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Bibliometric Analysis of Research on Gifted Education

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ABSTRACT

This bibliometric analysis reviews 3,577 research articles on gifted education from the Scopus database published between 2005 to 2025, identifying trends and circuits of publications in this specialised area. Although gifted education research has grown over the last 20 years, no single bibliometric investigation has concomitantly analysed the changes over time in the publication rates, patterns of collaboration, and the overall development of the subject matter of enquiry on the same using a variety of analytical techniques, which have provided gaps in comprehension of intellectual organisation of the field, geographical concentration and implications of the pandemic era. The study uses VOS viewer software which uses the co-occurrence analysis of keywords, citation analysis, co-citation provides mapping, and collaboration network visualisation. The study reports relatively stable research output: on average, 150-200 articles per year with a significant increase to a bit less than 400 publications in 2021 after the pandemic. The United States leads within this research sphere generating close to five times more publications than any other country centred around the research facility of the University of Connecticut, Purdue University, and William & Mary. Donna Y. Ford is the most prolific researcher (61 publications) far ahead of other researchers. Network visualisations show complex intellectual structures based on central issues of identification strategies, equity concerns, developmental theories, and educational programmeming approaches. Co-citation analysis reveals separate scholarly communities joined by prominent researchers such as, Renzulli, Sternberg, Gardner and Ford, while international collaboration networks, because of increase, are however supremely US-centric. Such results capture the shift in the field of study to move beyond the identification focuss to that of multidimensional study of educational interventions, equity issues, developmental theories, and talent development in diverse populations and contexts.

Keywords: Bibliometric analysis, gifted education, publication trend, scopus database

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INTRODUCTION

Gifted education is a discipline of special expertise dedicated to the specific intellectual, inventive, and developmental needs of pupils who demonstrate gifted abilities and talents. Gifted students usually exhibit improved cognitive ability, creativity, and high levels of task involvement (Renzulli, 2012). According to Davis et al. (2021), gifted students tend to assimilate and analyse information more quickly, think about problems in greater depth and subtlety, and reach more profound comprehension than equally aged pupils. Identification, and cultivation of gifted students' potential is a must in current educational systems around the world. A certain percentage of students; 3-5%, may be gifted, according to the National Association for Gifted Children (2019), but this figure might vary depending on the methods and criteria adopted in identification. To achieve optimal development of gifted students, their educational courses need to incorporate differentiated challenges that promote a depth and complexity, according to VanTassel-Baska and Hubbard (2016).

Research indicates that under optimal conditions, gifted students are under threat of underachievement, disengagement, and psychological distress when there are no effective educational programmes (Siegle et al., 2020). Subotnik et al. (2018) claim that successful developing of gifted abilities can be achieved using intentional educational strategies, dedicated educators, and supportive environment that encourages experiment and creative thought. New accomplishments in our knowledge of neurological development, talent routes, and emerging ideas about intelligence and creativity have triggered continuous progress in the area (Sternberg, 2018). Modern gifted education practices focuss on developing talents in different fields, guarantee cultural competence, and use inclusive approaches, directed to a sufficient identification and development of gifted potential in the population with various backgrounds (Ford, 2013; Plucker & Peters, 2022). Although gifted education has been changing considerably in the last 20 years, the area has not been analysed thoroughly and systematically in terms of its intellectual landscape. Past bibliometric research works have been restricted in a number of ways: (1) they have been limited in time to specific periods (Ai, 2022; Ozcan & Donmez, 2021), (2) they have been short in coverage using a single database (Lo & Porath, 2017), (3) they have not investigated the relations between publication trends, collaboration patterns, and thematic evolution at the same time (Hernández-Torrano & Kuzhabekova, 2020). More so, none of the recent studies examined the effect of COVID-19 pandemic on research productivity and focuss in gifted education. This discontinuity makes it hard to comprehend: the intellectual history of the field, the geographic and institutional hegemony of some locations and organisations, the presence of silos of research rather than coherent scholarly societies, and new areas to which research needs to be extended.

LITERATURE REVIEW

Bibliometric analysis is now a critical tool for defining the intellectual pathways and patterns in gifted education research. Lay the groundwork for understanding the scholarly structure of gifted student education research was prepared by early studies (e.g., Heller & Menacher, 1992), which examined journals' publications and revealed that well-organised efforts were steered mostly towards North America, with a minimal international collaboration. Digging deeper into this pattern, Hernández-Torrano and Kuzhabekova (2020) analysed 40 years of research and found greater validity in the fact that although research on gifted education had spread across the globe, most of the top research bared-its-teeth from the west, particularly the US.

The multidimensional mapping of gifted education field derived from the inclusive co-citation analysis of Ai's (2022) examination of 1,418 gifted education documents from the Web of Science database from 1980 to 2020. By means of this analysis, the following five domains of primary research were distinguished. The main issues were gifted identification and assessment, creativity and talent development, addressing underrepresentation of minorities, socioemotional well-being of gifted children, and educational practice. Based on this, Lo and Porath (2017) conducted a view of articles in "High Ability Studies" that were published from 1990 to 2016 using bibliometric tools demonstrating a change in the focuss of scholarly interests from psychometrics to social-cultural aspects of giftedness. Chubarova et al. (2022) presented a global analysis of research into gifted education, detecting cultural factors that influence the choice of research issues and underlying theories by comparison of bibliometrics from different countries. They found out that American studies were inclined toward emphasis on identification strategies and programmeming whereas European studies were inclined more toward exploring the psychological traits and developmental pathway of gifted individuals. A review of the articles using CiteSpace software completed by Ozcan and Donmez (2021) based on 493 articles published between 2010-2020 concluded that Asian, European, and North American scholars have different citation networks – the support for cultural differences in research interest.

