On the Widespread Impact of the Most Prolific Countries in Special Education Research: A Bibliometric Analysis

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Abstract

The aim of this study is to identify the most prolific countries in the field of special education and to discuss the widespread impact of their papers by taking into account the country's h-index. Through a bibliometric analysis, the data were collected in the Web of ScienceCore Collection category "Education, Special" in the Social Science Citation Index during 2011-2020. The 25 most prolific countries in the field of special education were determined in terms of paper productivity, and it was seen that the leading country was undisputedly the USA(54.42%). Meanwhile, a strong positive correlation was found between the h-index and the number of papers published by the countries (r=0.864). On the other hand, when the ranking in terms of the number of papers was reconfigured by the h-index, it wasrelatively changed.The possible reasons for this change for the countries with the most changing rankings were discussed by considering some definitive criteria such as the journal quartiles, the percentage of international and domestic, and the percentage of open access papers.This study reports a positive correlation between the quality and quantity in the field of special education for the publications of countries. It has been shown that where the positive correlation deviates, then especially, the journal quartiles, the percentage of international collaboration and the percentage of open access papers have a significant effect.The bibliometric findings may be useful to enrich the discussion about the widespread impact of papers and debate whether the use of h-index is acceptable for cross-national comparisons.

Keywords: Special Education, h-Index, Journal Quartile, Collaboration, Open Access.

Introduction

Special education is an education type that is offered to children with special needs who are different from the majority, that enables those with superior characteristics to maximize their capacity in line with their abilities, which also prevents the insufficiency from turning into a disability; and also equips the disabled person with skills that will support them to become self-sufficient and become integrated into the society, as well as to become independent and productive individuals (Heward, Alber-Morgan & Konrad, 2018). In this context, it is worth emphasizing that although the special education is a more thematic field of education, it is an important branch of education. For instance, according to a recent report by the National Center for Education Statistics, the number of students ages 3-21 (14% of all public students) who received special education services under the Individuals with Disabilities Education Act in school year 2019-20 was 7.3 million in the USA, and 33%

of them of had specific learning disabilities (NCES, 2021). As a result of the increasing interaction of the special education field with other disciplines, as well as its wide content and internationalization in the field (Heward, Alber-Morgan & Konrad, 2018); academic journals, which are among the official communication languages of science, have come to the forefront more than ever in the process of spreading and using the information produced in the field (Örnek, Miranda & Orbay, 2021).On the other hand, with the rise in the number of researchers and journals (Fire & Guestrin, 2019), the competitive atmosphere has prompted debates over "publish or perish!" and "quality or quantity" (Civera, Lehmann, Paleari & Stockinger, 2020; McGrail, Rickard & Jones, 2006; Van Dalen, 2021). Therefore, following the publications and analyzing the widespread effects in academic journals in the field of special education, is a prerequisite to understanding the level of expansion of the field and the collaboration with other disciplines. As a result, categorizing data rather than dealing with it in bulk allows for better analysis and the acquisition of the right, dependable, and adequate information required. The bibliometric analysis method, which was first defined by Pritchard (1969), is one of the methodologies that may be utilized for this purpose. Bibliometric studies are those that indicate the present status, orientation, and progress of research in a discipline's current literature (Donthu et al., 2021; Merigó & Yang, 2017; Tsay & Shu, 2011).

Nowadays, the papers published in journals are indexed in the Web of Science Core Collection (WoS-CC) database are predominantly accepted in the academic community as quality research; and as a result, this database is frequently used in the bibliometric analysis (Birkle, Pendlebury, Schnell & Adams, 2020). Several citation indexes in the WoS-CC are created, but the most popular is the journal impact factor (Garfield, 1972). Although there is a great interest in journal impact factors within the research ecosystem, issues such as the skewness in citation distribution, the inclusion of the journal self-citation, and the limitation of the citation window to two years, cause the use of journal impact factorto be intensely discussed (Lariviere & Sugimoto, 2019). New indicators have been developed to be used as an alternative or in combination with the journal impact factor (Lariviere & Sugimoto, 2019). Among these alternative indicators, perhaps the h-index is the most popular (Hirsch, 2005), which was originally developed for evaluating researchers and attracted great interest in the literature. After a short time, it has been extended to include the academic output and the widespread effects of publications by researchers or countries (Schubert & Schubert, 2019).

