



## Social Network Analysis of Academic Studies on Gifted People

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### Abstract

In this study, 1035 articles on giftedness published between the years of 1956-2016 and indexed in WoS were analyzed in terms of their bibliometric qualities and the social network structure was revealed by means of using CiteSpace 4.0 program in order to present the historical process and the general structure of the field of giftedness and thus help the field to be viewed from above with a bird's eye. As a result of this research; the distribution of the number of publication and citation of articles on giftedness within the field of education according to years, countries, university/institute labels, and research fields. Moreover, word and keyword network structure, cited journal network structure, co-cited reference network structure and co-cited author citation network structure belonging to these publications were revealed. It is thought that researchers to start a new study will make use of the results of this study so as to get as much information as possible about the field of giftedness.

### Keywords

Giftedness  
Gifted education  
Bibliometric network analysis  
Social network  
Descriptive analysis

### Article Info

Received: 02.08.2018  
Accepted: 06.11.2018  
Online Published: 10.11.2018

DOI: 10.15390/EB.2018.7735

### Introduction

The first studies on giftedness and defining the gifted student focus on intelligence and intelligence tests. Afterwards, it was concluded that the superior ability was wide and multidimensional enough not to be restricted by intelligence (Grand National Assembly of Turkey [TBMM], 2012). Individuals who perform at a higher level than their peers in terms of intelligence, creativity, art or leadership can be determined as gifted by experts (Ministry of Education [MEB], 2007). Education and learning are defined both as right and as responsibility, and the right to receive education in accordance with the interests, skills and abilities is guaranteed by the Constitution in our country, and no one can be deprived of this right (TBMM, 1982).

When the literature about giftedness is reviewed, it is possible to come across studies of meta-analysis, compilation and systematic compilation. Kim (2016) carried out a study of meta-analysis that included 26 studies that were published between the years of 1985-2014. Likewise, Steenbergen-Hu and Moon (2011) carried out a study of meta-analysis with 38 studies that were published between the years of 1984-2008, and revealed that acceleration programs were effective on students' academic success as well as their social-emotional development. Coleman, Guo, and Dabbs (2007) summarized and evaluated the 124 qualitative studies which were published in American journals on gifted people's education between the years of 1985-2003. At the end of the compilation, the studies that were published

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between the years of 1990 and 1995 were called as the first generation studies that gave birth to the concepts and definitions in the field, the qualitative studies which were published between the years of 1996 and 2000 were found to focus mostly on the inner world of individuals and contextual-external conditions, the topics of the studies published between the years of 2001 and 2003 were seen to get various while more specific and creative topics were studied and researchers that had international publications rose in number. Besides these studies, there were meta-analysis and systematic compilation studies that were carried out in more specific areas (Matthews et al., 2008; Litster & Roberts, 2011; Bailey et al., 2012; Aljughaiman & Ayoub, 2013; Carman, 2013; Steenbergen-Hu & Olszewski-Kubilius, 2016).

It is very difficult to identify gifted children and most of diagnostic methods are criticized because of not being sensitive enough (Daugherty & White, 2008). That's why it is an urgent need to come up with a valid and just method in order to identify cognitive skills of gifted children (Scott & Delgado, 2005). Studies show that early diagnosis and attention to gifted children during critical developmental periods have an effect on children's motivation, stability, self-respect and perfectionist criteria (Daugherty & White, 2008). Kroesbergen, van Hooijdonk, Van Viersen, Middel-Lalleman, and Reijnders (2015) state in their study that gifted children have a lower level of well-being when compared to their peers and because of this reason, an appropriate diagnostic method can help to identify these children and improve their level of well-being.

In other words, gifted children are gifted in terms of creativity and problem solving skills as well (Borkowski & Peck, 1986; Sternberg, 1988; Torrance, 1988; Daugherty & White, 2008). All students including the gifted ones should be provided with different but equal learning opportunities not only during pre-school period but also in the following years of education life (Mooij, 1999). A qualified educational environment to be designed for a gifted individual from early ages will certainly contribute to the individual's development to be a happy, productive and successful person all throughout the life. Therefore, it can be said that in order to ensure the healthy development of gifted children, it is important to diagnose them and be aware of their qualities starting from early childhood; only by this way it could be possible to diminish and prevent the troubles that those children may face, and thus they can be provided with an opportunity to take a more active role in society and make the most use of their potentials. When considered from this point of view, it can be expressed that it is of great importance to analyze the articles and studies that were carried out on giftedness. The results to be obtained from reviewing studies that contribute to especially psychological and social development of gifted students, first and foremost, the ones that focus on qualified educational environment, will also shed light on the future scientific studies to be carried out later. Because of this reason, the starting point of this study is to analyze the studies on giftedness that have been carried out up to now.

When the meta-analysis studies and compilations within the field of giftedness are analyzed, it is apparent that these studies are very precious in that they encompass information specific to the field. However, it is expected that this study will have a specific contribution to the field as it includes studies carried out thought out 60 years between 1956 and 2016, it makes use of 1035 articles, and unlike other studies, and it reveals social network analysis.

It is crucial to notice gifted individuals at early ages. A qualified educational environment to be designed for gifted individuals starting from an early age will certainly contribute to the individuals in being happy, productive and successful all throughout their lives. Analyzing studies especially on qualified educational environments that contribute to gifted children's psychological and social development will also bring light to the future of scientific studies. Because of this reason, the starting point of this study is to analyze the studies on giftedness that have been carried out until today.

### *Aim of the Study*

The term, social network was first used in 1954 by J. A. Barnes and it was defined as a structure that shows the connection between individuals and organizations. And social network analysis helps us see the world with its factual formal and informal relations (Gürsakar, 2009). Citation analysis based on analyzing the references of academic researches is one of the methods that helps to determine the interesting subjects of scientific disciplines and the dominant view by grounding on the number of citations (Üsdiken & Erden, 2002). The aim of this research is to reveal the bibliometric qualities and social network structure of studies on gifted people within the field of educational sciences, and to designate the trends in the fields as well as researchers and/or groups active in the field. In order to find out the contribution of 1035 studies carried out in different countries between 1956-2016 to the field and to determine the subject fields which are mostly researched, bibliometric qualities of the studies were analyzed, and network structures of word and keyword analysis, journal citation analysis, reference citation analysis and author citation analysis were revealed. Thus, the mostly researched subjects, effective writers, and fundamental reference guides within the field of gifted people have been discovered. Moreover, it is expected that this research will clear up the way for future researches in terms of finding out the subjects that have not been researched enough yet, and fundamental guides that direct the field.

This research, which helps to have a bird's-eye-view over previous researches, is expected to bring light and contribute to the field. Within this framework, the current research tries to answer the following questions: (1) What is the distribution of the number of publication and citation of articles on giftedness within the field of education according to years, countries, university/institute labels, research fields? (2) What are word and keyword network structure, cited journal network structure, co-cited reference network structure and co-cited author network like?

## **Method**

### *Research Design*

This research is based on thematic review and descriptive research design was used to do it. Descriptive researches are carried out in order to specify current cases as well as to explain and reveal them (Karasar, 2009; Sönmez & Alacapınar, 2014). Most of educational studies are descriptive, and descriptive studies help to describe the variables in the research, and to compare them, to put forward their similarities and differences, to categorize them, to analyze them and lastly to interpret them by means of focusing on individuals, groups, institutions, methods and materials (Cohen, Manion, & Morrison, 2007). In this study, educational researches on gifted people were designated, analyzed, and interpreted.

### *Data Collection*

While collection data for the study, the literature was reviewed use of Web of Science (WoS) database on March 14, 2017. The reason why WoS was used to review the literature was that WoS is a database that is used by all the scientific world and it is respectable and acceptable in getting an academic degree. The criteria of scan were limited with the title as "giftedness" (keyword: gifted or talented –in title–), with the topic as used including the words of "TS: school" or "students" or "teachers", with label of educational studies (Education & Educational Research) and with document type as article. While there were no limitations as to the year of publications, the part to be scanned was limited to core collection. The reason why core collection was chosen was that the publications within the core collection included author name/names, institution and country, title of the publication, year of publication, title/journal of the reference, the number of citation, abstract, keywords and information about reference in full. At the end of scanning, bibliographic data of 1035 articles published on gifted people between 1956 and 2016 within the field of educational sciences, and these data were listed in the

database in the software. Then, the data included in the database were analyzed according to the criteria of keyword, journal, and author one by one and the database was established accurately after the necessary amendments were done about the duplicated data. For example, two different uses (high-achieving/high achieving) came out for students with a high success and the data set was arranged to have the same use (high achieving) all throughout it. Likewise, the duplications in journal names (Gifted Child Quart/Gifted Child Q.) and writer names (Peterson J S/Peterson JS) were arranged to have a clean set of data.

