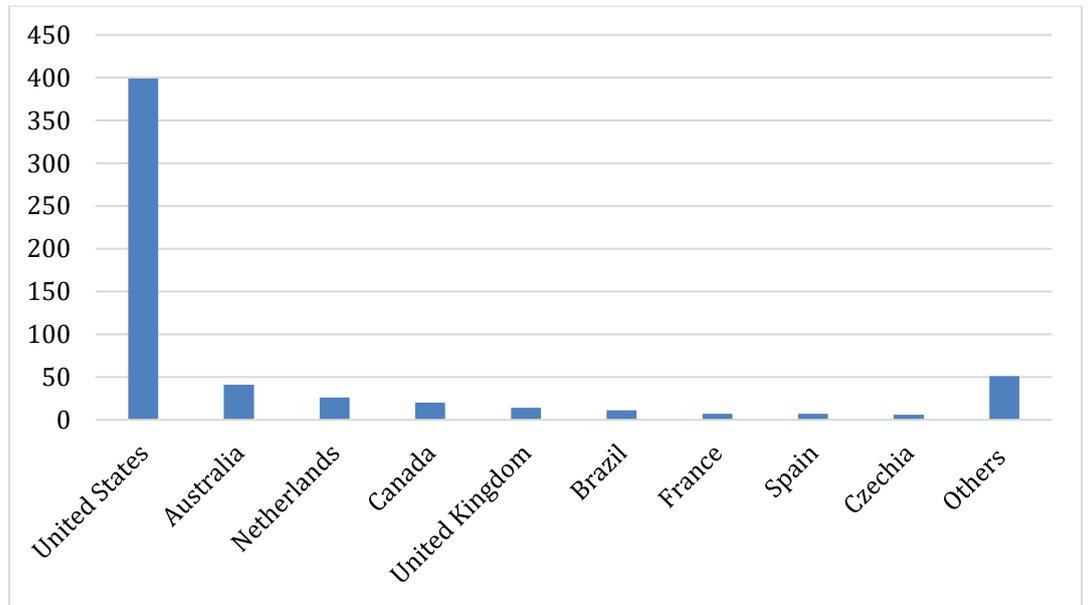


Figure 7. Number of publications by country

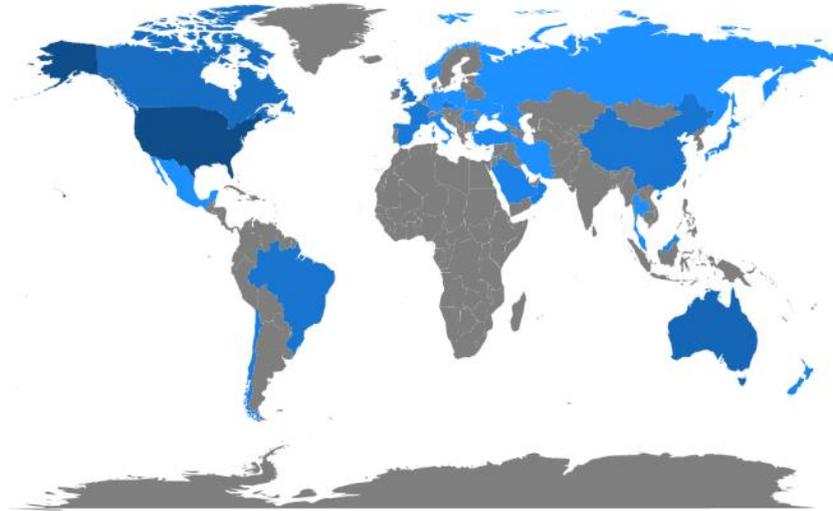


Figure 8. Broadcast intensity by country

When examining the number and intensity of publications based on country, calculations considered factors such as the fact that a publication has more than one author and the authors were from different countries. When Figure 7 and Figure 8 are examined, the country with the highest number of publications on the twice-exceptionality is the United States ($n = 399$). Among these countries include Turkey with a single article (i.e., Bildiren and Firat, 2020b). In Figure 9, the distribution of the citations to the publications related to the twice-exceptionality by country is given.

