Teachers' Turnover: A Bibliometric Analysis in the World Basic Educational System

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Abstract

The global basic education system is facing a number of challenges, and one of them is teacher turnover. In relation to this, the purpose of this paper was to map and analyze the published literature on teachers' turnover in order to provide new knowledge on this phenomenon in basic education. Incentive theory was analyzed in relation to this phenomenon. The analysis methodology is the Prisma method, based on descriptive techniques to count the number of scientific publications, and the secondary source is the Dimensions platform, from which 1,246 articles were mapped during the period 1932 to 2022 for 74 countries. The results showed that 2021 was the year with the highest rate of publications on the phenomenon, at 13.8%; followed by the highest number of publications in English, at 87.1%; then, America was the continent with the highest production and publication rate, at 51.8%, with the United States leading the way with 45.8% as a country. This work is original in that it makes new contributions to this phenomenon in terms of the social involvement of educational actors. The study suggests that countries around the world should take this phenomenon into account in order to implement public education policies to address it.

Keywords

Bibliometrics, Educational System, Prisma Method, Teachers' Turnover.

INTRODUCTION

Teachers' turnover is a phenomenon that is ravaging the education system in countries around the world. It has emerged with the weakness in the application of public educational policies by the states to value the teachers in the schools. The existence of teacher' turnover in the school system is considered a major international problem with concerns that have increased in recent years both by researchers, international organizations, educational managers, and the teaching profession itself [1]. The existence of teacher' turnover in schools has a potentially devastating impact on the education system [2].

The phenomenon of turnover became a global problem. In this regard, in China, high rates of teachers resignation and burnout have become obstacles to the development of early childhood education [3]; in the U.S., this phenomenon is particularly prevalent in low-performing urban schools, where 50% of teachers leave within the first five years [4], then, the turnover rate was about 30 to 50% over the last 40 years [5]. In Brazil the situation is worrying, as 38% of the total number of teachers left the schools in 2012 [6]; in Canada, teachers with low social support are more likely to intend to change jobs than those with high social support [7]; in Kenya, a study revealed that there was a statistically significant relationship between the turnover of 26 school principals and the performance of 246 teachers [8].

Australia has been a decrease of 40% and 50% of teachers who have had five years of teaching experience; in the Netherlands, teachers attrition rate has been estimated at about 15%, and the number of departures has increased over the last 30 years; in Chile, 20% of teachers left the profession before completing five years of practice, and 70% did not continue to teach in the school where they were recruited in their first year [9]. Teachers' turnover is a challenge for school administrators to retain qualified and experienced teachers in their schools [10].

Many studies have shown that high teachers' turnover, especially at the preschool level, this jeopardizes the quality and stability of the teaching staff and limits the overall development of early childhood education in any country, which is a serious problem worldwide [2]. This phenomenon is also detrimental to student learning, according to many researchers and policymakers [11].

Due to the existence of teachers' turnover, this is becoming a worrying and growing situation at the international level, as the number of teachers who have decided to leave the education system before having reached 5 years of experience [12]. Indeed, the school is an organization formed by several actors, and the teaching body is one of the important actors in the educational system that has the responsibility of transmitting their knowledge capital to form citizens for a more just and balanced society, in this sense, it is important to make a bibliometric analysis of the articles written about this phenomenon.

The objective of this study is to map and analyze the literature that is published on the phenomenon of teachers' turnover in international scientific platforms in basic education. In relation to this objective, articles available in the Dimensions digital database were used to build knowledge and suggest possible new avenues for study.

Bibliometric analysis was targeted with the aim of mapping scientific publications on teachers' turnover on basic education in various international journals. Specifically, as contributions, we proposed: *(i)* to classify the

countries in which the turnover phenomenon has been the highest; *(ii)* to identify the languages that these researches have been published the most; *(iii)* to identify the continents with the highest number of publications on the phenomenon; *(iv)* to classify the 16 authors who have the highest number of citations and publications on the turnover phenomenon; *(v)* to analyze the biographical map of the documents and organizations on the turnover phenomenon; and *(vi)* to present the trends of the bibliographical map by references to the authors' works.

To achieve these objectives, the first section presented a theoretical and conceptual review from a general perspective on teachers' turnover in the education system based on incentive theory, and Hurwicz's economic incentive theory was analyzed in relation to the phenomenon of turnover. The second section presented the methodological aspect using the prism method, as well as the descriptive technique to count the articles taken from the Dimensions web platform on the global education system. The third section presented discussions on the results on performance and mapping of all selected articles on teachers' turnover in the global basic education system. In the last section, general conclusions were drawn on the article based on discussions of the results obtained.