### *Data Analysis*

Two different data analysis methods were used in order to answer the questions in this study. Bibliometric techniques were used to answer the first research question while social network analysis was used to answer the second research question.

Bibliometric techniques were used to designate the distribution of articles on giftedness within the field of educational sciences as to year of publication, number of citation for each year, the countries and universities published, language of publication and WOS categories. By making use of these techniques, the most productive researchers in the field, the resources, journals, keywords, etc. can be specified; the level and reasons of interaction between researchers can be revealed; in-depth researches can be done to explain these reasons. Also, performances of countries, institutions and departments can be analyzed according to the criteria such as h-index, number of publication and citation per faculty member by means of using bibliometric techniques. Using bibliometric researches not only describe but also explain the effective and productive use of national resources as this plays an important role in evaluating scientific publications as well (Al, Sezen, & Soydal, 2012).

Social network analysis was used to determine the word and keyword network structure, cited journal network structure, co-cited reference network structure and co-cited author network structure in the articles that were analyzed within the framework of this study. The importance of network analysis researches is rising day by day (Otte & Rousseau, 2002; Carrington, Scott, & Wasserman, 2005). Although network and social network researches are mostly found in the field of sociology, they have an important role in other social sciences as well (Otte & Rousseau, 2002). Social network researches have the potential to explain the future cases which are currently a matter of curiosity in a certain discipline (Kilduff & Tsai, 2008).

Social network analysis can be done through many various software programs (eg: UCINET, Pajek, NetMiner, STRUCTURE, MultiNet). In each software, the qualities of the data to be entered and the obtained visuals (eg: graphs, patterns, linkages) are different from each other (Huisman & Van Duijn, 2005). Choice of software is guided by the questions to be answered in the research. In this study, the program of CiteSpace 4.0 was used to reveal the social network structure of 1035 articles included in the database. Citespace is used for free and it is an application that enables to analyze and visualize the tendencies and patterns within the literature. This application focuses on revealing the critical points of the development within the subject field. Citespace provides researchers with various opportunities to understand and interpret network structures and patterns that change in time (Chen, 2004, 2006).

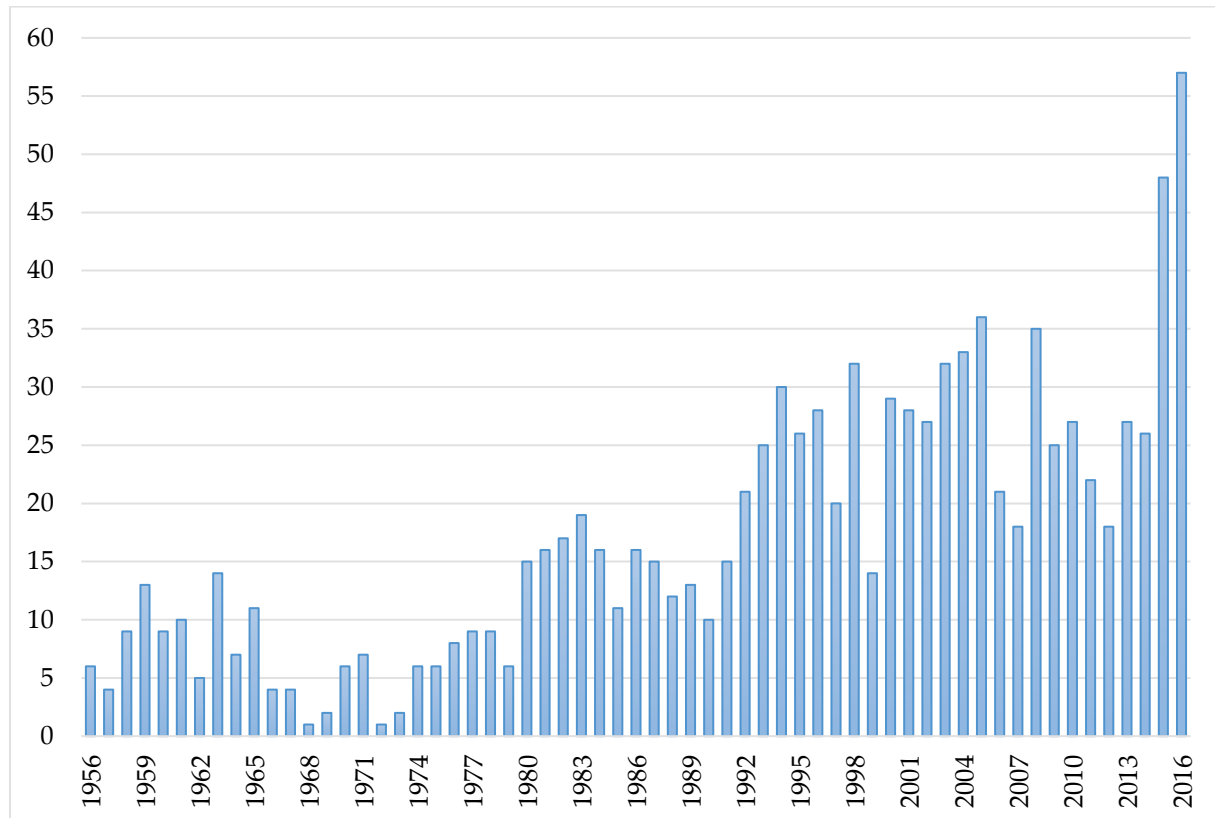
In order to explain the network structures about the field of giftedness, values related to the density, mean silhouette value and modularity Q were calculated. One of the important concepts to interpret the structure of network is centrality (Al et al., 2012; Otte & Rousseau, 2002). In this study, the value of betweenness centrality was calculated as it is an effective method to reveal the indirect relations between the components of network structure.

## Results

While the research findings are provided, firstly, the distribution of the number of publication and citation of articles on giftedness within the field of educational sciences are given as to year, country, university/institute label and research field. Then, word and keyword network structure, cited journal network structure, co-cited reference network structure and co-cited author network structure are given respectively.

### *Bibliometric Findings*

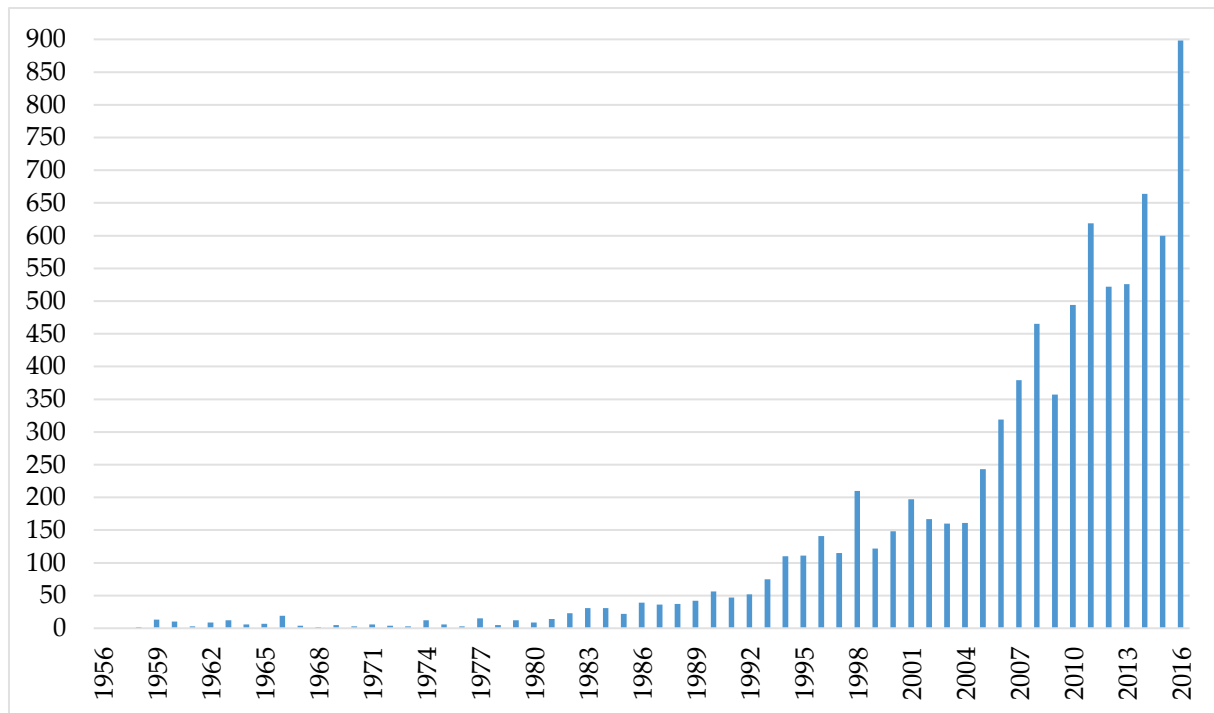
1035 articles that were carried out in the field of giftedness and indexed in WoS were published between the years of 1956 and 2016. The number of publications as to the year are given in Figure 1.