Meanwhile, some of the components that affect the widespread effect of research can be listed as; the journal impact factors, in other words, the journal quartile ranking (Q) (Miranda & Garcia-Carpintero, 2018; Miranda & Garcia-Carpintero, 2019; Orbay, Miranda & Orbay, 2020; Orbay, Karamustafaoğlu & Miranda, 2021), the level of domestic and international collaborations in the articles (Bai et al. 2021, Kwiek, 2018), and the percentage of open access articles (Piwowar et al., 2018),etc.

In the WoS-CC database, journals in the field of special education are indexed in the "Education, Special" category (from now on the SE category) in the Social Sciences Citation Index (SSCI). The SE category is described as *"covering resources that are concerned with the education and development of persons with special needs, including the gifted as well as those with learning disabilities"* (Clarivate Analytics, 2021).

Most of the studies in the field of education have focused on a specific topic or subfield (Huang et al., 2020; Ivanovic & Ho, 2019). To the best of the author's knowledge, the complete bibliometric analysis on the field of special education that gives a holistic review of the publications for the most prolific countries and discusses the widespread impact of these papers does not exist in the literature.

The aim of this study is to identify the most prolific countries in the field of special education based on the WoS-CC between 2011 and 2020 through bibliometric analyses and to discuss the widespread impact of their papers by taking into account the country's h-index.

In academic specialties such as special education research, many stakeholders in the profession have an interest in reliable and accurate measurements of the quality of papers. Therefore, bibliometrics are often used to guide readers, academic institutes,

countries, and researchers to analyze academic excellent of research and individual papers.

Methods

Research/Study Design: This study used a literature database to do a bibliometric analysis of a specific category.

Data/Statistical Analysis: The data were collected from the SE category of SSCI in the WoS-CC and In Cites databases on August 26, 2021. The timespan was from 2011 to 2020.A total of 21344 documents were found in the first search, but after excluding unrelated documents such as out of category and no author/anonymous documents, a total of 20831 documents were analyzed in the SE category. Of the remaining documents, there was a total of 15188 articles (68.45%) and reviews (4.46%), representing 72.91% of all the documents. The types of other important documents were 18.36% meeting abstracts, 4.03% editorial materials, and 2.37% book reviews. Throughout the study, only 'articles' and 'reviews' document types were considered, categorized under the term 'papers'. The publication language of all these papers was English. Descriptive statistics were applied, and IBM SPSS Statistics Software version 20 was used for the analysis.

Visualization: VOS viewer 1.6.13 was used to analyze and illustrate bibliometric maps connected to scientific affairs using data collected from the WoS-CC (Van Eck & Waltman, 2010).

Ethics Statement: This study is based on a literature database; therefore, there is no need to ethical approval.

Results and Discussion

The change in the total number of papers for the SE category in the 2011-2020 period was shown in Figure 1. As shown in Figure 1, the growth rate showed a zigzag pattern. Meanwhile, a very weak correlation was found between the time period and the number of papers published (R2=0.05). On the other hand, Hu, Leydesdorff and Rousseau (2020) found that the whole WoS-CC database showed a yearly increase. In fact, an exponential growth curve provides a better fit although the increases are roughly linear (over R2=0.95). It shows that productivity is very limited in the SE category compared to the whole WoS database.
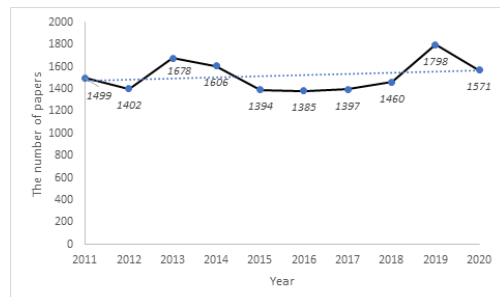
Figure 1: The Annual Distribution of Papers for the SE Category During 2011-2020