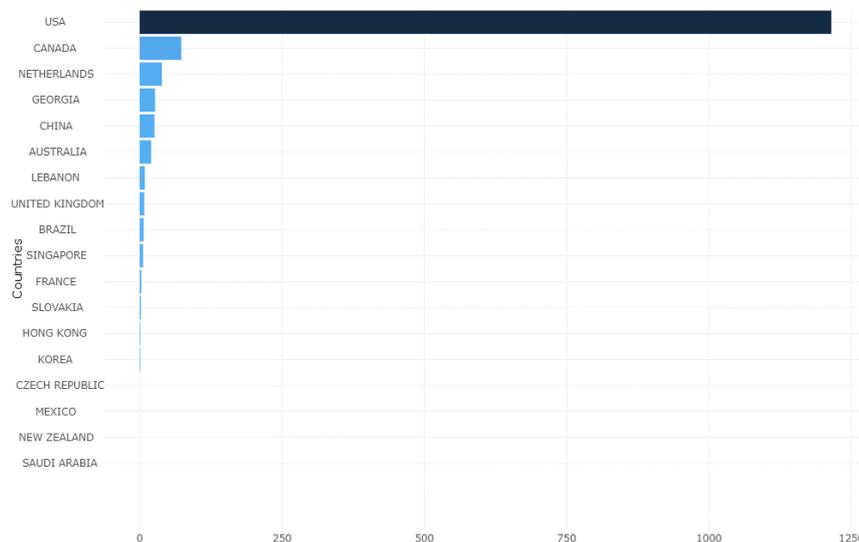


Figure 9. Number of citations by country

When Figure 9 is examined, the United States ($n = 1242$), has the most publications related to twice-exceptionality, followed by Canada ($n = 73$), the Netherlands ($n = 39$), China ($n = 26$), and Australia ($n = 20$). The distribution of the publications related to the twice-exceptionality according to the university is shown in Table 1.

Table 1.
Numbers of Publications by Universities

	University	Number of Publications
1	UNIVERSITY OF IOWA	45
2	UNIVERSITY OF CONNECTICUT	20
3	UNIVERSITY OF GRONINGEN	13
4	BALL STATE UNIVERSITY	12
5	GRIFFITH UNIVERSITY	10
6	PURDUE UNIVERSITY	9
7	ALLIANT INTERNATIONAL UNIVERSITY	8
8	UNIVERSITY OF ALABAMA	8
9	UNIVERSITY OF WOLLONGONG	6
10	UNIVERSITY OF CALIFORNIA	6

When the distribution of publications in the field of twice-exceptionality is examined by university, the top 10 universities are given in Table 1. The top three most published universities are the University of Iowa ($n = 45$), the University of Connecticut ($n = 20$), and the University of Groningen ($n = 13$). The journals with the most publications on the twice-exceptionality are shown in Table 2. The two most published journals are Roeper Review ($n = 31$) and Gifted Child Quarterly ($n = 30$). The publication graph of the five journals that publish the most about the twice-exceptionality is shown in Figure 10

Table 2.
Most Published Journals on the Topic

	Journal	Numbers of Publications
1	ROEPER REVIEW	31
2	GIFTED CHILD QUARTERLY	30
3	JOURNAL FOR THE EDUCATION OF THE GIFTED	19
4	JOURNAL OF LEARNING DISABILITIES	8
5	PSYCHOLOGY IN THE SCHOOLS	7
6	GIFTED AND TALENTED INTERNATIONAL	5
7	AUSTRALASIAN JOURNAL OF GIFTED EDUCATION	5
8	JOURNAL OF AUTISM AND DEVELOPMENTAL DISORDERS	5
9	INTERVENTION IN SCHOOL AND CLINIC	4
10	JOURNAL OF ADVANCED ACADEMICS	4