**Figure 1.** Numbers of Publications by Years

According to Figure 1, the most active years of articles on giftedness is 2016 with 57 publications and 2015 with 48 publications. The least active years are, on the other hand, 1968 and 1972. It can be said that starting from 1970s, the number of publications have increased while it has even been rising more quickly since 1990s. Moreover, it is apparent that the number of publications reached its peak point in 2015 and 2016. When the authors of the articles are listed according to the number of publications, the leading names in the field of giftedness are Ford D. Y. (18 articles), Chan D. W. (13 articles), Callahan C. M., Gentry M and Renzulli J. S. (12 articles).

The number of citations from articles on giftedness between the years of 1957 and 2016 is given in Figure 2. When the citations are analyzed, it is clear that the number of citations have risen from the first years of publication and the citations have risen more quickly since the late 2000s.



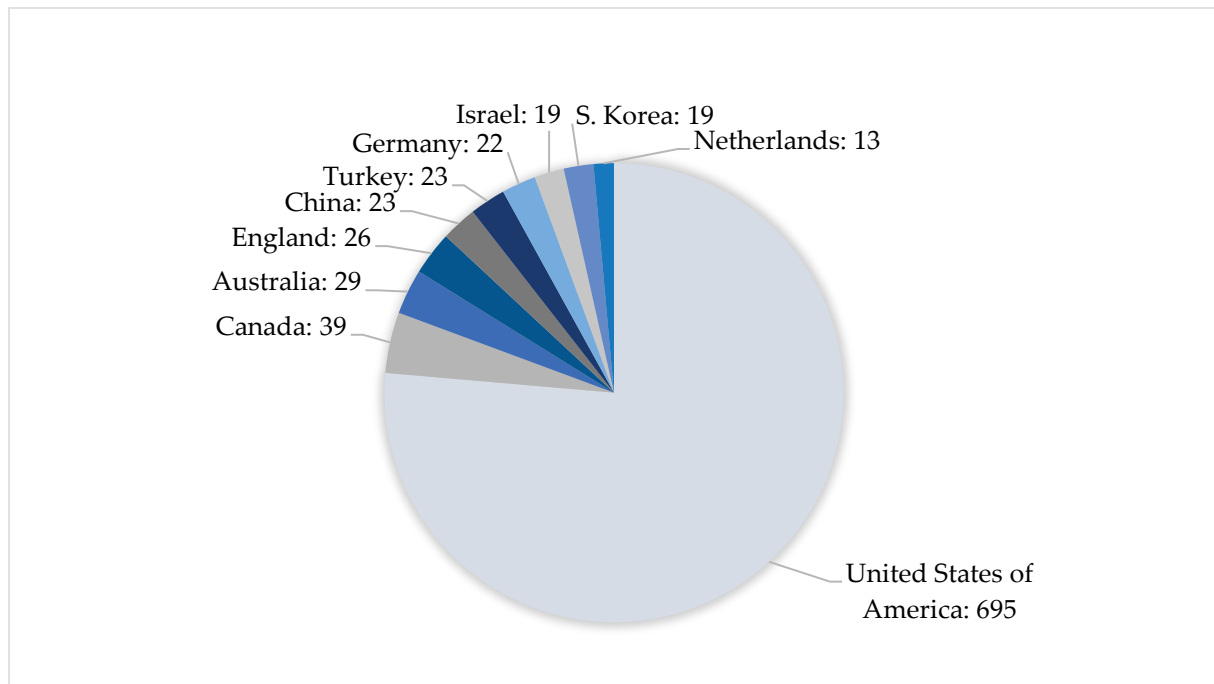
**Figure 2.** Numbers of Citations by Years

It is apparent in Figure 2 that the citations of articles began to rise in parallel with the rise in the number of publications starting from 1990s. It is observed that the increase has gone up with a rising pace since 2000s. It is seen that the number of citations of articles is the highest in 2016. It can be said that this rise results from the factors such as foundation of Council of Higher Education, considering WoS publications while evaluating academic performance, academic incentive grants and the increase of Turkish journals indexed in WoS.

When the cited articles are analyzed one by one, it was found that the mostly cited article with 125 citations was written by Marsh, H. W., Chessor, D., Craven, R. and Roche, L. in 1995 in American Educational Research Journal (Vol. 32, No. 2, pp. 285-319) with the title of "The Effects of Gifted and Talented Programs on Academic Self-Concept - The Big Fish Strikes Again."<sup>1</sup> When the articles that follow the one by Marsh et al. are considered, it came out that there were six articles with 30 or more citations, nine articles with 20 or more citations and seventeen articles with ten or more citations. On the other hand, there were 259 articles with nine or fewer citations. And there are 218 articles with no citations. Likewise, it has been found out that the number of citations from these articles increased after 2008 when compared to the previous years.

Among 1035 articles, the ones with country tags were reviewed, and the top ten countries where the number of publications was highest and the number of publications are given in Figure 3. Moreover, top ten American universities which have the highest number of publications are included in Figure 3.

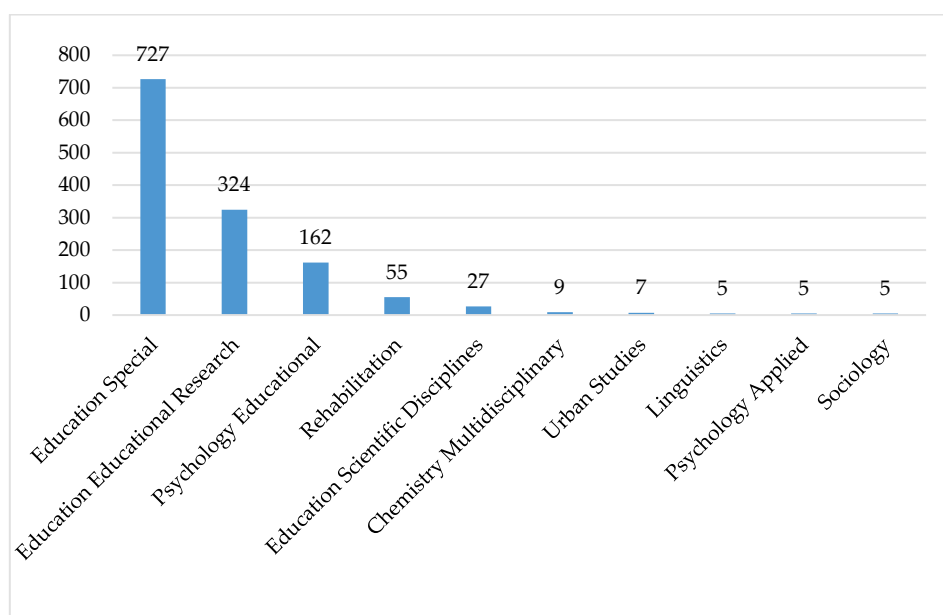
<sup>1</sup> For more information: <http://journals.sagepub.com/doi/abs/10.3102/00028312032002285>



**Figure 3.** Top 10 Countries by Number of Publications

When Figure 3 is reviewed, it is seen that there are 695 articles which were published with the tag of United States of America (the USA). The articles published in the USA constitute %67 of all the articles on giftedness which have been published since 1956 up until today. Top ten American universities by number of publications are listed as University of Connecticut (n=41), Purdue University (n=32), University of Georgia (n=30), The University of Virginia (n=30), Johns Hopkins University (n=24), University of North Carolina (n=24), College of William Mary (n=19), University of Iowa (n=19), University of Wisconsin (n=17), Northwestern University (n=16).

Top ten WoS categories which include the highest number of publication on giftedness are given in Figure 4. The publications included in WoS can be tagged in more than one category. Therefore, it was found out that there was more than one tag in some publications. For instance, it was seen that when publications with two tags are in question, the first tag is a more general category while the second tag is a more specific one.