When the general situation of the papers published in the 2011-2020 period is observed, a total of 102 countries/regions (hereafter referred to as 'countries' for simplification) were counted, and the top 25 most prolific countries for the SE category were listed with the county's h-index in Table 1. As shown in Table 1, each country is a member of at least one of the OECD, G20, or EU memberships. Therefore, the common denominator is that they are industrialized, developed, or developing countries. The USA is the undisputed leading country in the field of special education in terms of both the number of published papers (54.42%of TP) and the widespread impact of the publications (h-index=89), followed by England (9.03%, h=52), Australia (7.34%, h=45), and Netherlands (5.23%, h=49), respectively.

Table 1: Top 25 Most Prolific Countries of Papers for the SE Category During 2011-2020

Country	PN	% of TP	h-index	Rank (PN)	Rank (h-index)
USA	8263	54.42	89	1	1
England	1372	9.03	52	2	2
Australia	1115	7.34	45	3	4
Netherlands	793	5.23	49	4	3
Canada	757	4.98	43	5	5
Italy	459	3.02	40	6	6

| Taiwan	418	2.73	34	7	8
Spain	379	2.49	29	8	14
China	375	2.47	28	9	15
Israel	361	2.37	31	10	12
Belgium	311	2.04	38	11	7
Germany	266	1.75	32	12	9
Ireland	258	1.69	31	13	11
Sweden	237	1.56	31	14	10
Scotland	229	1.50	27	15	16
New Zealand	214	1.40	30	16	13
France	203	1.33	25	17	17
Norway	166	1.09	22	18	19
Japan	153	1.01	21	19	21
Turkey	150	0.98	18	20	24
Wales	145	0.95	23	21	18
South Korea	135	0.88	18	22	23
Brazil	128	0.84	21	23	20
Greece	117	0.77	18	24	22
Finland	113	0.74	17	25	25

PN, Paper Number; TP, Total Paper.

Using the data in Table 1, a strong positive correlation is found between the h-index and the number of papers published by the countries (*Pearson's correlation r = 0.864*). As can be clearly seen from Table 1 and Figure 2, despite the strong positive correlation between the countries' h-index and the number of papers, it is seen that some countries' places have changed sharply when the papers are reordered according to their h-index values, which is accepted as a measure of the widespread effect of the papers. From these countries,while China (-6), Spain (-6) and Turkey (-4) have regressed to lower ranks, on the other hand, countries such as Belgium (+4), Sweden (+4), New Zealand (+3), and Wales (+3) have elevated to higher rankings.
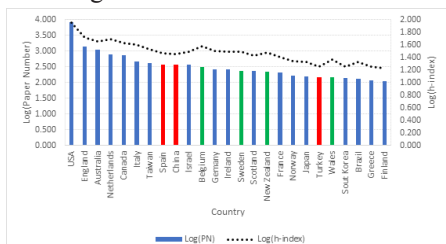
Figure 2: Log-Transformed Number of Papers and h-index of the Top 25 Countries

For countries whose rankings have changed sharply; the journal quartiles (Q) of the journals, the level of domestic and international collaborations in the publications (DC% and IC%), and the percentage of open access (OA%) papers are given in Figure 3-6.
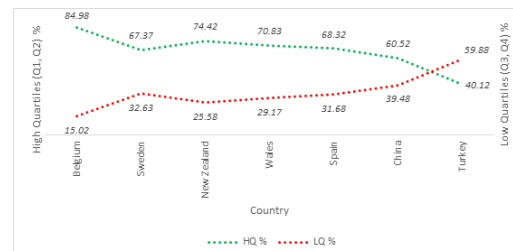
Figure 3: Comparison of Percentages of Papers by the Journal Quartiles for Countries