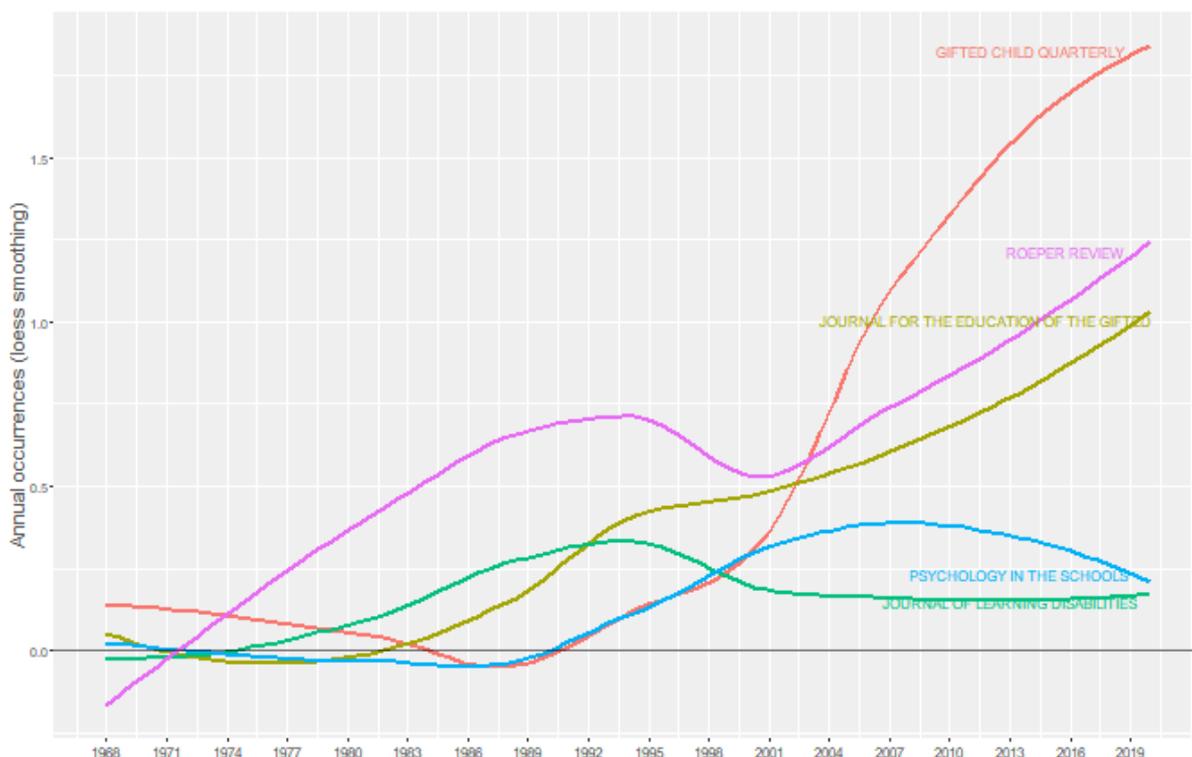


Figure 10. Publication graph of the journals that published the most about twice-exceptionality.

Figure 10 displays the five most frequently published journals on twice-exceptionality over the years. Roeper Review, which published the most articles in total, has always risen from the years of the first publication on the subject to 1995, while the decline between 1995 and 2000, has always increased since the 2000s. Gifted Child Quarterly, on the other hand, published fewer subject matter-related publications from 1968 to 1990, but since the 1990s, there has always been an increase in the number of publications related to twice-exceptionality. It can also be observed that Gifted Child Quarterly has been the most published journal on the subject of twice-exceptionality in recent years. There has been an increase in the number of publications on twice-exceptionality in the Journal for the Education of the Gifted, particularly in the last decade. Table 3 presents the most cited publications.