Using the bibliometric analysis method, Sellman et al. (2021) identified the methodological approaches used in 1,290 articles concerning gifted education published between 2000 and 2020. According to the review most published research (63%) used the quantitative approach with the remaining utilising quantitative and mixed methods in 22% and 15% of the studies, respectively. In addition, Carman (2020) noted that experimental studies had been overwhelmingly outstripped by correlational and descriptive research, which demonstrated a serious research method imbalance. In attempt to examine the emergence of a theoretical framework in gifted education, Coleman et al. (2018) made use of co-word analysis techniques on journals for more than 4 decades. They discovered that research has shifted from the conventional intelligence focussed perspectives of gift to a greater concentration on developmental and domain specific theories of talent. Other aspects of innovations in gifted education, in particular, development of interdisciplinary relationships were noted by Subotnik et al. (2021) in their connections with neuroscience, positive psychology, and social justice education. An investigation of article counts by Lee et al. (2023) using topic modelling showed that there has been a strong increase in the number of publications on twice-exceptional students, individuals who are gifted and suffer from learning disabilities, as the rate has grown 175% since 2010 and 2022. Brigandi and Bainbridge (2022) added more detail to this emerging area of research through the review of 224 articles concerning twice-exceptionality and determining three major representative angles:The study revealed three principal research themes; the first one was identifying twice-exceptional students; the second was implementing instructional methods; the third was providing support in emotional and social contexts.

Hernández-Torrano et al. (2023) investigated the pattern of collaboration in gifted education research with the help of the co-authorship network in 2,345 published documents over the period between 2010 and 2022. Results from the research revealed the fact that gifted education studies are localised with majority of teams working individually with only 16.7% of the papers being multi-country efforts. Following earlier studies, Hong and Shuyan (2023) discovered analogous trends while studying the social structures of networks and discovering important institutions and scholars connecting different research communities. The contribution of gifted education research was investigated by Plucker and Callahan (2020) with the help of a review of citation rates in 15 journals between 2000 and 2020. They found that there were substantial differences in citation rate, with theoretical contributions cited much more than practical works which may signify the schism of scholar theory and practical usage. Scholarly works demanding extensive reforms in identification procedures drew many citations yet its influence on the direction of educational policies was minimal (Robinson et al., 2021). VanTassel-Baska and Hubbard (2023) described emerging research directions via a bibliometric analysis of articles published between 2018 and 2023, including an increased emphasis on developing STEM talent and engaging in culturally responsive gifted education, using technology in talent identification, and employing psychosocial interventions to gifted students. These shifts in focuss in research reflect the alignment of the field to contemporary shifts in education in equity and technology as well as comprehensive student support that might be the focuss of gifted education in the future.

Research Question

The following research questions guided the analysis:

1. What are the time trends of the number of gifted education publications between 2005 and 2025?
2. Who are the most prolific authors (in terms of publication output) in the research of gifted education?
3. What are the top countries (by author affiliations) and universities in terms of publications on gifted education?
4. What are the most gifted published journals in research on education?
5. What intellectual organisations and collaborative networks are present in the study of gifted education as identified using the methodology of keyword co-occurrence analysis, co-citation patterns, and international collaboration mapping?

METHODOLOGY

Bibliometrics refers to the accumulation, compilation, and analysis of bibliographic data emanating from scientific literature (Verbeek et al., 2002). The analysis includes tracking metrics of the publication outlet and year, category of author (Y. Wu & T. Wu 2017) as well as tools such as co-citation analysis. A coherent literature review holds a repetitive pattern of identification of keywords, database search, and analytical processing to develop bibliographies and credible results (Fahimnia et al., 2015). Methodological steps tend to have to do with determining the top search terms, assessing the first results, and then adjusting any need for more specific searches.

Meier (2011) argues that the fact that journals exist in Clarivate Analytics' Journal Citation Reports (JCR) is an indication of quality. To inform itself on advances in theoretical foundations, this research consulted leading journals and extracted data from the Elsevier Scopus database (Di Stefano et al., 2010; Tan et al., 2014). In order to keep the quality, this research limited the scope to peer reviewed academic journal articles only eliminating books and conference proceedings (Li et al., 2016. Scopus, operated by Elsevier, contains more journals than other databases and it focusses on recent publication (Aghaei Chadegani et al., 2013). The research-accessed 5400 articles from Scopus between 2005 and the half months of 2025. Scopus was the convenient instrument for fetching articles as it offers extensive scope of citation and bibliographic records that are imperative to social sciences and humanities with better journal coverage as compared to other databases (Aghaei Chadegani et al., 2013; Olijnyk, 2015).

Data Search Strategy

Study employed a screening sequence to determine the search terms for article retrieval. Study was initiated by querying Scopus database with online TITLE-ABS-KEY (gifted AND education) AND PUBYEAR > 2004 AND PUBYEAR < 2026 AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "PSYC") OR LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "COMP") OR LIMIT-TO (SUBJAREA