THEORETICAL FRAMEWORK

Theoretical analysis is an integral part of the research process and provides valuable input at almost every operational stage [13]. In relation to this, the theorist Hurwicz makes his contribution based on an economic theory, and this theory has been used to explain teachers' turnover in the school system.

Incentive Theory of Leonid Hurwicz

Incentive theory argues for the fusion of different levels of analysis in the relationships of individuals, society, the State, and the system [14]. In this perspective, Hurwicz analyzed the existence of a system that is willing to make the search for interest of economic agents coincide with the efforts of their organizations to maximize value.

However, the objectives of individuals are not totally in line with those of their organizations, their interests often conflict, and consequently, each economic agent will act according to his own interests [15]. In this sense, modern economic theories have spoken of the theory of incentive as a motor that will help in the resolution of conflict between individual and collective interests in order to harmonize the behavior of individuals with the value of the organization.

Parallel analysis of this theory in relation to the phenomenon of teachers' turnover in the global education system, teachers face basic problems such as survival and development, so they are economic men, in this sense, they seek security, self-esteem, emotion and social status, even selfless dedication in addition to economic benefits, the basic needs of survival and development as well as maximizing individual economic benefits [15].

On the one hand, in relation to the existence of these unmet needs, there may arise problems related to the lack of personal satisfaction that creates in teachers a negative sense of job satisfaction, a sense of entitlement, the decrease of their motivation, and the reduction of their academic performance that will lead to the resignation in schools. On the other hand, school institutions do not pursue maximum economic interests as non-profit organizations, which is contrary to the objective of economic interest of teachers in the market economy. From this situation arises the rational choice for any economic man to leave the school in order to achieve greater interests, which leads to the current explicit teachers' turnover [15].

Teachers' Turnover

Faculty turnover is the flow of faculty in and out of organizations in unpredictable ways [16]. Teachers leave for a variety of reasons, in that there is no single model to explain why teachers leave the education system and their profession [17]. According Zhang (2009), the turnover is divided into two categories: the explicit turnover and the recessive turnover according to different situations [15].

For the latter, first, explicit turnover refers to qualified teachers who leave their positions to study or work elsewhere; second, and recessive turnover refers to teachers who, regardless of their current teaching responsibility, engage in secondary activities instead of teaching and research activities due to their intention to leave the school [15].

In school, whenever there is a turnover, schools face teacher shortages in their educational system. The teacher shortage is not new, because periodically throughout the last half century there have been fewer teachers available than needed, and policymakers at the state and federal level have responded by stepping up recruitment efforts and issuing temporary teaching credentials to unqualified [18].

In addition to this, when teachers intend to leave the profession, it is in the sights of education managers because of the negative impact it can have on the productivity of its teachers themselves, on student learning outcomes, and on the educational institution itself [19].

Teachers' Turnover: Periods and Contexts in Global Education

Holtom et al. (2008) classified three time periods and contexts in which the analysis of faculty turnover was carried: the first period was prior to 1985, and turnover was focused on antecedent analyses at the individual level; then, the second period was between the years 1985 and 1995 with the analysis of turnover on individual consequences, with emphasis on some analysis at the organizational level; lastly, since 1995, the research has been expanded to include antecedent analyses and more diverse consequences at both the individual and organizational levels, with an increased emphasis on job retention and improved working conditions [20].

Indeed, over the past decade, Richard Ingersoll (2001, 2002, 2003, 2004) has conducted a series of studies on teachers' turnover in the education system, based on the working conditions of teachers from the perspective of the sociology of organizations, the profession and work [18]. According to Russell et al. (2010); Cox (2012); Johnson et al. (2012); and Varlas (2013), high teachers' turnover has become a serious problem locally, nationally, and internationally, and the persistent problem of teachers' turnover undermines student learning while upsetting the ethics of school communities [21]. Much of the literature that has already existed has shown that teachers' turnover has a negative influence on student achievement [22].

Thus, turnover in the educational system has a meaning of a teachers' desire to leave the teaching profession [23], and the process of replacing teachers in schools takes time to complete, and this time can contribute to problems such as: not meeting subject loads, too many replacements, increased dropout and retention rates [16].