Table 3.
Most Cited Publications

	Author/Authors	Publication Name	Number of Scopus Citations	Number of WoS Citations
1	Brody ve Mills, 1997	Gifted children with learning disabilities: A review of the issues.	124	99
2	Foley-Nicpon vd., 2011	An empirical investigation of twice-exceptionality: Where have we been and where are we going?	102	80
3	Silverman, 1989	Invisible gifts, invisible handicaps.	76	-
4	Assouline vd., 2010	Cognitive and psychosocial characteristics of gifted students with written language disability.	64	47
5	McCoach vd., 2001	Best practices in the identification of gifted students with learning disabilities.	62	54
6	Journey vd., 2000	Compensation strategies used by high-ability students with learning disabilities who succeed in college.	61	57
7	Lovett and Lewandowski, 2006	Gifted students with learning disabilities: Who are they?	49	-
8	Baum vd., 2001	Dual differentiation: An approach for meeting the curricular needs of gifted students with learning disabilities.	46	-
9	Reis vd., 2014	An operational definition of twice-exceptional learners: Implications and applications.	44	32
10	Assouline vd., 2009	Profoundly gifted girls and autism spectrum disorder: A psychometric case study comparison.	43	33

The top 10 most cited publications were published between 1989 and 2014. The number of single authors from these publications is two, while the other eight publications have two to four authors. Studies are predominantly compilation studies ($n = 7$). The other three studies are descriptive studies aimed at establishing the current situation. Table 4 presented the most published researchers on twice-exceptionality.

Table 4.
Most Productive Authors

	Researcher Name	Number of Publications
1	Megan Foley-Nicpon	17
2	Susan Assouline	11
3	Jeffrey W. Gilger	7
4	Any Al-Hroub	6
5	Rena D. Mayes	6
6	Benjamin J. Lovett	5
7	Alexander Minnaert	5
8	Michelle Ronksley-Pavia	5
9	Sally M. Reis	4
10	Susan M. Baum	4

Megan Foley-Nicpon, one of these researchers, is the most published researcher. Dr. Foley-Nicpon is a professor at the University of Iowa. She works on assessment and intervention with twice-exceptional students. The 10 most commonly used keywords in the studies are given in Figure 11.

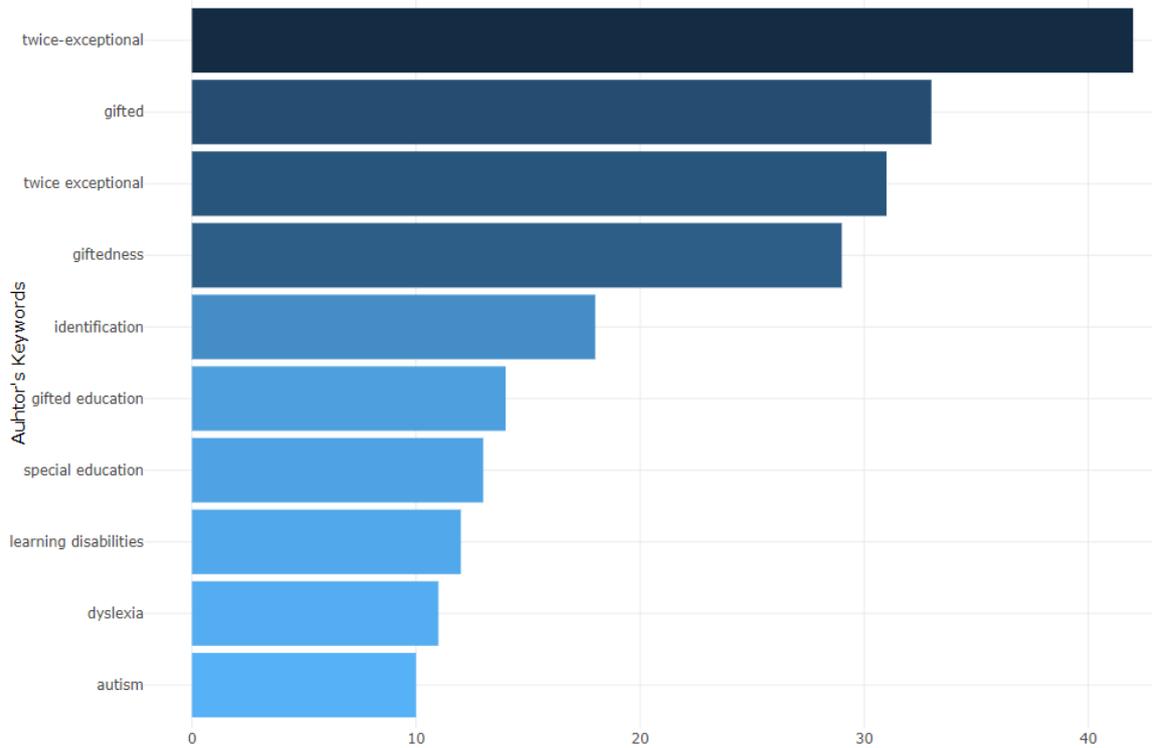


Figure 11. The most common keywords.