, "MEDI") OR LIMIT-TO (SUBJAREA , "ENGI") OR LIMIT-TO (SUBJAREA , "MATH") OR LIMIT-TO (SUBJAREA , "HEAL") OR LIMIT-TO (SUBJAREA , "BUSI") OR LIMIT-TO (SUBJAREA , "PHYS") OR LIMIT-TO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "ENVI") OR LIMIT-TO (SUBJAREA , "BIOC") OR LIMIT-TO (SUBJAREA , "MULT") OR LIMIT-TO (SUBJAREA , "IMMU") OR LIMIT-TO (SUBJAREA , "VETE") OR LIMIT-TO (SUBJAREA , "DENT") OR LIMIT-TO (SUBJAREA , "PHAR") OR LIMIT-TO (SUBJAREA , "MATE") OR LIMIT-TO (SUBJAREA , "NURS") OR LIMIT-TO (SUBJAREA , "AGRI") OR LIMIT-TO (SUBJAREA , "CENG") OR LIMIT-TO (SUBJAREA , "EART") OR LIMIT-TO (SUBJAREA , "CHEM") OR LIMIT-TO (SUBJAREA , "ENER") OR LIMIT-TO (SUBJAREA , "DECI") OR LIMIT-TO (SUBJAREA , "NEUR")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "bk") OR LIMIT-TO (DOCTYPE , "ch") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j") OR LIMIT-TO (SRCTYPE , "b") OR LIMIT-TO (SRCTYPE , "p") OR LIMIT-TO (SRCTYPE , "k") OR LIMIT-TO (SRCTYPE , "d"), As a starting point, 5400 articles were retrieved for review. The criteria were clarified to focuss solely on “gifted education” or “gifted & talented education” – concentrating on students as learners. This refinement yielded 3577 results. Articles in a non-English language and review accounts were also deleted from the collection. A thorough bibliometric analysis was completed based on 3577 articles from the Scopus database, all of which were as of May 2025 and studied gifted education with the perspective of student learning.

Data Analysis

Plaintext data such as publication year, publication title, publication details, journal articles, citations, and keywords were retrieved from the Scopus database for works published from 2005 up to May 2025 for analysis. After data extraction, we performed the analysis through VOSviewer software version 1.6.15, able to apply its VOS clustering and mapping algorithms to building graphical representations. It is VOS viewer that is used as an alternative of the Multidimensional Scaling (MDS) method (Van Eck & Waltman, 2010) preserving the principle goal, which is to arrange the items in a low-dimensional space, such that the distance in between any pair represents their similarity and relationship (Appio et al., 2014). The fundamental difference is that MDS mainly calculates similarity measures (Jaccard indexes, cosine, etc.), while VOS uses a more effective strategy for normalisation of co-occurrence frequencies (Van Eck & Waltman, 2007). More precisely, here the ‘association strength’ (ASij) is used during the process:

Asij
Cij/(WiWj)

The ASij measure is equal to "the ratio between the observed number of co-occurrences of i and j and the expected number of co-occurrences of i and j, assuming independence between i and j" (Van Eck & Waltman, 2010, p. 531). By using this index, VOSviewer provides maps with the emphasis on minimising the total weighted sum of squared distances between all pairs of items. Appio et al. (2016) stated that linlog/modularity normalisation were used in our analysis. The results of the application of VOSviewer's visualisation approaches on the dataset revealed patterns that were developed on the basis of mathematical relations that favoured the analysis of keyword co-occurrence, citation trends and co-citation mappings. Keyword co-occurrence analysis supplements the study of trends in development of the research area over time (Zhao, 2019) and identifies dominant issues in various academic disciplines (Li et al., 2016). Citation analysis allows identifying key research topics, emerging tendencies, and known methods (also exploring how a field's major interests originated) (Allahverdiyev & Yucesoy, 2017). Document co-citation analysis has been highly popular in bibliometrics research (Appio et al., 2016; Fahimnia et al., 2015; Liu et al., 2015). Fahimnia et al. (2015) and Liu et al. , 2015 use network theory to create maps and expose important data patterns (Liu et al., 2015).

FINDINGS

What are the Time Trends of the Number of Gifted Education Publications between 2005 and 2025?

Figure 1 plots a 20-year horizon in studies on gifted education, beginning in 2005 and ending in 2025, with 109 articles in 2005, with a sharp drop towards 78

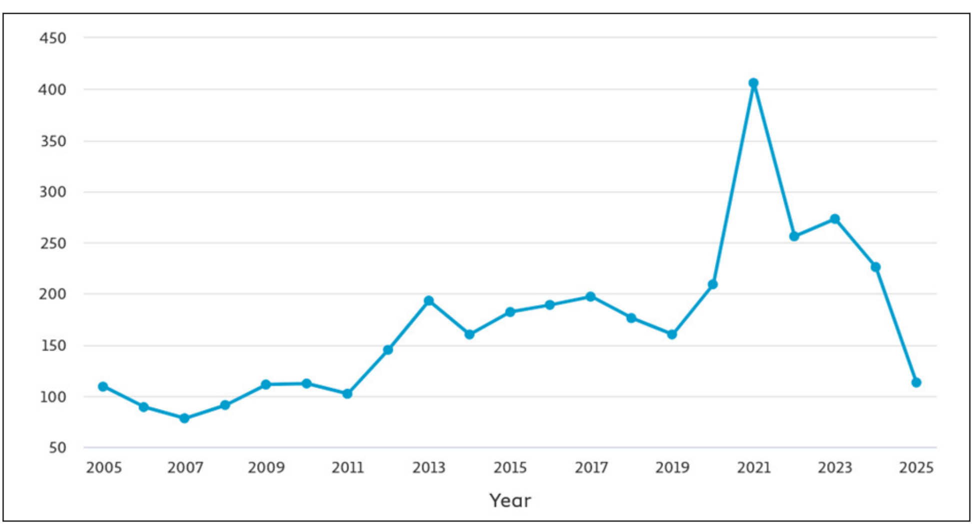

Figure 1. Trend of research in gifted education by years

in 2007. Post the first decline, publications continued to grow until by 2013 there were roughly 200 studies a year. Publication rate during 2013-2019 demonstrated slight fluctuations but had remained constant at 150-200 articles annually which indicated successive scholarly interest. According to the Table 1, 2021 recorded a substantial top in publications number with a jump to 400 – twice as much compared with the previous research output. The dramatic increase may be accounted for by the increased attentiveness to gifted education in the wake of the pandemic that led to scholarly examination of its effects on exceptional learners. The temporary peak did not persist long and publication numbers slowly returned to 273 at 2023, before they rapidly dropped to over 113 in 2025. On the whole, the results indicate steady scholarly engagement with significant though short-lived 2021 surge, followed by a recovery to publication levels that are similar to those of two decades ago.