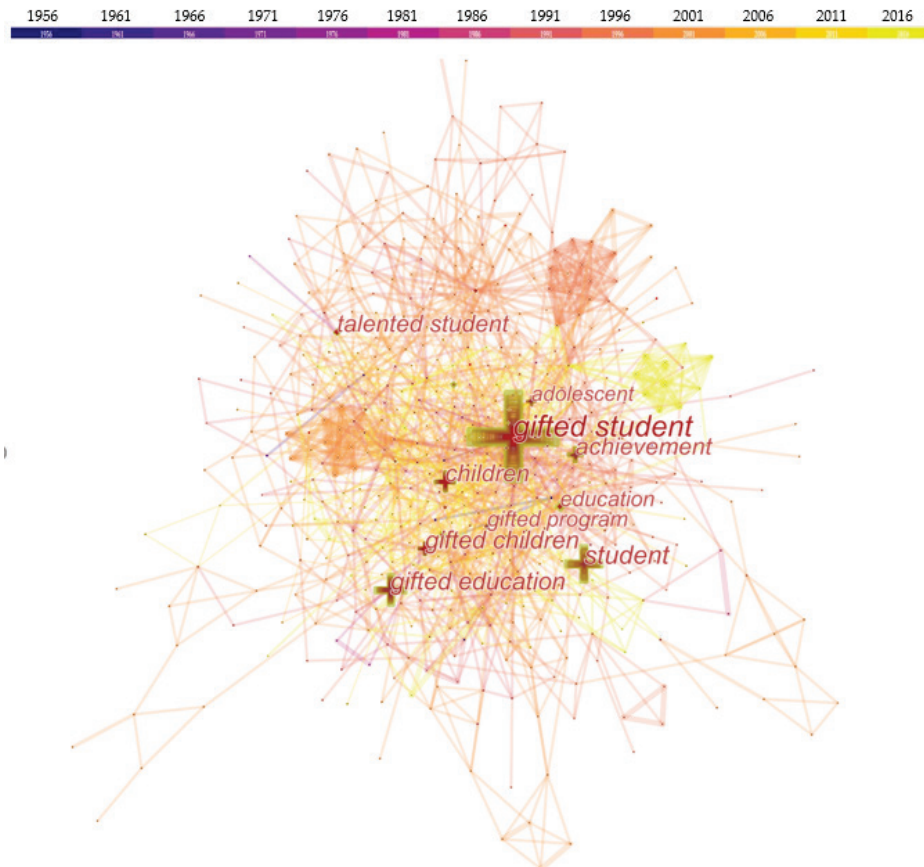


**Figure 4.** Top 10 WOS Categories by Number of Publications

A great portion of publications (n=727; 70,24%) carry the tag of Education Special. The second mostly preferred tag is the category of Education Educational Research (n=324; 31,30%). Psychology Educational (n=162, 15,65%) is the third mostly preferred category.

### Word Network Structure

Word network structure which has come out after analyzing all the words and Word phrases included in the title, abstract, author keywords and research keywords determined by WoS in 1035 articles that fall into the framework of this study is given in Figure 5.



**Figure 5.** Word Network Structure

Figure 5 shows the word based network structure of 1035 articles included in this study. It is observed that the density of the resulting word network structure is low (density=0,013). At the end of the analysis, 1035 articles were divided into 16 groups according to keywords. It is obvious that the homogeneity of the network is low (mean silhouette value=0,33) and has a loose structure (modularity Q= 0,64).

The 10 words and word phrases that were found to be most frequently used in the articles within the field of giftedness and that have the highest centrality at the end of the word based analysis are listed in Table 1.

**Table 1.** Frequency and Centrality Values of Word and Noun Phrases

	Word/Noun phrases	Frequency		Word/Noun phrases	Centrality
1	Gifted student	340	1	Adolescent	0.18
2	Student	153	2	Elementary school	0.09
3	Gifted education	125	3	Adjustment	0.09



**Table 1.** Continued

	Word/Noun phrases	Frequency		Word/Noun phrases	Centrality
4	Gifted children	110	4	Personality	0.09
5	Talented student	109	5	Perspective	0.08
6	Achievement	99	6	Talented youth	0.08
7	Children	93	7	Identification	0.07
8	Gifted program	66	8	Gender difference	0.07
9	Education	64	9	Gifted girl	0.07
10	Adolescent	58	10	Impact	0.07

According to Table 1, the first 10 words and Word phrases that have the highest frequency in the articles carried out within the field of giftedness are *gifted student, student, gifted education, gifted children, talented student, achievement, children, gifted program, education, adolescent*. The words/word phrases that have the highest centrality value are *adolescent, elementary school, adjustment, personality, perspective, talented youth, identification, gender difference, gifted girl, impact*.

#### **Keyword Network Structure**

Keyword network structure which has come out after analyzing all the words and word phrases included in the title, abstract, author keywords and research keywords determined by WoS in 1035 articles that fall into the framework of this study is given in Figure 6.

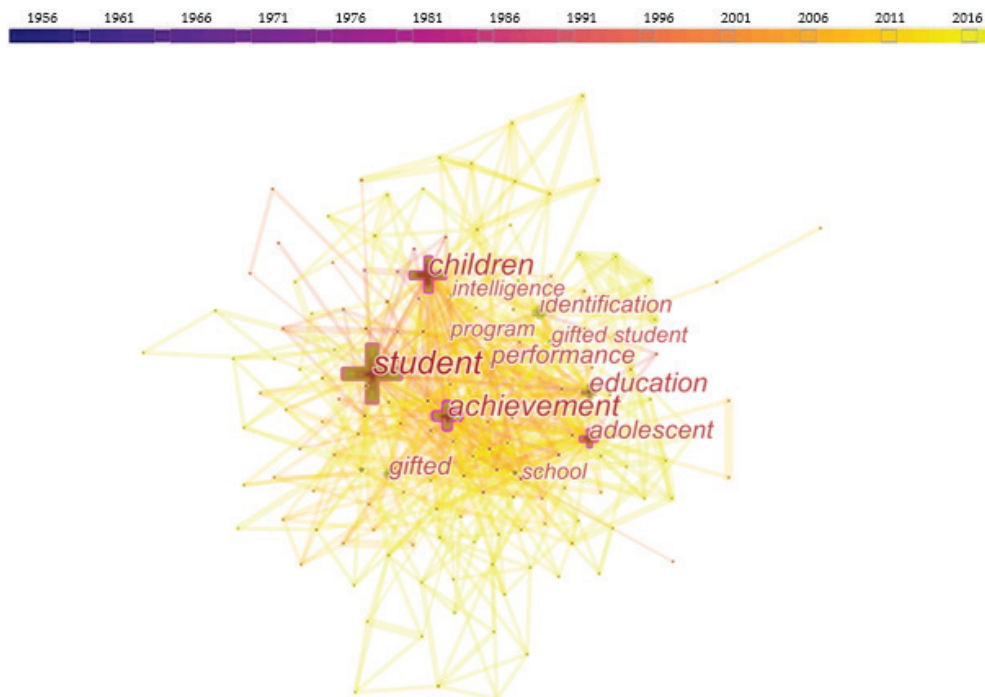
**Figure 6.** Keyword Network Structure

Figure 6 shows the keyword based network structure of 1035 articles included in this study. It is observed that the density of the resulting word network structure is moderate (density=0,0526). At the end of the analysis, 1035 articles were divided into 8 groups according to keywords. It is obvious that the homogeneity of the network is moderate (mean silhouette value=0,538) and has a tight structure (modularity Q= 0,42).

**Table 2.** Frequency and Centrality Values of Word and Noun Phrases

	Keyword	Frequency		Keyword	Centrality
1	Student	153	1	Achievement	0.44
2	Achievement	96	2	Student	0.28
3	Children	91	3	Children	0.23
4	Education	63	4	Adolescent	0.20
5	Adolescent	50	5	Education	0.16
6	Performance	45	6	Ability	0.12
7	Gifted	44	7	Gifted student	0.08
8	Identification	38	8	Model	0.08
9	School	33	9	Gifted	0.07
10	Intelligence	30	10	Identification	0.07

According to Table 2, the first 10 keywords that have the highest frequency in the articles carried out within the field of giftedness are *student, achievement, children, education, adolescent, performance, gifted, identification, school, intelligence*. The keywords that have the highest centrality value are *achievement, student, children, adolescent, education, ability, gifted student, model, gifted, identification*.

#### *Cited Journal Network Structure*

Journal citation network structure which has come out after analyzing all the journals where 1035 articles that fall within the scope of this scope were published and that were cited in their references is given in Figure 7.