METHODS

The study is a bibliometric review based on a set of articles from two databases with different world-renowned scientific productions on the phenomenon of teachers' turnover in schools. According to OECD (2016), bibliometrics is a statistical analysis that studies the publications of books and articles [24]. Bellis (2009) told us that it is frequently used in the scientific analysis of literature [24]. Therefore, bibliometrics is gradually being extended to all disciplines for more objective and reliable analyses, and researchers are using it to make qualitative and quantitative approaches in the process of literature review, in order to understand and organize the results [25].

The objective of the study is to map and analyze documents published on the phenomenon of teachers' turnover on global scientific platforms. In the bibliometric analysis, the method used is Prisma and the technique is descriptive analysis, and the source is secondary, which is the Dimensions research platform for the analysis of 74 countries.

In our methodological procedure, the following steps were established: a) the thematic was defined; b) the topic and keywords were defined; c) the search of the articles was performed and downloaded in two separate Excel database files; d) the sorting was done, the incompatible articles, and those with repetitions were removed; e) the merging in a single Excel database was done, and the results were interpreted. To carry out this study, we used the prism method, whose statistical technique allowed us to organize and count the results of the searches of all the articles.

In the search (b), we used keywords like «*Teachers' Turnover, Teachers' Leavers, Teachers' Abandon, Teachers' Mobility, Teachers' Movers*». Once both Excel databases were retrieved from the Dimensions site, we used the prism method to sort. In the identification phase, a total of (n=1.955) documents were downloaded as shown in figure 1

below with 1.721 in Excel 1, and 684 in Excel 2.

Then, in the selection phase, 1.426 documents remained in the database after applying the exclusion criterion of 529 articles; then, in the eligibility phase, 1.246 of them had relevant information to meet the objectives of this research after eliminating duplicates which were 180. Finally, the 1.246 articles were finally retained in the inclusion phase.
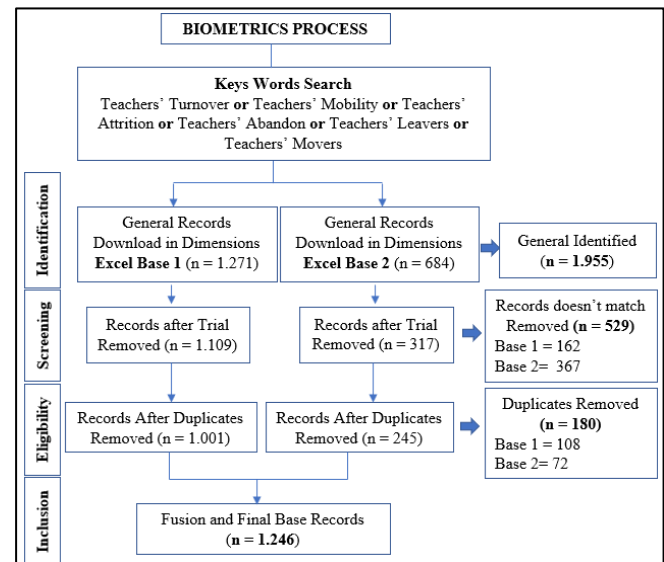
Source: Prepared by the Author (2024)
Figure 1. Modeling the scientific article sorting technique of the Teachers' Turnover

Once the final articles were included for the bibliometric analysis of the teachers' turnover in a single Excel file, we made the enumeration of all these scientific productions by year, language, continents, countries, type of method used to analyze the performance of these productions on the phenomenon during the period from 1932 to 2022.

Then, we made a map analysis by the most relevant authors in number of scientific publication and in number of world citation, then, the biographical analysis coupled by reference, organization and by country was made. The SPSS[1] 26 software was used as a statistical analysis tool, and VOSviewer 1.6.18 was used to generate the performance map.

RESULTS AND ANALYSIS

This chapter presented the results of the quantification of global scientific production based on the teachers' turnover in schools. It is divided into two subsections: the first subsection is emphasized on the performance analyses of the articles by country, continent (geolocation), language, year and methodology; as for the second section, it presented a map analysis of the 16 most relevant authors identified who have made the most contributions in the scientific production on teachers' turnover, then, another 16 authors were identified relevantly on the number of global citation, finally,

[1] Statistical Package for the Social Sciences

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a map analysis by co-citation of the references, the biography coupled by country, organization and document on teachers' turnover in the global education system.

Performance Analysis of Teachers' Turnover

This subsection presented the analysis of the set of scientific documents extracted on teachers' turnover in terms of publication in the educational system in the world. The records selected after searching and sorting were in their entirety approximately (n = 1,246; 100%) in the educational system. The results have been presented in number, and as a percentage, in the tables and graph below.