As can be seen from Figure 3; papers from Belgium, Sweden, New Zealand, and Wales were published in journals with a high impact value compared to Spain, China, and Turkey. As expected, the average citation rates by papers published in Q1 and Q2 quartile journals were higher than in Q3 and Q4 quartile journals (Huang, 2016; Liu, Guo & Zuo, 2018; Miranda & Garcia-Carpintero, 2019; Orbay,

Miranda & Orbay, 2020; Orbay, Karamustafaoğlu & Miranda, 2021). As a natural consequence of this, it can be interpreted that they receive more citations, and their h-index values increase. On the other hand, the distribution of the papers in the SE category in the 2011-2020 period by quarter isrespectively: 42.64% Q1, 19.91% Q2, 19.16% Q3, and 18.29% Q4.Based on this data, it can be concluded that journals with the highest impact factors (62.55% (Q1, Q2)) publish much more papers than journals with the lowest impact factor (37.45% (Q3, Q4)) in the SE category.This finding is consistent with previous studies (Huang, 2016; Liu, Guo & Zuo, 2018; Miranda & Garcia-Carpintero, 2019; Orbay, Karamustafaoğlu & Miranda, 2021; Örnek, Miranda & Orbay, 2021).
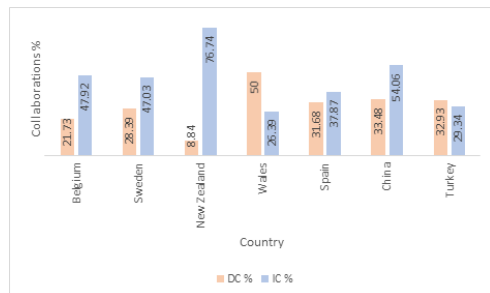
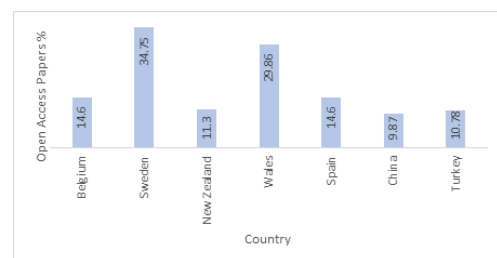**Figure 4: Comparison of the Percentage of Domestic and International Collaborations**

As can be seen from Figure 4, while New Zealand is by far the leader in terms of international cooperation, the international collaboration levels of Belgium, Sweden, and China are higher than Wales and Turkey. On the other hand, while the percentage of domestic collaboration in the SE category is 46.04% for the period of study, the percentage of international cooperation is at the level of 15.58%. Meanwhile, in order to better understand the parties in international collaboration, the network visualization map shown in Figure 5 is created using data from 44 countries with at least 20 papers. In Figure 5, the circle's size shows the large number of papers, the thickness of the lines indicates the strength of collaboration, and the colors indicate the cluster of collaboration. When the cluster structures that have been formed are examined, geographical neighbourhoods draw attention to collaborations.

For example, while Wales mostly cooperates with leading neighbours such as England, Ireland, and Scotland; China is in intense collaboration with Singapore, Taiwan, and Canada.
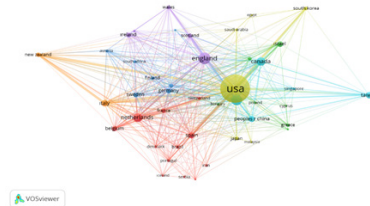
Figure 5: The Social Network of Collaboration between Countries in the ES Category

The percentage change of open access papers, which means free to read online, either on the publisher website or in an OA repository (Piwowar et al., 2018), is given in Figure 6. As can be seen in Figure 6, Sweden and Wales are the leading countries in terms of open access paper percentage when compared to other countries. China, Turkey, and New Zealand, on the other hand, published relatively low rates in terms of the percentage of open access papers. Moreover, the percentage of open access papers in the SE category for the period studied is at the level of (20.02%). It should be noted that OApapers are more advantageous in terms of being read and therefore cited (Piwowar et al., 2018; Piwowar, Priem & Orr, 2019).