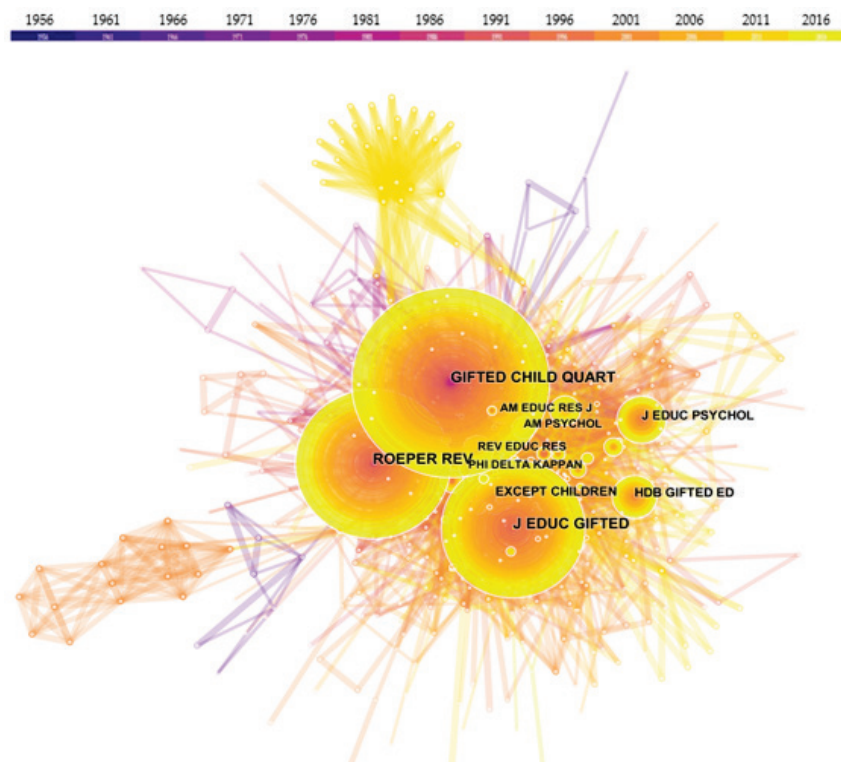
**Figure 7.** Cited Journal Network Structure

Figure 6 shows the journal citation network structure of the articles included in this study. It is observed that the density of the resulting journal citation network structure is low (density=0,0176). At the end of the analysis, 1035 articles were divided into 13 groups according to journal citations. It is obvious that the homogeneity of the network is low (mean silhouette value=0,316) and has a moderate loose structure (modularity Q= 0,54).

**Table 3.** Frequency and Centrality Values of Cited Journals

Journal	Frequency	Journal	Centrality
1 Gifted Child Quarterly	740	1 Journal for the Education of the Gifted	0.10
2 Roeper Review	459	2 Exceptional Children	0.09
3 Journal for the Education of the Gifted	413	3 Gifted Child Quarterly	0.08
4 Journal of Educational Psychology	211	4 The Journal of Creative Behavior	0.08
5 Exceptional Children	177	5 Journal of Educational Psychology	0.07
6 Handbook of Gifted Education	170	6 American Psychologist	0.07
7 The Review of Educational Research	153	7 Genetic Studies of Genius	0.07
8 American Psychologist	150	8 British Journal of Educational Psychology	0.07
9 The American Educational Research Journal	136	9 Child Development	0.06
10 Phi Delta Kappan	129	10 Journal of Counseling and Development	0.06

Table 3 shows the first 10 journals that have been most frequently cited by the journals within the field of giftedness and the first 10 journals that have the highest centrality value. As Figure 7 shows, the most frequently cited journals are respectively Gifted Child Quarterly, Roeper Review, Journal for the Education of the Gifted, Journal of Educational Psychology, Exceptional Children, Handbook of Gifted Education, The Review of Educational Research, American Psychologist, The American Educational Research Journal, and Phi Delta Kappan.

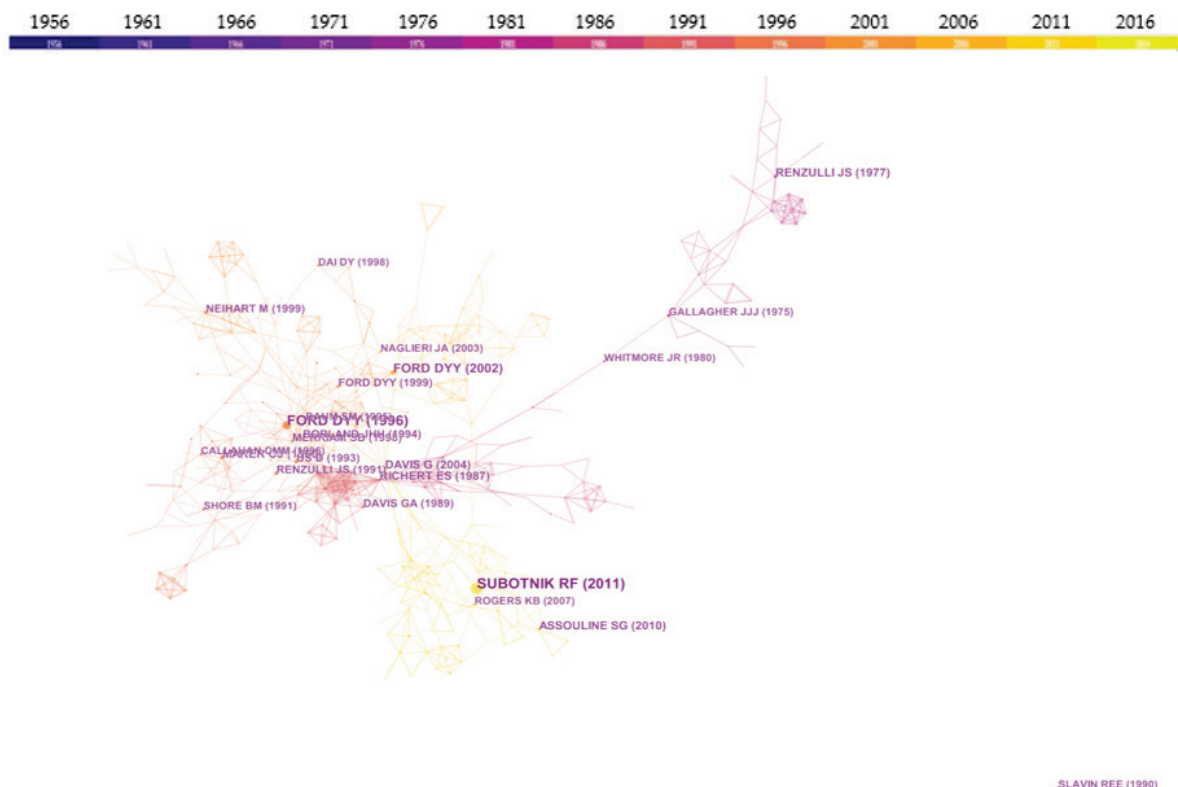
1. Gifted Child Quarterly (GCQ) aims at providing original research as well as new and creative information about gifted people within the context of school, home and society, and development of gifted people. Each issue includes qualitative and quantitative research studies that explore the qualities of gifted children, program models, curriculum and other important fields which takes the development and education of gifted children to the highest level (Defense Industry Research and Development Institute [SAGE], 2017b).
2. Roeper Review publishes academic articles on theory, applied research, policy, practice and all other dimensions of education rendered to gifted children. Some of the topics included are the theories and philosophical analyses pertinent to giftedness, talent, and creativity; gender issues; curriculum studies; instructional strategies; educational psychology; elementary/early childhood/secondary education of the gifted; emotional, motivation, and affective dimensions of gifted individuals; differentiating instruction; teacher education; tests, measurement, and evaluation; and program development (Taylor & Francis Online, 2017).
3. Journal for the Education of the Gifted (JEG) provides information and research on gifted children and their educational as well as psychological needs (SAGE, 2017c).
4. The main goal of Journal of Educational Psychology is to publish original and primary psychological researches at all the levels of age and education. The second goal of the journal is to publish the important theoretical and review articles about educational psychology (American Psychological Association [APA], 2017a).
5. Exceptional Children is a peer-review journal and publishes research studies, reconnaissance surveys, methodological surveys of the literature, databased positional papers and political analysis on the education and development of exceptional children and teenagers (SAGE, 2017a).
6. Handbook of Gifted Education is a compiled of articles composed of subheadings such as "Concepts and Description, Teaching Models and Applications, Creativity, Thinking Skills, Education, Psychological and Counselling Services" (Pearson, 2017).
7. The Review of Educational Research (RER) publishes holistic criticism of research literature about education including conceptualization, interpretation and synthesis on a wide area like education and educational research (SAGE, 2017e).

8. American Psychologist publishes current and timely articles that attract a great attention including empirical reports, meta-analysis, and academic reviews on science, application, education and politics. The contributions mostly address national and international political issues (APA, 2017b).
9. The American Educational Research Journal published reviewed analysis articles which are originally peer-reviewed on the field of educational research at all levels of sub-fields and disciplines, at all grades of education and at all types of learning (SAGE, 2017d).
10. Phi Delta Kappan is a professional journal that publishes studies about education from pre-school education till secondary education. This journal publishes articles about in-class deeds, educational policies, vocational issues and innovations in education. Phi Delta Kappan has an authentic place in the field as a journal that is the intersection point of publications about educational research, implementation and policies (SAGE, 2017f).

Gifted Child Quarterly, Journal for the Education of the Gifted, Journal of Educational Psychology, Exceptional Children and American Psychologist are included in the top 10 journals that have the highest frequency and centrality value. Roeper Review, Handbook of Gifted Education, The Review of Educational Research, The American Educational Research Journal and Phi Delta Kappan, which have high frequency, are not included in the centrality ranking as they have low centrality value. On the other hand, The Journal of Creative Behavior, Genetic Studies of Genius, British Journal of Educational Psychology, Child Development and Journal of Counseling and Development, which have low frequency, are included in the top 10 journals in centrality ranking.