Scientific Document Analysis of Teachers' Turnover by Country

Table 1 showed that 74 countries were identified and

assigned in this bibliometric research at the global level on teachers' turnover in quantity and percentage, and seven (7) of them, in which the research results were found jointly. The results showed, on the one hand, that the United States topped the list in the number of publications (571), that is, 45.8%; then, comes South Korea with 135 publications on the phenomenon (10.8%); then, in third place China with 63 publications which was evaluated at a rate of 5.1%; Kenya in fourth place with 40 publications which was evaluated at a rate of 3.2%; Indonesia in fifth place with 37 publications (3.0%); finally, Brazil in 6th place with 36 publications (2.9%). We could also see that the majority of the other countries had a low rate of scientific production (0.2%; 0.1%) on the phenomenon of teachers' turnover.

Table 1. Scientific Papers on Teachers' Turnover by Country, 1932-2022

Countries	Publications		Countries	Publications	
	Articles	(%)		Articles	(%)
United States	571	45.8	Kazakhstan	2	0.2
South Korea	135	10.8	Malawi	2	0.2
China	63	5.1	New Zealand	2	0.2
Kenya	40	3.2	Poland	2	0.2
Indonesia	37	3.0	Rwanda	2	0.2
Brazil	36	2.9	Saudi Arabia	2	0.2
Australia	29	2.3	Slovakia	2	0.2
Canada	29	2.3	Uganda	2	0.2
Pakistan	24	1.9	Ukraine	2	0.2
United Kingdom	23	1.8	Bangladesh	1	0.2
India	22	1.8	Botswana	1	0.1
Japan	16	1.3	Bulgary	1	0.1
Nigeria	13	1.0	Costa Rica	1	0.1
Norway	12	1.0	Curaçao	1	0.1
South Africa	12	1.0	Denmark	1	0.1
Israël	11	0.9	Ecuador	1	0.1
Philllipines	9	0.7	Egypt	1	0.1
Finland	8	0.6	Fiji	1	0.1
Ghana	8	0.6	Kuwait	1	0.1
Russia	8	0.6	Lebanon	1	0.1
Turkey	8	0.6	Lithuania	1	0.1
Italy	7	0.6	Madagascar	1	0.1
Netherlands	7	0.6	Mexico	1	0.1
Belgium	5	0.4	Namibia	1	0.1
Malaysia	5	0.4	Nepal	1	0.1
Sweden	5	0.4	North Macedonia	1	0.1

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Countries	Publications		Countries	Publications	
	Articles	(%)		Articles	(%)
Taiwan	5	0.4	Peru	1	0.1
United Arab Emirates	5	0.4	Portugal	1	0.1
Ethiopia	4	0.3	Serbia	1	0.1
Iran	4	0.4	Seychelles	1	0.1
Ireland	4	0.4	Siberia	1	0.1
Oman	4	0.4	Vietnam	1	0.1
Spain	4	0.2	Zimbabwe	1	0.1
Tanzania	4	0.2	China & Korea	1	0.1
Chile	3	0.2	Brazil & Spain	1	0.1
Czech Republic	3	0.2	Canada & Pakistan	1	0.1
Estonia	3	0.2	Japan & United States	1	0.1
Singapore	3	0.2	Bosnia & Herzegovina	1	0.1
Switzerland	3	0.2	Belgium & Netherland	1	0.1
Thailand	3	0.2	Canada & United King	1	0.1
Hungary	2	0.2			
Total	**1.197**	**100**	**Total**	**49**	**100**

Source: Prepared by the Author (2024)

This shows that in these four countries (United States; South Korea; China; Indonesia; Brazil), the turnover phenomenon is ravaging the education system the most, and they have had a higher number of teachers leaving the education system compared to the others. In the other countries, the phenomenon of turnover is lower.

Scientific Document Analysis by Continent (Geolocation)

This subsection provided us with the number of scientific productions found by distinct geographical regions. We could see in table 2 that out of the total of 1.246 records found, all continents were affected by the phenomenon of teachers' turnover. These continents were divided into 6 separate geographical regions on the planet, then there were two regions in which the results were found in a combined way.

In terms of results (table 2), we found that the American continent had the highest number of publications on the phenomenon of teachers' turnover in the world, that is, 51.8%; then comes Asia with 28.6%; then Europe in third place with a rate of 8.0%; and in fourth place Africa with a rate of 7.4%.