Table 1
Trend of research in gifted education by years

Year	Documents	Percentage
2025	113	3.2%
2024	226	6.3%
2023	273	7.6%
2022	256	7.2%
2021	406	11.4%
2020	209	5.8%
2019	160	4.5%
2018	176	4.9%
2017	197	5.5%
2016	189	5.3%
2015	182	5.1%
2014	160	4.5%
2013	193	5.4%
2012	145	4.1%
2011	102	2.9%
2010	112	3.1%
2009	111	3.1%
2008	91	2.5%
2007	78	2.2%
2006	89	2.5%
2005	109	3.0%

Table 2
Most influential author

Author	Documents
Ford, D.Y.	61
Peters, S.J.	37
Olszewski-Kubilius, P.	33
Gentry, M.	31
Matthews, M.S.	30
VanTassel-Baska, J.	30
Callahan, C.M.	27
Jolly, J.L.	27
Johnsen, S.K.	25
Moore, J.L.	25

Who are the Most Prolific Authors (in Terms of Publication Output) in the Research of Gifted Education?

The measure of gifted education research by experts is provided Figure 2. Ranking first in terms of productivity, Ford, D.Y. has produced 61 papers, which also exceed team members. As presented in the Table 2, the next most productive scholar is Peters, S.J. with 37 works. In the middle segment, Olszewski-Kubilius, P. produces 33 documents whereas Gentry, M., Matthews, M.S. and VanTassel-Baska, J. all produce 31 publications each. One can see from the lower part of the graph that Callahan, C.M., Jolly, J.L., Johnsen, S.K., and Moore, J.L. have each produced between 27 and 25 documents in

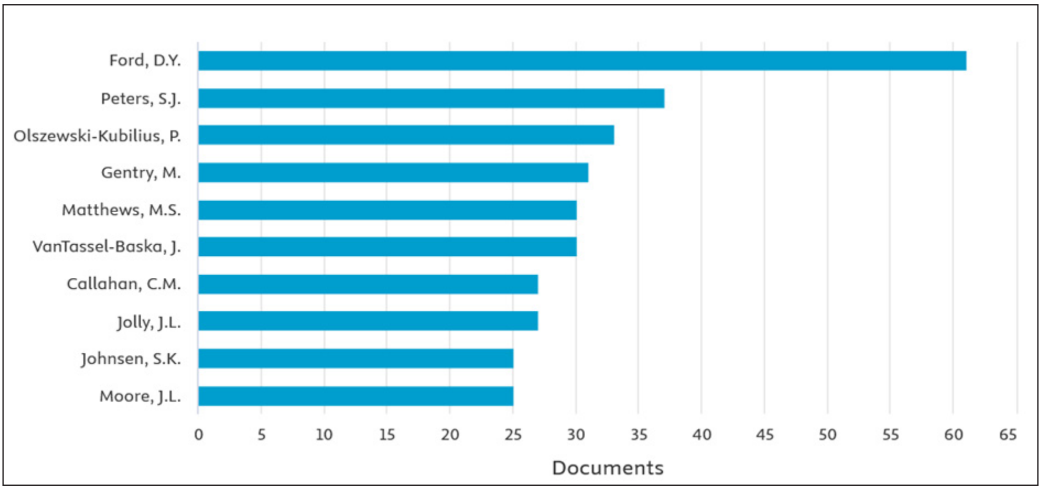

Figure 2. Most influential author

gifted education research. This graphic very definitively shows the relative publication output among influential gifted education researchers, something far from equal for Ford, whose output is nearly double anyone else's, comproving her as a voice to be listened to. Upon analysing the data, most of the researchers are found to traverse a pretty consistent publication trajectory, Ford being the exception because she has an extraordinary scholarly output.

What are the Top Countries (by Author Affiliations) and Universities in Terms of Publications on Gifted Education?

Figure 3 displays the distribution of research documents published on gifted education throughout the world for ten different countries. With 1,700 documents, the greatest number of publications was done by authors based in institutions located in the United States by a clear margin of leadership, faring more than five times better than second place Australia with 243 documents. Turkey and United Kingdom are each similarly at 200 documents from Australia. Contribution from these other countries is a diminishing mark: Canada publishes 130 papers while Germany produces 105 papers. The Table 3 shows that the Russian Federation, South Korea, Spain and Israel are all documented at less than a 100. This clear disparity highlights

Table 3
Most influential country

Country	Documents
United States	1690
Australia	243
Turkey	187
United Kingdom	183
Canada	132
Germany	105
Russian Federation	98
South Korea	75
Spain	59
Israel	57