When Figure 11 is examined, the 10 most commonly used keywords are twice-exceptional ($n = 42$), gifted, ($n = 33$), twice exceptional ($n = 31$), giftedness ($n = 29$), identification ($n = 18$), gifted education ($n = 14$), special education ($n = 13$), learning disabilities ($n = 12$), dyslexia ($n = 11$) and autism ($n = 10$). The 10 most commonly used words in abstracts are given in Figure 12.

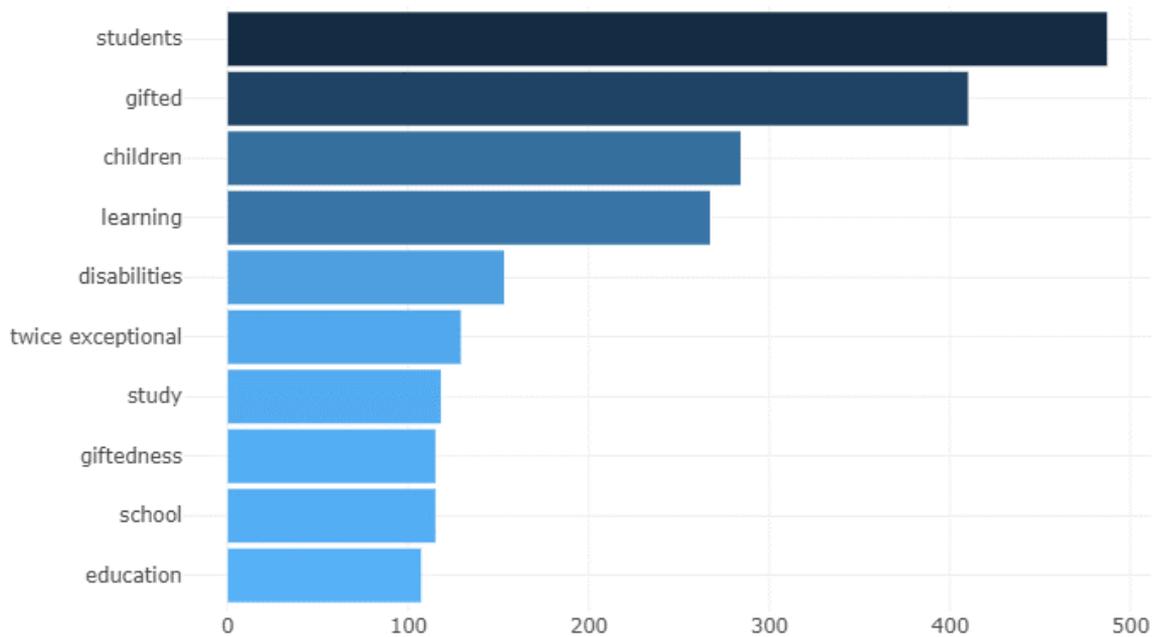


Figure 12. The most commonly used words in abstracts.

When figure 12 is examined, the ten most commonly used keywords in abstracts are students ($n = 517$), gifted ($n = 425$), children ($n = 295$), learning ($n = 277$), disabilities ($n = 160$), twice exceptional ($n = 137$), study ($n = 127$), giftedness ($n = 116$), school ($n = 122$), and education ($n = 122$). The 10 most commonly used words in the titles are given in Figure 13.