Table 2: Quantity Scientific Document of Teachers' Turnover in Schools by Continent, 1932-2022

Continents (Geolocation)	Turnover Publications	
	Total Articles	Percentage (%)
Africa	92	7.4
America	645	51.8

Continents (Geolocation)	Turnover Publications	
	Total Articles	Percentage (%)
Asia	356	28.6
Europe	100	8.0
Eurasia	18	1.4
Oceania	32	2.6
America & Europe	2	0.2
America & Asia	1	0.1
Total Publications	**1.246**	**100**

Source: Prepared by the Author (2024)

This shows that the phenomenon of teachers' turnover is ravaging the most, the educational system of the planet through those four continents (America; Asia; Europe; Africa) that have had a greater scientific production on the number of departures of teachers in the world educational system compared to the other continents during the period analyzed.

Article Analysis on Teachers' Turnover by Language

As for the results of our bibliometric research (Table 3), the documents were published in different languages, and we found that English (1.085) was the most influential language in these publications, with a percentage of 87.1%; then came Korean (100), 8.0%; then Portuguese (27), 2.2%. It is worth noting that the publications of scientific documents in other

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languages such as: Italian, Arabic, Bulgarian, and Norwegian (0.1%) were the lowest out of the total of 1.246 articles selected and analyzed.

Table 3: Quantity Article on Teachers' Turnover in Schools by Language, 1932-2022

Languages	Turnover Publications	
	Total of Articles	Percentage (%)
Arabic	1	0.1
Bahasa Indonesia	10	0.8
Bulgarian	1	0.1
English	1.085	87.1
French	2	0.2
Hungarian	2	0.2
Italian	1	0.1
Japanese	3	0.2
Korean	100	8.0
Mandarin Chinese	2	0.2
Norwegian	1	0.1
Portuguese	27	2.2
Russian	6	0.5
Spanish	3	0.2
Ukrainian	2	0.2
Total Publication	**1.246**	**100**

Source: Prepared by the Author (2024)

English is the language in which the most articles were published during this period, followed by Korean. With the supremacy of English, it tops the list as the world's publication language on the phenomenon of teachers' turnover. This shows that English, Korean and Portuguese were the three major languages in which publications were made on the number of teacher departures in the world education system compared to other languages.

Article Analysis on Teachers' Turnover by Year

Table 4 presented the details on the number of papers published on teachers' turnover in the global education system during the period from 1932 to 2022. It is interesting to note that among the years that these papers were published, the largest number of papers (172) was found in the year 2021 (13.8%); then in second place, 134 papers in 2020 with a rate of 10.8%; then, 121 papers were published in third place in 2019 (9.7%); finally, 115 papers were published in 2022, which is 9.2% out of the total number of publications of 1.246 scientific papers. The publication rate was low for the others years.

Table 4: Quantity Article on Teachers' Turnover in Schools by Year, 1932-2022

Years	Older Publications		Years	Recent Publications	
	Number of Articles	(%)		Number of Articles	(%)
1932	1	0.1	1993	3	0.2
1936	1	0.1	1994	6	0.5
1937	1	0.1	1995	2	0.2
1939	1	0.1	1996	6	0.6
1940	1	0.1	1997	10	0.8
1955	2	0.2	1998	4	0.3
1956	1	0.1	1999	7	0.6
1957	1	0.1	2000	1	0.1
1962	1	0.1	2001	8	0.6
1965	1	0.1	2002	7	0.6
1967	1	0.1	2003	13	1.0
1968	2	0.2	2004	13	1.0
1969	2	0.2	2005	17	1.4
1972	1	0.1	2006	6	0.5
1973	1	0.1	2007	17	1.4
1974	1	0.1	2008	22	1.8
1977	1	0.1	2009	25	2.0
1978	4	0.3	2010	29	2.3
1980	1	0.1	2011	29	2.3
1981	3	0.2	2012	49	3.9
1982	4	0.3	2013	39	3.1

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Years	Older Publications		Years	Recent Publications	
	Number of Articles	(%)		Number of Articles	(%)
1983	1	0.1	2014	38	3.0
1984	2	0.2	2015	58	4.7
1985	1	0.1	2016	75	6.0
1986	1	0.1	2017	67	5.4
1987	2	0.2	2018	99	7.9
1988	2	0.2	2019	121	9.7
1989	2	0.2	2020	134	10.8
1990	5	0.4	2021	172	13.8
1991	4	0.3	2022	115	9.2
1992	2	0.2			
Total	54	100		1.192	100

Source: Prepared by the Author (2024)

This shows that in these last four years (2021; 2020; 2019; 2022), the scientific production on the phenomenon of teachers' turnover have been the highest and that many teachers have participated in the phenomenon by leaving the educational system worldwide.