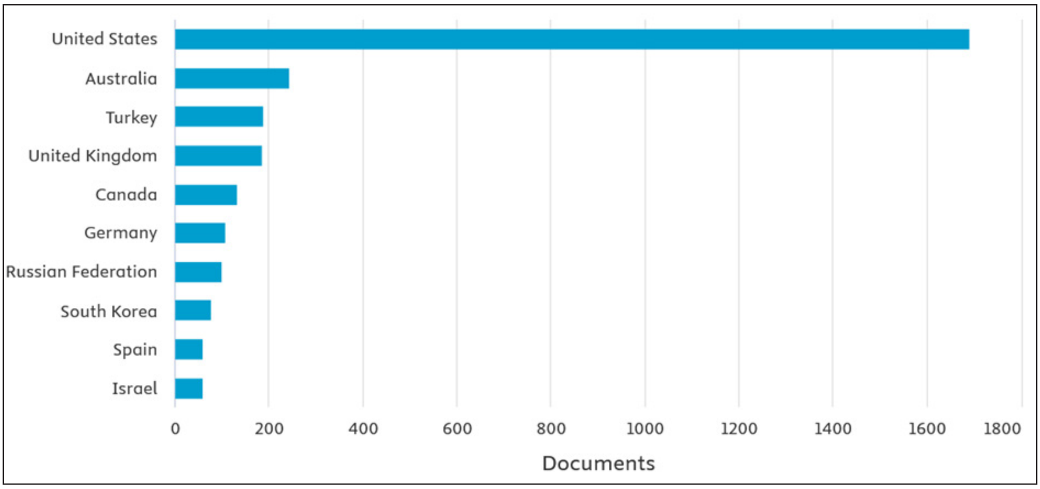

Figure 3. Most influential country

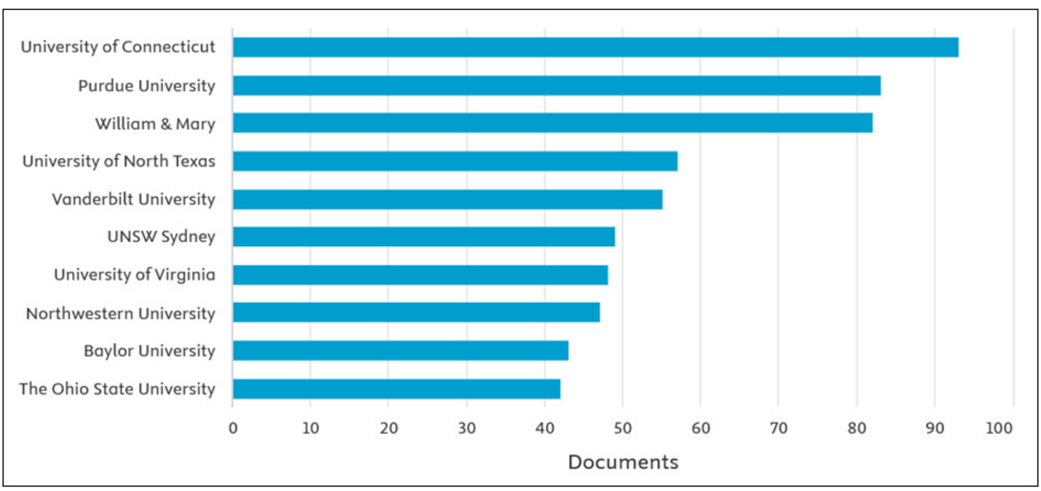

Figure 4. Most influential university

the leading role of the United States in the research of gifted education, the leadership probably explainable by early detection and the support of gifted students in the United States, larger funds for this area of study, and feature of a wider academic community, who are specialised in exceptional learners. The wide disparity in research production in the US vis-a-vis other nations points at potential for improved international cooperation in gifted education research.

Figure 4 shows the contributions of highest-contributing universities to gifted education research in relation to the number of documents written. Close to 90 documents have made the University of

Connecticut the highest performer of gifted education research. The Purdue University and William & Mary both excel with each contributing 80 articles and act as the top tier contributors to gifted education research. With almost 60 documents quoted, the University of North Texas takes the average position, while in second place, we have 55 publications belonging to Vanderbilt University. The lower part of the graph shows a phased decrease in document output: The University of Virginia and UNSW Sydney provided 49 documents, followed by Northwestern University with 47 and Baylor University with 43. A clear rank arises from this visual information making the University of Connecticut's Neag centre for Gifted Education and Talent development closely likely to drive its nearest at the top position. In the Table 4, eight American universities in the top ten speak out for the leading role of the United States in the gifted education research, bearing out the word of UNSW Sydney, the only international institution among these highly productive centres.

Table 4
Most influential university

University	Documents
University of Connecticut	93
Purdue University	83
William & Mary	82
University of North Texas	57
Vanderbilt University	55
UNSW Sydney	49
University of Virginia	48
Northwestern University	47
Baylor University	43

Table 5
Top contributing journals

Source	Documents
Gifted Child Quarterly	182
Gifted Education International	175
Gifted Child Today	160
Roeper Review	147
Journal for the Education of the Gifted	146

What are the Most Gifted Published Journals in Research on Education?

As indicated in the Figure 5,the line graph outlines publication outputs in five major gifted education journals over the period 2005-2025. Here, the presentation demonstrates how these top journals display distinctive variation and change in the production of their publications over time. On the other hand, in red there is a peak publication rate of 22 documents in 2016 and consistent publication rate with notable increases in 2019 and 2022 (20 documents both years) presented in Gifted Child Today (in green). Gifted Child Quarterly (red line) has a very variable pattern, including a significant high record level of 18 documents in 2012, after which an ultimate set of changes which all lead to less publications over time. Gifted Education International (blue line) commences with a rather healthy 15 documents in 2005, suffers a sharp decline to virtually no publications in 2011, gradually increases to a stable middle range in the mid-2010s, topping out at 17 documents in 2021, when the numbers start to slide again. The Journal for the Education of the Gifted follows a balanced trajectory:

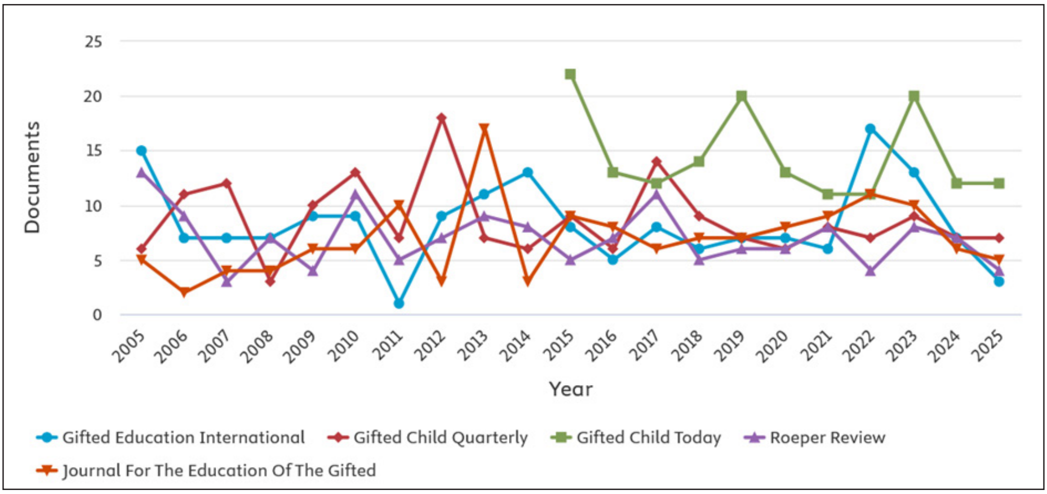

Figure 5. Top contributing journals

average number of articles per year, 17 (peak documented in 2013). Highest stability level is shown by Roeper review (purple line): 5-10 pieces of research per year in the 20-year period. As evidenced in the Table 5, this twenty-year analysis shows repeated trends in academic publishing for gifted education, as well as the different levels of influence different journals attained throughout the times because of the changing nature of academia and by presenting Gifted Child Today as the most active periodical in the past years. 488 items, 11 clusters.

What Intellectual Organisations and Collaborative Networks are Present in the Study of Gifted Education as Identified using the Methodology of Keyword Co-occurrence Analysis, Co-citation Patterns, and International Collaboration Mapping?

Co-occurrence

The dimensions of the bibliometric relations within the area of gifted education research are selectively examined in this Figure 6, revealing the multitude of connections between the central concepts and areas of study, represented as points and lines. In the network's heart is the red cluster that is the gifted education, which links to such important areas of identification, acceleration, equity and underachievement among others depicting the area's main focuss on identifying and supporting gifted children. Around the central cluster of gifted education lie various other interconnected fields of research. The green one focusses on students, engineering education, and computational thinking distinguishing STEM-oriented research in the area. Achievement, child development and developmental considerations dominate the blue cluster. The yellow cluster connects medical education to other issues in education and hosts several smaller clusters focussing on topics such as human computer interaction and self regulated

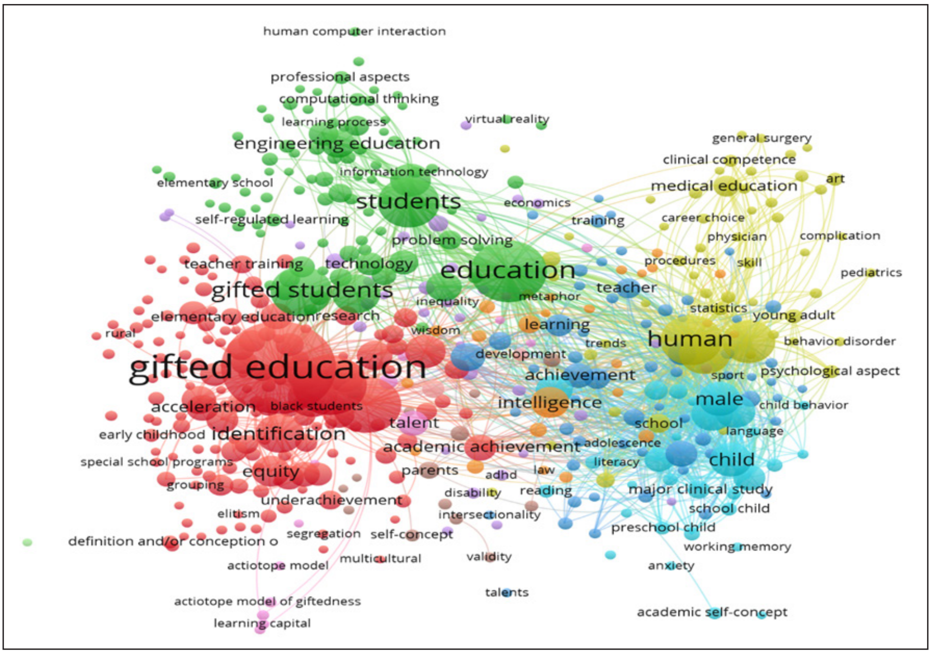

Figure 6. Keywords co-occurrence network visualisation map

learning. From the map, it is clear that gifted education research today includes not only the themes of education, but also individual psychological fundamentals, equity, specific methods, as well as various applications. The map is an effective visualisation of the shift from limited concern with selection to an enriched discipline of educational, psychological and social talent cultivation in multiple contexts.

Co-citation by References

Figure 7 presents a co-citation network among the literature base for gifted education, with dissimilar research clusters colour coordinated. The network presents how scholars and researchers interrelate through citation patterns showing the most important hubs such as Subotnik, Olszewski-Kubilius, and Renzulli as hubs of contact between different research communities. The green cluster seems to be concentrated on theoretical frameworks of giftedness (featuring Gardner, Sternberg, and Renzulli) and the red one seems aimed at identification and assessment perspectives (with such researchers as Plucker and Ford). The blue cluster seems to search for developmental and educational methods, and such outstanding personalities as Dai and Vygotsky. This network visualisation shows that the field of gifted education research comprises a complex interaction of various perspectives, so that the field seems to be informed by various theoretical frameworks and methodologies mutually supporting and contesting each other; thus, bespeaking attendances to a