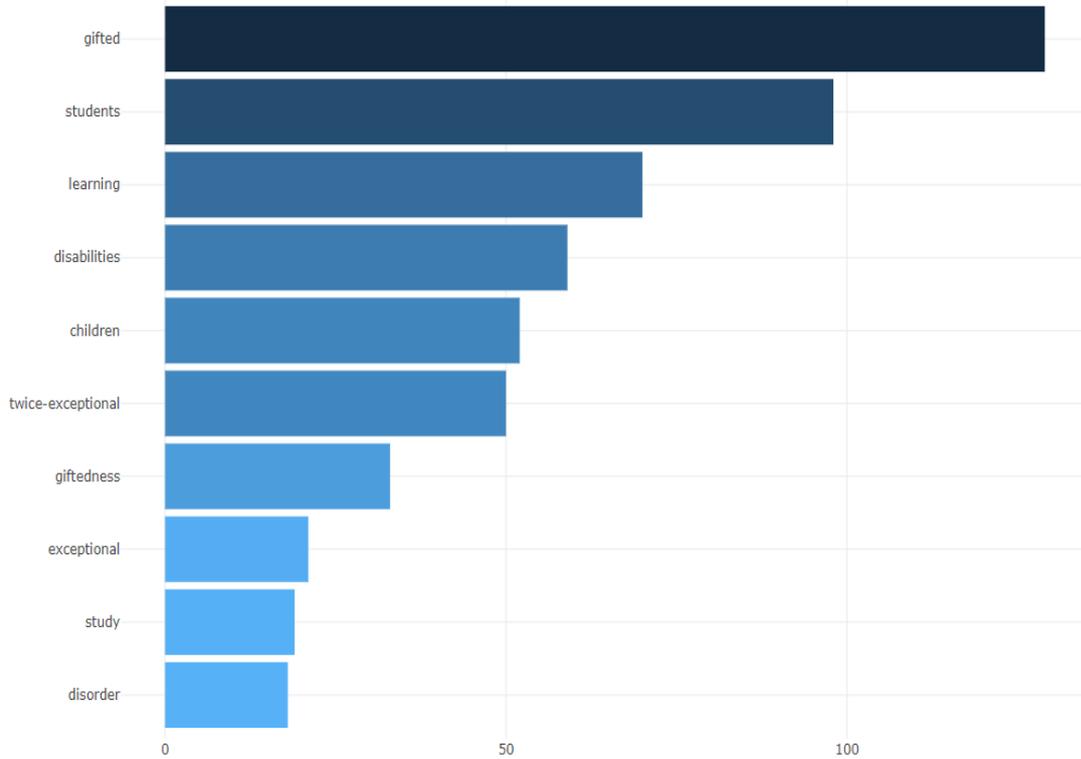


Figure 13. The most common words in titles

When Figure 13 is examined, the 10 most commonly used words in the headings are gifted ($n = 129$), students ($n = 98$), learning ($n = 70$), disabilities ($n = 59$), children ($n = 59$), twice-exceptional ($n = 50$), giftedness ($n = 33$), exceptional ($n = 21$), study ($n = 19$), and disorder ($n = 18$). In Figure 14, the titles of publications related to twice-exceptionality are given words that are trending over time.