Article Analysis of Teachers' Turnover by Work Methodology

Table 5 as a whole presented the working methods in which was used in the scientific production of these articles on the phenomenon of teachers' turnover. We found that the majority of scientific papers produced on teachers' turnover in the world educational system were carried out through the quantitative method (1040), that is, 83.5%; then, the qualitative method (167) was in second place with a rate of 13.4% of use in scientific production; finally, the mixed method (39) was found in the results in last position with a rate of 3.5%.

Table 5: Quantity article of Teachers' Turnover in schools by Work Methodology, 1932-2022

Methods	Turnovers Publications	
	Total of Articles	Percentage (%)
Quantitative	1.040	83.5
Qualitative	167	13.4
Mixed	39	3.1
Total Publications	1.246	100

Source: Prepared by the Author (2024)

In the end, the quantitative method was the most used in the realization of the scientific production of documents on the phenomenon of teachers' turnover the world educational system compared to other methods of work.
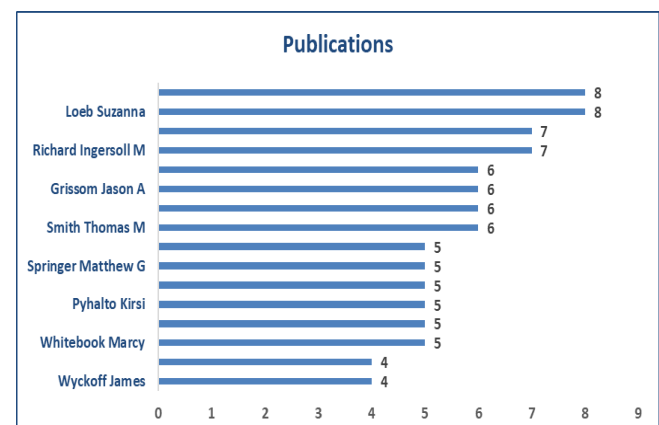
Mapping Analysis of Teachers' Turnover

In this sub-section, we presented six levels of map analysis, the first one concerns the analysis of the 16 most relevant authors on the number of articles published in the world on the phenomenon of turnover; the second one is based on the analysis of the 16 most relevant authors in which their paper has the highest number of citations worldwide; the third one presented the sources cited by references; the fourth one presented a coupled biography map analysis of countries; the fifth one presented a coupled bibliography map analysis of documents; and the last one presented a coupled biography map analysis of organizations.

Analysis of Relevant Authors by Number of Publications

In this subsection, we have presented the 16 authors who have published the largest number of articles they have written on teachers' turnover. According to our result, we found that Redding Christopher and Loeb Suzana are at the top of the list with a number of publications of 8 articles each, then, comes the American author Richard Ingersoll and Nguyen Tuan D with 7 articles published worldwide each, in third place, we had a sequence of four authors with 6 scientific publications on this phenomenon.
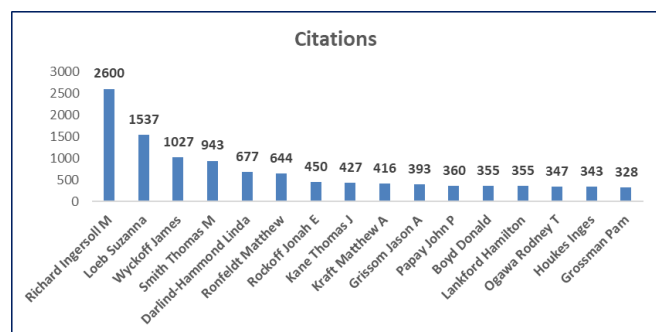

Source: Prepared by the Author (2024)
Figure 2. Authors with the most scientific publications on Teachers' Turnover, 1932-2022

Analysis of Relevant Authors by Number of Co-Citations

In this subsection, we have also presented the 16 authors in which their works written on teachers' turnover have been the

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most cited in other scientific production worldwide on the same phenomenon. We have noticed that the articles of the American author Richard Ingersoll have been at the top of the list with a number of citations worldwide on the phenomenon, that is to say, 2.600 citations in other articles written on the phenomenon.

Lastly, comes the author Loeb Suzanna with a total of 1.537 citations in other works published worldwide; in third place, we have Wyckoff James with 1.027 citations worldwide in scientific publications on this phenomenon.