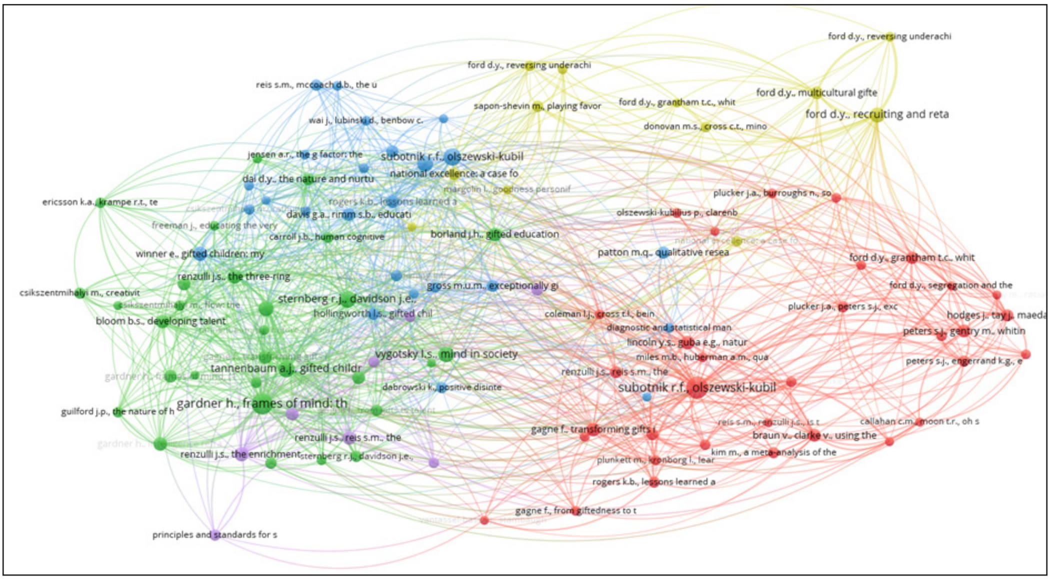

Figure 7. Co-citation by references

multidisciplinary nature of research on giftedness and talent development.

Co-citation by Authors

Figure 8 implies co-citation relations between authors in gifted education research, which show a complicated network in which node size reflects citation frequency, and colours correspond to separate scholarly communities. The visualisation shows a number of powerful clusters where Renzulli, Sternberg, Gardner and Ford are powerful centres of intellectual activity. The red cluster seems to be taking on cognitive and developmental theorists (Sternberg, Gardner, and Lubinski), the green cluster (led by Ford) probably deals with equity/diversity in gifted education. The purple/blue areas (Reis and McCoach) seem to denote identification and programmeming paradigms and Renzulli is placed between several research communities as a liaison. This network shows how gifted education scholarship is organised around complementary yet separate theoretical orientations that simultaneously address cognitive development, talent identification, educational programmeming, and social justice issues, while also displaying the intellectual diversity of, and interrelationships between, the field through important scholars whose works transcend individual perspectives.

Countries' Collaboration

In Figure 9, international research collaboration patterns in gifted education studies are illustrated whereby node size represents paper volume and connecting lines indicate collaborative relationships between countries. The United States is presented as a dominant hub, which is