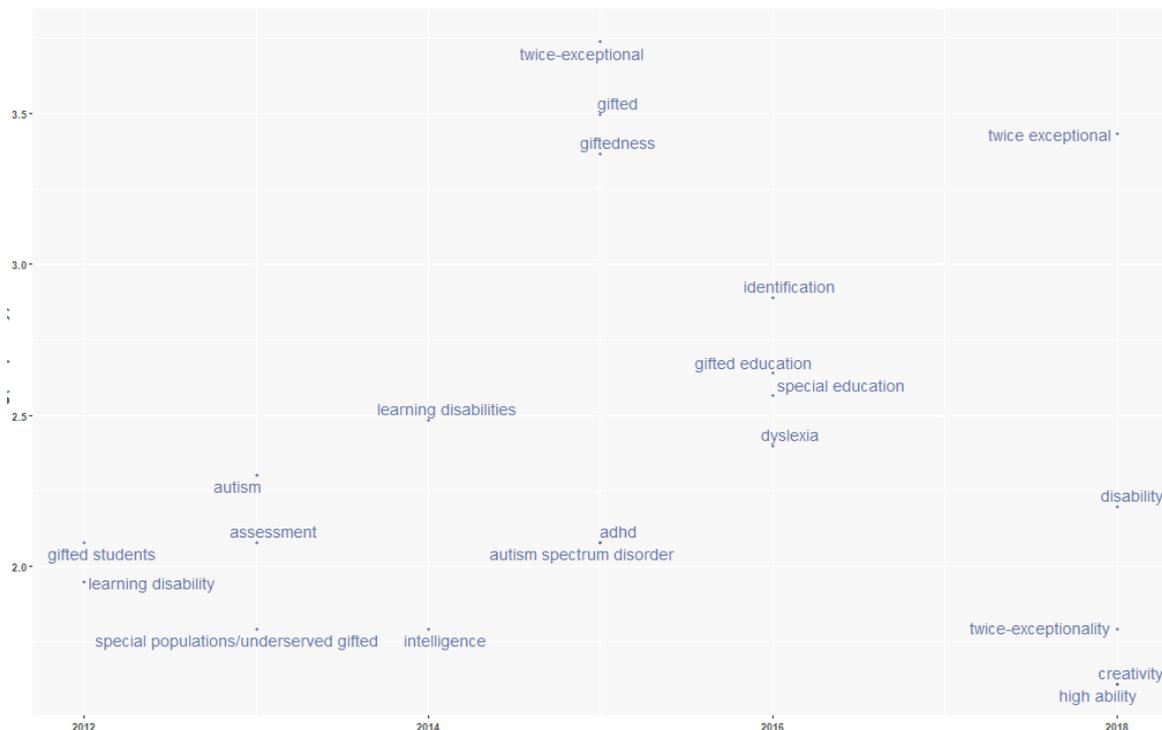


Figure 14. Trending topics in publications in the field of twice-exceptionality.

In Figure 14, the trending topics on twice-exceptionality are reported. The graph obtained from the keywords of trending topics in the last 10 years, in parallel with publications in early 2010 in which it was stated that LD and giftedness can be seen together, the words gifted students ($n = 8$) and learning disability ($n = 6$) were trending. In 2013, the most popular keywords were autism ($n = 10$), assessment ($n = 8$), and special populations ($n = 6$). Since then, studies on the gifted with ASD, and in particular the identification of these individuals, have become popular with the subjects related to the necessary services. The most popular keywords of 2014 were learning disabilities ($n = 11$) and intelligence ($n = 6$). 2015 was the year in which twice-

exceptional ($n = 41$), gifted ($n = 31$), giftedness ($n = 26$), identification ($n = 16$) and autism spectrum disorder ($n = 8$) were studied the most. Here, the concept of twice-exceptionality is now adopted in the literature; however, it results in increased studies on the diagnosis of twice-exceptional individuals. In 2016, there were concepts of gifted education ($n = 13$), special education ($n = 12$), dyslexia ($n = 10$) and twice-exceptionality ($n = 5$). Since 2018, the most studied concepts have been twice exceptional ($n = 31$), disability ($n = 9$), twice-exceptionality ($n = 6$), creativity ($n = 5$), high ability ($n = 5$).

4. RESULTS, DISCUSSION AND RECOMMENDATIONS

Within the scope of the study, 272 studies on twice-exceptionality were analyzed in terms of bibliometric characteristics. The first publication on the subject appeared in 1968. Since then, although there has been a variation in the number of publications, the general trend is observed to be an increase. With the launch of Sputnik into space in 1957, the education of the gifted was not perceived as a matter of national security in many countries, this understanding had a positive effect on the studies in the field (MNE, 2020). Because twice-exceptionality is a part of the education of the gifted, the studies in the field of twice-exceptionality in the years following the launch of Sputnik can be explained by the increased awareness on this topic.

Within the last ten years, there has been a significant increase in the number of publications in the field of twice-exceptionality. This finding also coincides with the bibliometric analysis conducted by Luor and his colleagues (2021). However, the fact that the number of studies available in any year is limited, even in scans without any preset restrictions on language or publication type, suggests that researchers working in this field be encouraged to do more work.