Source: Prepared by the Author (2024)
Figure 3. Authors with the highest number of citations on Teachers' Turnover Publications, 1932-2022

All this shows us that the United States is a country with the teacher in which their work has been most cited in the context of conducting other research on the phenomenon of turnover. In this case, for example, Richard Ingersoll is the American author who has worked and published extensively on this phenomenon of teachers' turnover to call the attention of the American state at the national level. This is considered a global warning for the educational system. The same is true for all the other authors as shown in graph 2 above.

Analysis of The Reference Co-Citation Map

Figure 3 showed complex bibliographic references that were used in scientific production on this phenomenon worldwide during this period, from 1932 to 2022. It represents a co-citation analysis of references concerning teachers' turnover in global education systems and shows the citation relationships between different scientific articles, based on their frequency of joint citation in publications. The graph made it possible to visualize the main authors and their influence on the subject, as well as the connections between different theoretical and methodological approaches.

Each node represents a publication, and the closer the publications are to each other, the more often they are cited together by other scientific works. The nodes are then grouped by color, which makes it possible to identify clusters of publications with similar themes or approaches.
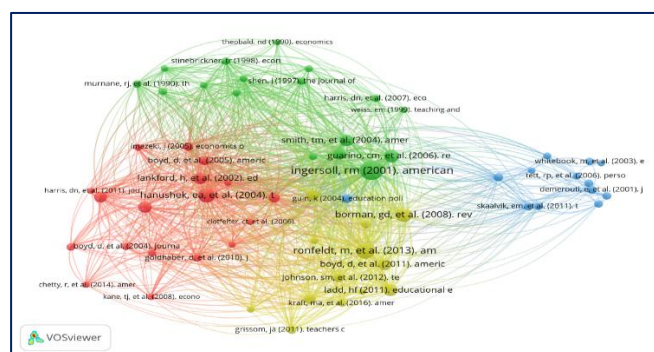
Source: Prepared by the Author (2024)
Figure 4. Co-Citation Reference on Teachers' Turnover in the Global Education System, 1932-2022

Certain authors such as Ingersoll, RM (2001), Boyd, D. et al. (2004) and Hanushek, EA, et al. (2004) appear as major figures in the citation network, with reference to their work frequently cited in research on teachers' turnover (see Table 1). Others, such as Borman, GD et al. (2008), address the impact of teachers' turnover in specific contexts within the education system, and there are several other authors whose work has been cited. All of these authors' works are interconnected.

Analysis of the Biographical Map Coupled with the Countries

Figure 4 shows the relationship between countries in which articles on teachers' turnover have been published most frequently in the global education system, based on co-publications and international collaborations. In terms of country positioning, each country is represented by a node, the size of which is proportional to its importance in the field of teachers' turnover research. The country at the center, the United States, is the most prolific in terms of production, publications, and co-publications.

We found that many countries have interconnected with the United States in the context of scientific production on this phenomenon around the world, for example, Brazil, Spain, China, South Korea, and others. Countries that are closest to each other indicate that they often collaborate on research related to teachers' turnover.

In addition, the United States and China appear to be the most central players in this research, being well-connected with many other countries, particularly in recent years. Other countries such as the United Kingdom, Australia, and Canada also appear to be regular contributors in this field, but are somewhat more peripheral compared to the United States. India, Indonesia, and Pakistan are also present, suggesting that teachers' turnover is a topic of interest in these regions as well, in both Eastern and Western countries. Thus, the United States is one of the countries that has published numerous articles on the phenomenon (see Table 1), and many researchers in other countries have been able to draw on its scientific publications to publish articles on teachers' turnover.
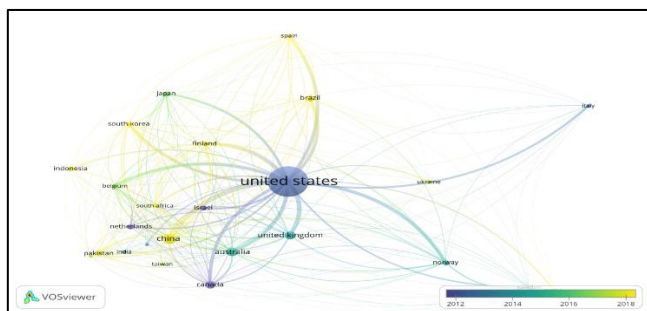
Source: Prepared by the Author (2024)
Figure 5. Coupled Biography of Countries Related to Teachers' Turnover, 1932-2022

The colors of the links between countries indicate the year of publication of co-authored articles: firstly, the color gradient, ranging from blue (2012) to yellow (2018), represents the evolution of international collaborations over time; secondly, dark blue (2012) indicates older collaborations, while yellow (2018) shows more recent publications. All of this makes it possible to visualize the evolution of international collaborations over the years, highlighting the dynamics and new partnerships in research on teachers' turnover.