**Co-Cited References Network Structure**

All the references included in the reference sections of all 1035 articles included in the scope of this study were analyzed in order to find out the cited references network structure. The resulting co-cited references network structure is given in Figure 8.



**Figure 8.** Co-Cited References Network Structure

Figure 8 shows the co-cited references network analysis of articles included in this study. It is seen that the density of co-cited references network structure is quite low (density= 0,0039). At the end of the analysis, 24.265 references cited in the 1035 articles were divided into 300 groups. It is obvious that the homogeneity of the network is quite low (mean silhouette value= 0,256) and has a loose structure (modularity Q= 0,92).

The top 10 references that were most frequently cited in the references of articles whose co-cited references network structure are given in Figure 8 and which were analyzed within the scope of this study are as below:

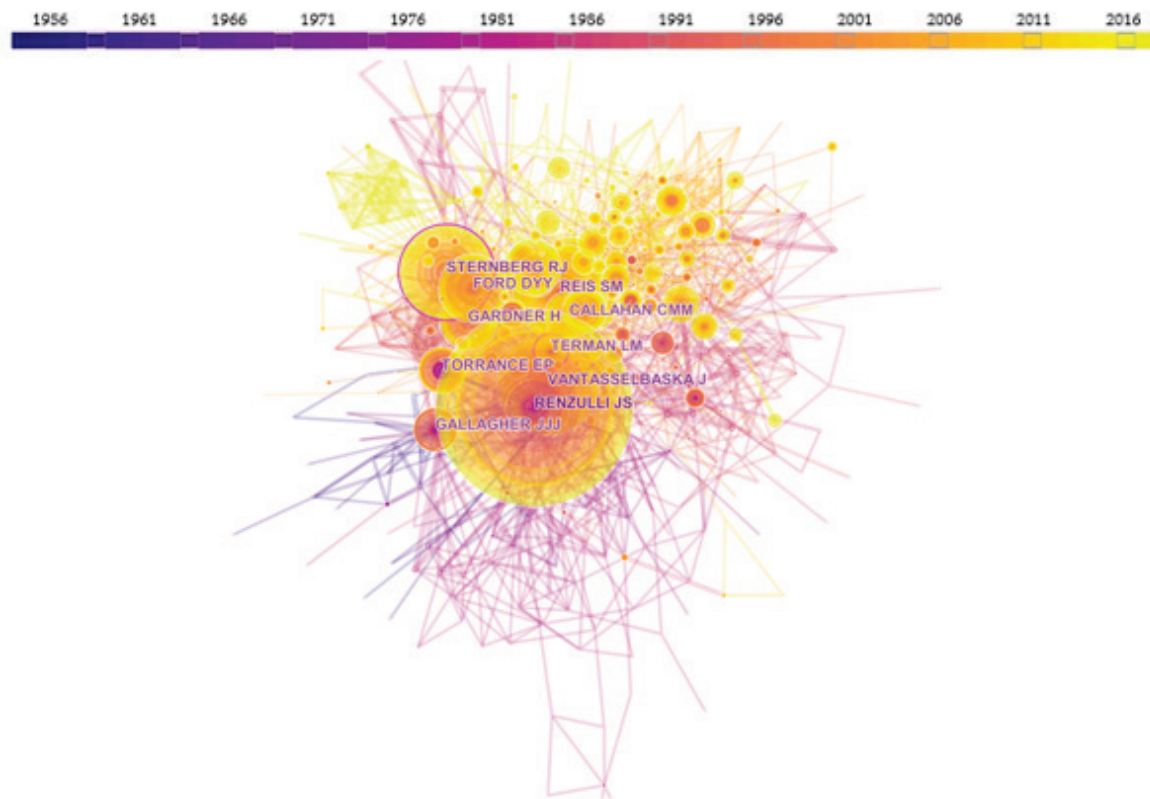
1. The article titled "Rethinking giftedness and gifted education: A proposed direction forward based on psychological science" written by Subotnik, Olszewski-Kubilius and Worrell in *Psychological Science in the Public Interest* in 2011 is the most common publication in the references of the articles on giftedness. This study starts with the description of intelligence. It focuses on the place of giftedness in educational politics, literature review in psychology, the points of agreement and disagreement, models of genius, methodological difficulties faced while doing research on gifted people and a proposed comprehensive model. It is deemed that the reasons why this article is the mostly cited reference are that it addresses the literature on giftedness in detail, it guides the researchers and implementers in the field, and it offers a new model.
2. Second common publication in the references is Ford's book titled "Reversing underachievement among gifted black students: Promising practices and programs" by Teachers College in 1996. This book focuses on the description of giftedness, failure, the social, cultural and psychological factors of failure, the relation between gender and failure in gifted people, learning environment, family, application, research and programs. The reason why this book turned out to be a reference guide is that it doesn't only focus on the advantages of being gifted, but it also addresses the disadvantageous points faced by gifted people in terms of social, cultural and psychological factors as well as the difference of gender.
3. Ford, Harris, Tyson and Frazier Trotman's research study titled "Beyond deficit thinking: Providing access for gifted African American students" in the journal of *Roeper Review* in 2002. This article focuses on the efforts to diagnose Afro-American gifted children and including them in the educational system. It mentions the need to include Afro-American students in the program designed for gifted students and to annihilate the prejudice of educators against Afro-American students. It is thought that this article is a preferred reference as it gives an idea about how to provide disadvantageous gifted students with an opportunity to realize their potential.
4. Neihart's study titled "The impact of giftedness on psychological well-being: What does the empirical literature say?" was published in the journal of *Roeper Review* in 1999. This study mentions about subjects such as giftedness and self-respect, depression, anxiety and suicide, giftedness and social competence, giftedness and psychiatric disorders, abnormal behaviors of gifted people.
5. Dai, Moon and Feldhusen's article titled "Achievement motivation and gifted students: A social cognitive perspective" was published in the journal of *Educational Psychologist* in 1998. This article addresses motivation for success and social cognitive view. Moreover, it focuses on perceived competence and self-competence, attributes to success and failure, goal tendencies and inner motivation.

6. Assouline, Foley Nicpon and Whiteman's article titled "Cognitive and psychosocial characteristics of gifted students with written language disability" was published in the journal of Gifted Child Quarterly in 2010. This study was carried out with twice-exceptional children who were gifted as well as possessing a learning impediment. This article emphasizes that these children can be overlooked when they are subject to general aptitude tests. It was found out in this article that these students could be noticed through tests specific to them. What is more, it focuses on the idea that these students who are gifted should not be lost during the diagnosis period.
7. Ford and Harris's book named "Multicultural gifted education" was published in Teachers College Press in 1999. This resource includes chapters with subheadings such as students that are different in terms of race and culture, education for the gifted and in a multi-cultural environment, multi-cultural teaching programs, teaching multi-culturalism, guidance and psychological counselling in the perspective of multiculturalism, families of students that are different in terms of race and culture, and reflective scenario/case studies.
8. Robinson's study titled "Cooperation or exploitation? The argument against cooperative learning for talented students" was published in Journal for the Education of the Gifted in 1990. The aim of this study is to summarize the academic disadvantages of gifted students. In the study, it was emphasized that the aim was to make the limitations of cooperative learning clearer instead of refusing the model of cooperative learning to the full.
9. The article by Renzulli titled "The enrichment triad model: A plan for developing defensible programs for the gifted and talented" was published in the journal of Gifted Child Quarterly in 1977. This study is about enriched triple model, which later on inspired many other following articles.
10. Maker's article titled "Identification of gifted minority students: A national problem, needed changes and a promising solution" was published in the journal of Gifted Child Quarterly in 1996. It is a study on the need of education for the gifted that would keep pace with the changing society. This article focuses on the fact that some students who are minority in terms of culture, ethnicity and language are not represented enough in the curriculum specific to the gifted. This study which discusses conceptual framework and diagnosis also mentions about a draft proposal.

When the most frequently cited references are analyzed, it is apparent that the oldest of all these resources is the one by Renzulli (1977). Other old resources were published in the late 1990s (Robinson, 1990; Maker, 1996; Ford, 1996; Dai, Moon, & Feldhusen, 1998; Ford & Harris III, 1999; Neihart, 1999). It is seen that the top three references that were most frequently cited were published in early 2000s (Ford, Harris III, Tyson, & Frazier Trotman, 2002; Assouline, Foley Nicpon, & Whiteman, 2010; Subotnik, Olszewski-Kubilius, & Worrell, 2011).

#### *Co-Cited Authors Network Structure*

The authors of the articles that were analyzed within the framework of this study and all the other authors included in the references of these articles were analyzed in order to reveal the co-cited authors network structure. The resulting co-cited authors network structure is given in Figure 9.