Figure 6: Comparison of Change of the Percentage of Open Access Papers

Conclusion

It should be noted that evaluating the quality of papers has not been a simple task. Therefore, the trade-off between quality and quantity in the academic ecosystem has long been discussed. In

recent years, the h-index has become a consistent estimation tool for the country's overall scientific achievements in a specific field since it includes the total number of publications and citations. That is to say, it is designed to assess both the quality and quantity of scientific papers in a cumulative approach. Using this approach, this study reports a positive correlation between the quality and quantity in the field of special education of the publications of countries. It has been shown that where the positive correlation deviates, then especially the journal quartiles (Q), the level of international collaboration(IC%) and the percentage of open access papers (OA%) have a significant effect.

The USA is the undisputed leading country in terms of both the number of the published papers and the h-index. However, the results showed that the countries with the highest number of publications were not those that made the most impact in terms of the widespread impact of the publications (h-index). In this regard, Belgium, Sweden, New Zealand, and Wales were among the most successful countries while China, Spain, and Turkey were far lower in both cases. These findings also showed that small, well-governed countries with a long history of democracy were better at turning economic success into high-quality science, as indicated by Allik, Lauk and Realo (2020).

Finally, the bibliometric findings for special education research may be beneficial in furthering the argument over the general influence of papers and whether the use of the h-index is acceptable for cross-national comparisons.

Research limitations/implications: Despite several notable contributions, this study had a few limitations. First, only bibliometric data from the WoS-CC was used; as a result, several important papers might have been missed in this study. Second, this study only examined the special education studies published in the SSCI and all of them are in the English language. Important special education studies in other languages (such as German, Chinese and French) are not included. Third, this study analyzed 'articles and reviews' document types in the field of special education, since it was believed that the dataset predominantly represented the industry

standard, even though other datasets are emerging. Finally, the number of citations used in bibliometric indicators is a time-dependent and can change over time. Based on the limitations listed above, future study might expand the coverage of databases to include others, such as ERIC or Scopus.

Acknowledgments

References

Allik, Juri, et al. "Factors Predicting the Scientific Wealth of Nations." *Cross-Cultural Research*, vol. 54, no. 4, 2020, pp. 364-97.

Bai, Xiaomei, et al. "Quantifying Scientific Collaboration Impact by Exploiting Collaboration-Citation Network." *Scientometrics*, vol. 126, 2021, pp. 7993-8008.

Birkle, Caroline, et al. "Web of Science as a Data Source for Research on Scientific and Scholarly Activity." *Quantitative Science Studies*, vol. 1, no. 1, 2020, pp. 363-76.

Civera, Alice, et al. "Higher Education Policy: Why hope for Quality when Rewarding Quantity?." *Research Policy*, vol. 49, no. 8, 2020.

Clarivate Analytics Help Center. https://mjl.clarivate.com/help-center

Donthu, Naveen, et al. "How to conduct a Bibliometric Analysis: An Overview and Guidelines." *Journal of Business Research*, vol. 133, 2021, pp. 285-96.

Fire, Michael, and Carlos Guestrin. "Over-optimization of Academic Publishing Metrics: Observing Goodhart's Law in Action." *GigaScience*, vol. 8, no. 6, 2019.

Garfield, Eugene. "Citation Analysis as a Tool in Journal Evaluation." *Science*, vol. 178, 1972, pp. 471-79.

Heward, William, et al. *Exceptional Children: An Introduction to Special Education*. Pearson, 2018.

Hirsch, J.E. "An Index to Quantify an Individual's Scientific Research Output." *Proceedings*

of the National Academy of Sciences, 2005, pp. 16569-16572.

Rousseau, Ronald, et al. "Exponential Growth in the Number of Items in the WoS." *ISSI Newsletter*, vol. 16, no. 2, 2020, pp. 32-38.

Huang, Cui, et al. "Evolution of Topics in Education Research: A Systematic Review using Bibliometric Analysis." *Educational Review*, vol. 72, no. 3, 2020, pp. 281-97.