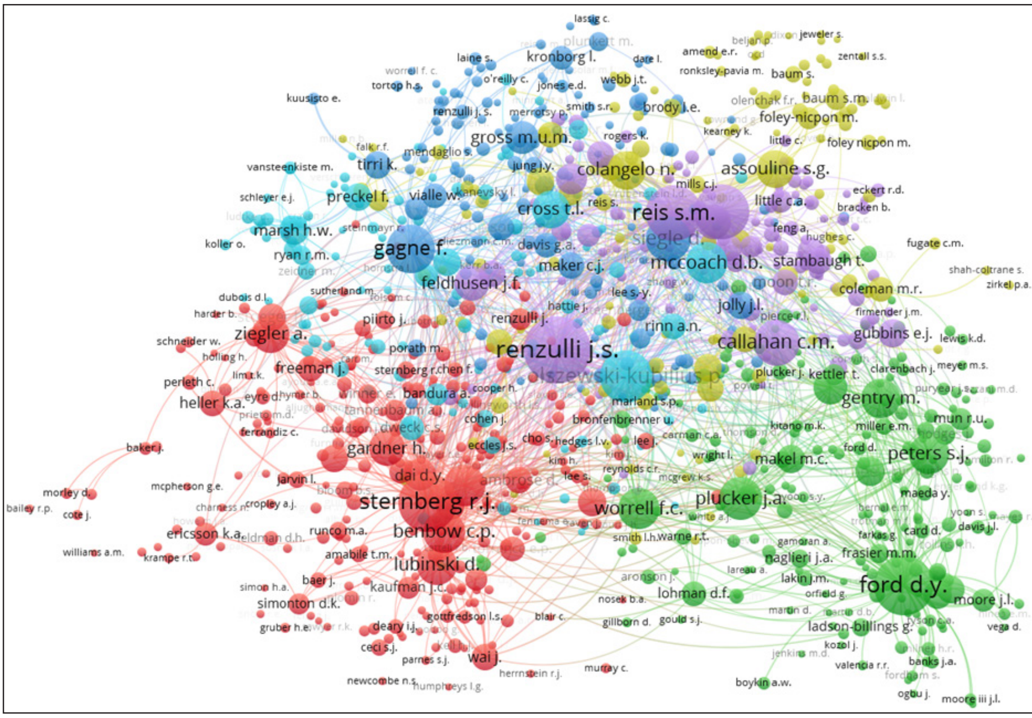

Figure 8. Co-citation by authors

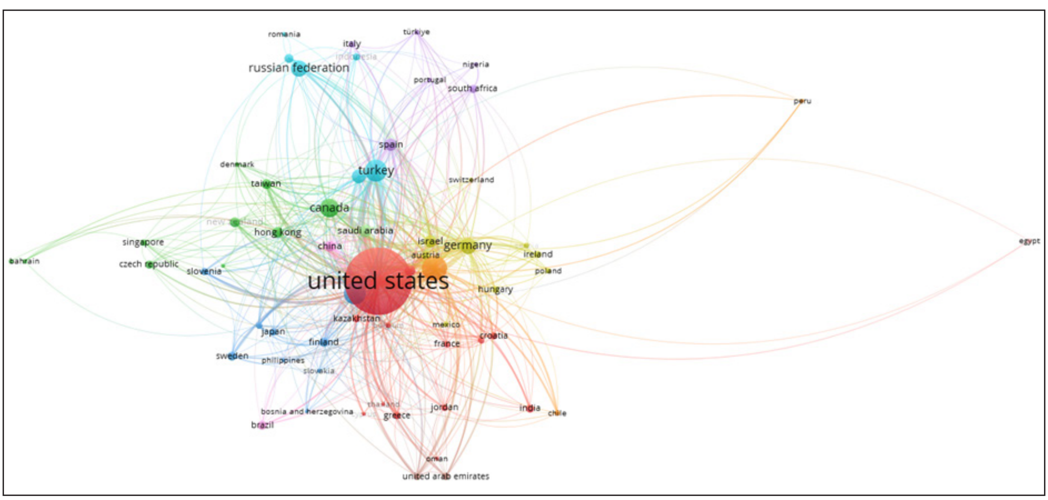

Figure 9. Countries' collaboration

centred and characterised with the biggest node size, indicating its large share in the influence and productivity of gifted education research. The network shows a number of distinct collaborative clusters, with close associations between the US and such countries as Germany, Canada, Turkey, and China, that might be interpreted as prominent research associations. Different coloured links probably relate to a variety of strengths or types of collaborative relations, that exhibit regional grouping for countries of Europe, Asia, and Middle East. The visualisation demonstrates the global nature of the research in gifted education while, at the same time, mapping out the strong reliance of the field on US-focussed knowledge production and collaboration networks. This international mapping of gifted education research collaboration indicates that, although this type of research is increasingly globalised, there is still a place for establishing more extensive collaborations between South and South and weakness in dependencies on traditional research powerhouses.

CONCLUSION

The detailed bibliometric analysis of the period of 2005 to 2025 of research in gifted education indicates some major patterns and trends in the discipline. Publication trends show generally sustained scholarly interest numbering 150-200 articles per year with an explosive increase in 2021, which was likely a consequence of heightened interest in gifted education, following the pandemic's effect on exceptional learners. This ephemeral high of some 400 publications later settled back to the platitudes of those two decades ago, signifying a field which has suffered no waning of scholarly interest despite the perturbations of quantity published. The analysis then effectively points to a clustering of research leadership, one among scholars and one among institutions. Ford becomes the most prolific researcher with 61 publications well over a half the output of the second most productive scholar (Peters). This dominance implies that some of the dominant voices may unduly determine discourse in the discipline. Likewise, American institutions dominate the gifted education research basket with a vast leadership, and the top tier of institutional contributors is constituted by University of Connecticut, Purdue University and William & Mary. The geographic clustering of research is further reflected in the fact that eight American universities were ranked in the ten most productive universities, while UNSW Sydney was the only international entry.

The understanding of international research landscape in field of gifted education shows considerable differences in the number of contributed countries. The United States leads with almost 1,700 documents more than five times Australia, which publishes with 243 documents in second place. This imbalance is probably a result of early identification and provisions system for gifted learners in the United States, a higher share for funding, as well as a leading academic community that caters to exceptional learners. The visualisation of international research collaboration patterns will only further the confirmation of the United States as the biggest hub (with the strongest relations of collaboration as the US-Germany, the US-Canada, the US-Turkey, and the US-China).

This global mapping shows that, although the field of gifted education and research is becoming more internationalised, there are still many opportunities for the development of South–South collaborative networks, and de-reliance on the more conventional research powerhouses. Analysis of the top journals indicates that the major five journals in gifted education have characteristic publication profile patterns. Gifted Child Quarterly, Gifted Education International, Gifted Child Today, and Roeper Review each have distinct trajectories to tell in the publication outputs for the period of 20 years. The fluctuating situations of stability and productivity in these journals reveal shifting trends in academic focuss and publishing trends among scholars in this area with Gifted Child Today becoming the most vibrant in recent years. These publication places cumulatively define knowledge flow in gifted education by providing the platforms for theoretical innovations, methodological changes, and practical applications. The appearance of the co-occurrence network visualisation illustrates the multiple dimensions of the gifted education research, and interrelated groups of topics about identification, acceleration, equity, underachievement, STEM education, achievement, child development, and medical education. This complex network indicates the disciplines evolution from narrow selection focuss to a rich discipline that encompasses educational, psychological and social domains of talent development within different contexts. Likewise, co-citation patterns by both references and contributors reflect the intellectual variety of the field, with powerful figures such as Subotnik, Olszewski-Kubilius, Renzulli, Sternberg, Gardner, and Ford being important network nodes between various research communities. Such networks illustrate the way gifted education scholarship is structured into complementary but separate theoretical orientations to cognitive development, talent identification, programmeming, and social justice concerns.

At the end, this bibliometric analysis gives a clear picture of the contemporary geography of the scholarly discourse of gifted education research of the past two decades. The results reveal an area of scholarly activity that is sustained, concentrated largely in the North America, with defined publication outlets, and with well-defined networks of intellectual exchange. Based on this, going forward, the field will benefit from more collaboration internationally and especially among researchers in the Global South to diversify perspectives and approaches. In addition, the visualisation of research clusters implies an opportunity for closer integration between theoretical frameworks, identification methodologies, educational interventions and equity considerations. Given that gifted education is in a process of development, the reflected structural patterns might be addressed in such a way that makes gifted education more inclusive and comprehensive in regard to identification and development of gifted potential among diversely placed populations and environments.

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