**Figure 9.** Co-Cited Authors Network Structure

Figure 9 shows the co-cited authors network structure of the authors of the articles analyzed within the framework of this study and the authors cited in the references of these articles. It is seen that co-cited authors network density is quite low (density= 0,0074). At the end of the analysis, 24.265 references that were cited by 1035 articles were divided in to 141 groups. It is clear that the homogeneity of the network is low (mean silhouette value= 0,3697) and has a loose structure (modularity Q= 0,91).

When Figure 9 is analyzed, in the references of 1035 articles, the most frequently cited top ten authors are respectively Joseph S. Renzulli, Robert J. Sternberg, Joyce VanTassel-Baska, Sally M. Reis, Howard Gardner, Ellis Paul Torrance, Donna Y Ford, Lewis Madison Terman, François Gagné and Carolyn M. Callahan.

1. Joseph S. Renzulli is accepted to be a leader and pioneer in education of the gifted. He applies the teaching strategies designed for the gifted for all students. He is one of the world's most effective 25 psychologists chosen by American Psychological Association. He has had various publications on "Three Ring Conception of Giftedness, The Enrichment Triad Model, Curriculum Compacting and Differentiation" since 1970s. In 1978, Renzulli founded UConn Mentor Connection, which is a summertime institution about differentiated teaching based on enrichment. This institution is a summer program that gives high school students with high potentials the opportunity to work with leaders. Moreover, Renzulli owns an online learning program that ensures to establish individualized profiles by means of finding out each student's strong academic sides, fields of interest, learning styles and way of expressing themselves (University of Connecticut, 2017a).
2. Robert J. Sternberg is a Human Development Professor at Cornell University while he is an emeritus professor at the Department of Psychology at Heidelberg University. According to the report of Sternberg APA Monitor on Psychology and the ranking list of cited authors in Google scholar, he is one of the leading researchers in the field. Moreover, studying in the field of psychology and psychiatry, he is one of the authors most frequently cited in ISI (top ½ of 1%) (Robert, 2017).

3. Joyce VanTassel-Baska is founding director of the Center for Gifted Education at The College of William and Mary in Virginia. She developed a graduate program in this center and a research and development center of gifted education. She has been awarded many times for the studies she has carried out in the field of giftedness. She is a member of various associations about gifted people and she has participated in many academic meetings. Her major research interests are on the talent development process and effective curricular interventions with the gifted (William & Mary, 2017).
4. Sally Reis is a faculty member at Connecticut University, in the field of Educational Psychology. She took office as a teacher and manager at state school for 15 years. She has written more than 250 articles, books, chapters of books, monographies and technical reports. She conducted workshops and provided professional development for school districts on the enrichment programs and gender equity programs (University of Connecticut, 2017b).
5. Howard Gardner is the Professor of Cognition and Education at the Harvard Graduate School of Education. He is also an adjunct professor of psychology at Harvard University and senior director of Harvard Project Zero. The author of thirty books translated into thirty-two languages, and several hundred articles, Gardner is best known in educational circles for his theory of multiple intelligences. His research areas are "Child Development, Cognitive Development, Early Childhood Development, Higher Education Curriculum, Intelligence, Interdisciplinary Education, Moral and Ethical Studies, and Psychology" (Harvard University, 2017).
6. E. Paul Torrance has been a pioneer in creativity research and education. Torrance's tests of creative thinking abilities are in use from kindergarten through graduate and professional education. The Torrance Tests of Creative Thinking (TTCT) are the most widely used tests of creative talent in the United States and over the world. At the end of his longitudinal studies, he found that characteristics of the creative thinking abilities are not the same those of the abilities involved in intelligence and logical reasoning. Then, intelligence tests only identify 30% of gifted students because of the tests such as TTCT (The State of Creativity, 2017).
7. Donna Y. Ford is Professor of Education and Human Development and Cornelius Vanderbilt Endowed Chair at Vanderbilt University. Her primarily research topics are gifted education and multicultural/urban education. Also she researches in these topics; the achievement gap, recruiting and retaining culturally different students in gifted education, multicultural curriculum and instruction, culturally competent teacher training and development (Donna Y Ford, 2017).
8. Lewis Madison Terman was a Cognitive Psychologist at Stanford University 1910 to 1956. He was one of the pioneers in educational psychology at the Stanford Graduate School of Education in the early 1900's. Revisioning of the Binnet test is his greatest contribution to the literature. This test became at once the standard intelligence test to use in schools and clinics throughout the United States (Sears, 1957).
9. François Gagne has studied in the Department of Psychology at l'Université du Québec a Montreal. Gagne has conducted a research in the field of giftedness and has given lecture for many years. His theory of talent development: the Differentiating Model of Giftedness and Talent is known in the giftedness literature (Gagne François, 2012).
10. Carolyn M. Callahan has studied in the area of Educational Psychology with an emphasis in gifted education. She has served as Director of the University of Virginia National Research Center on the Gifted and Talented for 18 years. She has been working on a program development for advanced talents (University of Virginia, 2017).



## Discussion

The articles published in the field of giftedness began to increase in number after 1970s and this number began to grow even faster after 1990s. The highest number of articles were published in the years of 2016 and 2015. The number of citations from these articles increased in number with a quick pace between 2006 and 2016 with the wide use of online databases. The number of publications is highest with the tag of universities in the USA, in the categories of Education Special, Education Educational Research, and Psychology Educational.

When the first rise in the number of articles on giftedness is analyzed, undoubtedly, the most striking event is that the Soviet Union launched Sputnik, the first spaceship in 1957. After this event, the USA looked through the programs and workforce, especially in science and maths, and spared a large budget for gifted students. And in 1972, Marland Report was published (Feldhusen, 1998; Torrance, 1992; Jennings, 1987; Jolly & Kettler, 2008; Stringfield & Herman, 1996; McClain & Pfeiffer, 2012; Jolly, 2009). In the Marland Report, it was emphasized that there was an urgent need for federal government to describe what giftedness means and a differentiated educational program be applied for gifted children (Marland, 1972). It is deemed that academic studies in the field might have accelerated thanks to this development.

The number of citations from the articles was the highest in 2016 (see. Figure 2). It may be interpreted that the number of citations got bigger between 2006-2016 because researchers began to reach the libraries in most parts of the world through the internet in 2000s (Seyidoğlu, 2003). For example, researchers from 50 countries could reach WoS database in 2003 whereas over 3,200 institutions in 74 countries began to be able to reach it in 2005 and 3,550 institutions from 90 countries could reach it in 2016 (Clarivate Analytics, 2017).

The 2018 data by The Times Higher Education (THE) show that 33% of the 100 best universities in the world that are ranked according to the number of studies carried out within the field of education are American universities (THE, 2018). In the light of this information, it is not surprising to think that that 67% of all the articles that have been published with a country label since 1956 have American label. The rate of inclusion of Canada (4,5%), Australia (4,5%), England (9,5%), China (5%) and Germany (12%) in the 100 best universities of THE ranking also complies with the rate of country labels of the publications analyzed in this study. Although Turkey ranks the 6th as for country label, there is no Turkish university in the top 100 universities list according to the THE ranking.

Being aware of publications in different categories and addressing them with the publications that are directly related to the field will help new studies to be based on sound grounds and thus contribute to the accumulation of knowledge to the greatest extent. For example; Martin, Burns, and Schonlau (2010) carried out a screening survey in the category of Education Special and Psychology Educational that covered a quarter century (1983-2008) about mental disorders of young people that were gifted and that were not gifted. It was found out that gifted young people had lower level of anxiety when compared to their peers but that they did not differ about depression or the intention of committing suicide. On the other hand, it was revealed with this survey that there were only few comparative studies on the mental health of gifted people. Likewise, the study carried out by Kim (2016) about the impact of enriching programs on gifted students between 1985-2014 is a meta-analysis study published in the category of Education Special and Psychology Educational. This study, which analyzed twenty six studies, showed that enriching programs had a positive impact on gifted students' academic success as well as their social development. Another meta-analysis in the same category was carried out by Steenbergen-Hu and Moon (2011), and it was found out in 38 experimental studies carried out between 1984-2008 that acceleration had a positive impact on academic success besides social-emotional development.

At the end of word-based analysis (see. Table 1), it is seen that the words and word phrases that are most frequently used in the publications within the field of giftedness (gifted student, student, gifted education, and others) are general concepts specific to the field. The words and word phrases that have the highest centrality (adolescent, elementary school, adjustment, personality, and others) are, on the other hand, terms that belong to the specific issues or topics about giftedness and/or education. The fact that the frequency of words is high means that these words are commonly used in the articles published within the field of giftedness. The fact that the centrality value of the words is high means that these words connect the articles published in the field of giftedness together. In other words, these words that have a high betweenness centrality function as a mediation between the words that have a high frequency in forming the network. For example, the word phrase that has the highest frequency, "gifted student," comes out very often in the publications within the field and these publications are connected to each other through words that have a high betweenness centrality such as "elementary school, adjustment, talented youth, and identification".