Huang, Ding-Wei. "Positive Correlation between Quality and Quantity in Academic Journals." *Journal of Informetrics*, vol. 10, no. 2, 2016, pp. 329-35.

Ivanovic, Lidija, and Yuh-Shan Ho. "Highly Cited Articles in the Education and Educational Research Category in the Social Science Citation Index: A Bibliometric Analysis." *Educational Review*, vol. 71, no. 3, 2019, pp. 277-86.

Kwiek, Marek. "International Research Collaboration and International Research Orientation: Comparative Findings about European Academics." *Journal of Studies in International Education*, vol. 22, no. 2, 2018, pp. 136-60.

Lariviere, Vincent, and Cassidy R. Sugimoto. "The Journal Impact Factor: A Brief History, Critique, and Discussion of Adverse Effects." *Springer Handbook of Science and Technology Indicators*, edited by Wolfgang Glänzel, et al., Springer, 2019, pp. 3-24.

Liu, Fang, et al. "High Impact Factor Journals have more Publications than Expected." *Current Science*, vol. 114, no. 5, 2018, pp. 955-56.

McGrail, Matthew R., et al. "Publish or Perish: A Systematic Review of Interventions to Increase Academic Publication Rates." *Higher Education Research & Development*, vol. 25, no. 1, 2006, pp. 19-35.

Merigó, Jose M., and Jian-Bo Yang. "A Bibliometric Analysis of Operations Research and Management Science." *Omega*, vol. 73, 2017, pp. 37-48.

Miranda, Ruben, and Esther Garcia-Carpintero. "Overcitation and overrepresentation of Review Papers in the Most Cited Papers." *Journal of Informetrics*, vol. 12, no. 4, 2018, pp. 1015-30.

Miranda, Ruben, and Esther Garcia-Carpintero. "Comparison of the Share of Documents and Citations from Different Quartile Journals in 25 Research Areas." *Scientometrics*, vol. 121, 2019, pp. 479-501.

"Students with Disabilities." *National Center for Education Statistics (NCES)*, https://nces.ed.gov/programs/coe/indicator/cgg

Orbay, Keziban, et al. "Building Journal Impact Factor Quartile into the Assessment of Academic Performance: A Case Study." *Participatory Educational Research*, vol. 7, no. 2, 2020, pp. 1-13.

Orbay, Metin, et al. "Analysis of the Journal Impact Factor and Related Bibliometric Indicators in Education and Educational Research Category." *Education for Information*, vol. 37, no. 3, 2021, pp. 315-36.

Örnek, Funda, et al. "Investigating the Journal Impact Factor of Special Education Journals Indexed in the Social Sciences Science Edition from Web of Science." *Journal of the American Academy of Special Education Professionals*, 2021, pp. 110-32.

Piwowar, Heather, et al. "The Future of OA: A Large-scale Analysis Projecting Open Access Publication and Readership." *BioRxiv*, 2019.

Piwowar, Heather, et al. "The State of OA: a Large-Scale Analysis of the Prevalence and Impact of Open Access Articles." *PeerJ*, 2018.

Pritchard, Alan. "Statistical Bibliography or Bibliometrics?" *Journal of Documentation*, vol. 25, 1969, pp. 348-49.

Schubert, Andras, and Gabor Schubert. "All Along the h-index-Related Literature: A Guided Tour." *Springer Handbook of Science and Technology Indicators,* edited by Wolfgang Glänzel, et al., Springer, 2019, pp. 301-34.

Tsay, Ming-Yueh, and Zhu-yee Shu. "Journal Bibliometric Analysis: A Case Study on the Journal of Documentation." *Journal of Documentation*, vol. 67, no. 5, 2011, pp. 806-22.

Van Dalen, Hendrik P. "How the Publish-or-perish

Principle Divides a Science: The Case of Economists." *Scientometrics*, vol. 126, 2021, pp. 1675-94.

Van Eck, Nees Jan, and Ludo Waltman. "Software Survey: VOSviewer, a Computer Program for Bibliometric Mapping." *Scientometrics*, vol. 84, 2010, pp. 523-38.

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