The country with the highest number of publications and references over the years was the USA, and the language of publication was English. This shows the dominance and power of the US in the field of twice-exceptionality. On the other hand, there seems to be only one publication in Turkey (i.e., Bildiren and Firat, 2020b). This reveals the limitations of studies on twice-exceptionality in Turkey. In Turkey, articles published on the topic in journals that are not indexed in the WoS and Scopus databases (e.g., Bildiren and Firat, 2020a; Gök, Bas, and Tuncay, 2018; Kaplan-Sayi, 2018; Kargi and Akman, 2003; Sekeral and Ozkardes, 2013; Sengil-Akar and Akar, 2020; Simsek and Karatas, 2019; Yilmaz-Yenioglu and Melekoglu, 2020) and graduate theses (Duyar, 2020; Omur, 2019); however, the number of studies on twice-exceptionality is still limited. Thus, further research needs to be conducted in the field of twice-exceptionality in Turkey.

The universities with the highest number of publications on twice-exceptionality are, expectedly, those where there is the highest number of researchers studying the topic. Hence, researchers who are interested in this area of study may be advised to follow their publications, and considered Table 4, which contains the researchers with the highest number of publications in the field. In addition, it will be useful to direct academic staff to these universities for sabbatical or post graduate studies in special education. Institutions and organizations that make policy decisions regarding studying abroad should consider the findings of this research. In addition, researchers who are interested in the field or in publishing internationally are advised to follow Roeper Review and Gifted Child Quarterly for trend topics on twice exceptional. Both journals are highly prestigious and publish on the education of gifted children. They publish four issues annually and include articles on twice-exceptionality.

The most cited publications are the core publications that form the basis of the field. The studies presented in Table 8 core publications for the field of twice-exceptionality. Examination of these publications by researchers is important for understanding the existing literature. It can be observed that the study that has been mostly cited in the field is a review (i.e., Brody and Mills, 1997). It can also be seen that seven studies are compilations and three are descriptive in nature. All Turkish studies on this subject are descriptive. The current analysis is important in that it is the first synthesis study in this field. Given that twice-exceptionality is a relatively newborn field, it is accepted that illustrative studies are important in establishing the current situation for this field. Whereas there is a need in Turkey to increase the number of studies, it is also recommended that comparison and intervention research be conducted in the field.

When keywords and popular topics are examined in the publications related to twice-exceptionality, it is understood that in the early years of this field, more focus was laid on gifted individuals with learning disabilities, whereas more recent research has focused on giftedness with ASD and ADHD. It is seen that issues such as screening, diagnosing, evaluating, teaching, and high-level thinking skills of these individuals have also emerged over time. This development and change in trends observed in studies on twice-exceptionality, which is quite new in the literature, is expected. In the early years of this field, there were studies carried out to understand the nature of twice-exceptionality. However, in the following years, studies on the concept focused on deeper aspects of twice-exceptionality. Current research trends are moving towards higher-order thinking skills such as creativity among twice exceptional individuals. It is recommended that researchers who study twice-exceptionality take these trends into account.

The present study is of significance because it described the contemporary state of matters in the field for twice-exceptional individuals based on studies published between 1968 and 2020. The related international, as well as Turkish literature, has been discussed. In light of these discussions, it is hoped that not only the level of awareness regarding twice-exceptional individuals arises but also the number of future studies on this topic increase in Turkey. In addition, activities should be organized to support the increase in the level of knowledge of families, teachers, and teacher candidates on twice-exceptional children. Seminars attended by families and in-service training for teachers can be organized. In addition, the education of

twice-exceptional children course can be added to in the special education teaching program. In this way, the knowledge levels of teachers can increase, which in turn can help raise the awareness of students and their parents as well as their colleagues when they start their professional life.

Research and Publication Ethics Statement

In this study, research and publication ethics were followed.

Contribution Rates of Authors to the Article

The first author involved in determining the subject of the study, determining the research design, collecting, and analyzing the data, and reporting the study. The second author involved in determining the subject of the study, determining the research design, and reporting the study.

Statement of Interest

There is no conflict of interest between the authors.

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