At the end of the keyword-based analysis (see. Table 2), it is seen that keywords that we come across considering both frequency and centrality value (student, achievement, children, education, adolescent, etc.) are almost the same and are composed of general terms. It is proven once more that the keywords used in the articles are of great importance. The most frequently used keywords included in the articles on giftedness are only general terms on education. It is important to designate the scope of the research while choosing keywords in order to ensure that the research is indexed and it is reached easily. Within the framework of this finding, it is apparent that the mostly preferred keywords are not specific to the field, they are rather common words and phrases. Keywords play a role of tool that helps index makers and search engines to find the related publications more easily (Springer, 2017). If the database finds the publication which is engine-searched, readers can find them easily as well. Thus, the number of people who read the article increases and most probably, the article will be cited more often. However, the keywords should be chosen with care in order to ensure their effectiveness. Keywords should represent the content of the article. These keywords are specific to the field or sub-field. When general words are used as keywords during literature review, there will come out a lot of results in number and this will make it harder to reach the publications that are indeed needed.

When the most frequently cited journals are analyzed, it has been noticed that these journals include the ones that publish articles in the field of "Giftedness" as well as those that publish studies in the fields of "Educational Psychology", "Special Education", "Educational Researches" and "Psychology." Matthews et al. (2008) analyzed articles published in peer-reviewed journals that were directly related to the education of gifted people and that had five fundamental media organs in order to evaluate the field by means of reporting influence quantity on the education of gifted people. These journals are Gifted Child Quarterly, Gifted and Talented International, Journal for the Education of the Gifted, Journal of Secondary Gifted Education and Roeper Review. The top three journals that were most frequently cited as shown by the journal citation network structure in this study and the top three journals that were chosen to be "the major journals in the field" in Matthews and others' article are the same. The other two journals are not included in this study as they are not indexed in WoS. In this study, besides journals that publish articles on giftedness, the journals in other fields such as educational psychology, special education and psychology where articles on giftedness are published are analyzed.

When cited journal network structure is analyzed, it is seen that the journals that are included in the top ten ranking list according to frequency of citation and centrality value are similar (see. Table 3). The top ten journals that have both a high frequency and centrality value include "Gifted Child Quarterly, Journal for the Education of the Gifted, Journal of Educational Psychology, Exceptional Children and American Psychologist"; according to criteria of SCImago Journal & Country Rank based on Scopus database (SCImago, 2007), except for Journal for the Education of the Gifted (Q4), they are included in the first and second quarter (Q1 and Q2), and according to the analysis of Clarivate Analytics which is related to WoS database, they are included in major journals list in Social Sciences Citation Index-SSCI and Emerging Social Sciences Citation Index-ESCI. It is seen in Clarivate Analytics

calculations that the effect size (0,032; 1,372; 2,296; 3,459 and 6,681) and H index (23; 32; 70; 160 and 188) of these journals are high (Clarivate Analytics, 2017).

According to co-cited reference network analysis, the oldest study that was cited is Renzulli's study which is about "enriched triple model" that has shed light on many following studies. In the early 1900s, a study that mentioned teaching and learning process revealed the limitations of cooperative learning for gifted students (Robinson, 1990). It was observed that studies carried out about gifted people in minority groups are attracting great attention (Maker, 1996; Ford, 1996). In the following years, there came out an article that focuses on the interaction between success, and self-competence as well as inner motivation in the gifted (Daiet al., 1998). In the late 1990s, we come across an article among the most frequently cited references on multi-culturalism in education of the gifted, and the processes of psychological counselling and guidance (Ford & Harris III, 1999). In the late 1990s, again, an eye-catching article was published which aimed at understanding the gifted more in depth and which focused on the gifted people's psychological wellbeing such as self-respect, depression, anxiety, suicide, etc. (Neihart, 1999). In the early 2000s, there was an interesting article about Afro-American gifted students (Ford et al., 2002). The study carried out by Assouline, Foley Nicpon and Whiteman in 2010 about diagnosis is among the most frequently cited publications and it attracts the attention with the concept of "twice-exceptional." The article by Subotnik et al. (2011) is deemed to be one of the most frequently cited publications because it is a very comprehensive study that starts with the description of intelligence, then focuses on the place of giftedness in educational policies; later, it includes a literature review in the field of psychology, and it then concentrates on the points that are agreed and disagreed, model of high potential, methodological difficulties faced when a study is done on gifted people, and lastly it offers a comprehensive model.

The references that were most frequently cited are composed of studies carried out about curriculum models for the gifted, teaching-learning processes, needs of minority groups, diagnosis, cognitive and psychological qualities. Articles about different issues have high ranks in the citation list, and this shows that the literature of giftedness was taken advantage from different points in the 1035 articles that were analyzed within the framework of this study. When author network structure was analyzed, it is seen that the authors are experts in the fields of educational psychology, curriculum development for the gifted, human development, cognitive psychology and test development. So, when the leading names in journal, reference and author citation networks are considered together, it can be said that in the field of giftedness, there is an inter-disciplinary approach that encompasses three different fields which are general education, special education and psychology.

### Conclusion and Suggestions

As a result of this research; published articles on giftedness increased in number after 1970s and the pace of this increase even got higher after 1990s. The number of published articles reached its peak in the years of 2015 and 2016. The number of cited references to these articles increased quickly between 2006-2016 with increasing in number of publications, and the wide use of online databases. The most published articles were listed under the categories of Education Special and Education Educational Research with the tags of universities in the USA. Words that were mostly used in the articles are common words. It is seen that there are even more specific words when it comes to the words with high centrality value. It was found out that the leading keywords are almost the same and general terms according to their frequency and centrality value. The fact that keywords are general words is a factor that makes it harder to reach a particular study. It is seen that journals that were most frequently cited in the field and that have a high centrality value are from different fields. The mostly cited publication is "Rethinking giftedness and gifted education: A proposed direction forward based on psychological science" by Subotnik, Olszewski-Kubilius and Worrell which was published in 2011 and which addresses the field of giftedness in all aspects. When historical flow is considered, the oldest article that was most frequently cited is Renzulli's (1977) study about "enriched triple model." In this context, it can be said that Renzulli is a leading name in the field with the model he proposed, and the study carried out by Subotnik, Olszewski-Kubilius and Worrell has a combining effect in the field as it compiles the

historical process of the field and offers a new model in the field. According to author citation network analysis, Renzulli again ranks first as a leading name.

In this study, only bibliometric analysis and network analysis were done. The findings help to see the general qualities of the field and reach a holistic piece of information about the field, studies that include more detailed analysis are needed in order to reach information in depth.

The results obtained from this study, in which articles about giftedness are examined in terms of their bibliometric properties, show that more detailed and operational data can be gathered about the subject of research when literature review is done by bibliometric analysis especially at the beginning of a new research study. Therefore, training on bibliometric analysis could be given to researchers in order to direct them to choose correct and convenient publications and to increase the individual awareness on this topic. Through bibliometric analysis, studies in all fields will be evaluated effectively and studies to be conducted in the field will be more qualified thanks to the foresight it will provide the researchers with.

As keywords are composed of general phrases specific to the field, it is recommended that the researchers that will carry out literature review make use of words that are specific to the field as well as more general words. Moreover, it is suggested that researchers that will publish new studies in the field of giftedness choose the keywords specific to the field that best explain the details of their study.

Likewise, as the leading journals in the field come from different fields, it is recommended during literature review that researchers make use of journals that are specific to the field besides journals in the field of education and psychology. Considering the fact that the leading researchers in the field of giftedness are experts in different fields, it is recommended that the researchers in the field carry out new studies with researchers from different fields in order to have a multi-faceted and comprehensive point of view in the field.

### **Limitations**

Although the data for this study are obtained from “Web of Science (WOS)”, which is used by all the scientific world and a respectable comprehensive database accepted in getting academic title, it cannot be said that it encompasses each and every article about giftedness.

Though CiteSpace software that was used to carry out social network analysis is quite useful in terms of analyzing huge amount of data and presenting reader-friendly visuals, the step of cleaning data that is necessary to study the bibliometric data obtained from WoS and getting them ready for the analysis requires a lot of attention and time, which are some general limitations of this and such studies.

### **Acknowledgements**

This research one of the products of “Primary School Curriculum (1st-4th grade) for Gifted Students Project: An Action Research” supported by Hacettepe University Scientific Research Projects Coordination Unit. We would like to thank to Proff. Emine Nilgün METİN, Proff. Umut AL, and PhD. Zehra TAŞKIN who shared his valuable opinions and suggestions with us.

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