Figure 5 highlights the main countries involved in research on this phenomenon and how these countries have collaborated with each other. The United States, China, and the United Kingdom are leaders in this field, while other countries such as Italy, Brazil, and Ukraine show more marginal connections. The temporal evolution of these collaborations also showed an increase in interest in this phenomenon starting in 2015, with an increasingly international dynamic.

Analysis of The Biographical Map Coupled with the Documents

Figure 6 showed the bibliography by linking documents published on teachers' turnover in the global education system. We found several articles and the names of several authors, such as Ingersoll in his 2001 work, Ronfeldt in his 2013 work, Borman in his 2008 work, and several others. All of these works were published on the phenomenon of turnover around the world.

It also showed a temporal evolution through the oldest authors, such as Mosha (1988) and Pounder (1995), who are on the periphery, while the most recent authors are presented as Schaack (2020) and Bassok (2021), integrated with smaller circles. However, all of this research on turnover is organized around Ingersoll (2001) as the central point.
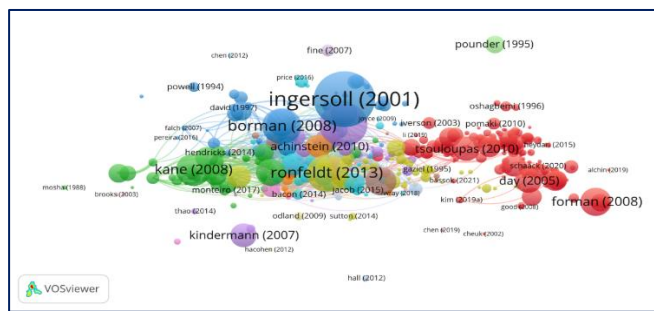
Source: Prepared by the Author (2024)
Figure 6. Biography Coupled with Documents of the Authors who published on Teachers' Turnover, 1932-2022

It should be noted that the central authors are influential in this sense. Ingersoll (2001), the American author, is the largest node at the center, and therefore the most influential and most frequently co-cited author.

In addition, his work is a major reference point on teachers' turnover. Next come Ronfeldt (2013) and Borman (2008), who have worked in the same vein as Ingersoll; then Tsouloupas (2010) and Day (2005), who are also very visible in another cluster (red), marking a complementary approach; Finally, Forman (2008), Kane (2008), and Kindermann (2007) are influential intermediate figures.

At the node level, blue stabilizes around Ingersoll, Borman, Achinstein, and which are axes centered on Ingersoll's work on teachers' turnover and its structural causes; then green, identified by Kane, Hendricks, Pounder, and Monteiro, is based on a more evaluative and quantitative approach to turnover, including institutional and contextual factors; then red, represented by authors such as Tsouloupas, Day, Forman, Heydar, Good, and Pomaki, who have presented work on stress, motivation, and burnout related to turnover; Finally, the purple group, represented by Kindermann, Thao, and Hachoen, is more marginal and links the phenomenon to relational dynamics.

*Analysis of the Coupled Biographical Map of Organizations*

Through Figure 7, a combined bibliographic analysis of organizations, i.e., universities and institutions that publish on the teachers' turnover, was presented in the global education system.

We found that several universities had stored these scientific articles on their scientific platforms. Based on this analysis, firstly, publications on professor turnover were dominated by several major American universities such as Harvard, Vanderbilt, Stanford, and John Hopkins, which form the core group; secondly, several other international universities such as Maastricht, Monash, and Oulu, Finland, have published joint articles on this phenomenon; and finally, social science and education research institutions (UNC, UPenn, NYU) have also published on the phenomenon.

All of these universities have published joint papers as part of scientific research on the phenomenon of teachers' turnover around the world. Overall, there is a strong

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American focus, but with a well-connected international network around the issue of teachers' turnover.

In terms of the network, based on color, red represents influential American universities, such as Harvard University, Vanderbilt University, Stanford University, the University of Washington, the University of Florida, Duke University, and Michigan State University. All of these institutions are highly interconnected and have produced a large portion of the research on the phenomenon of faculty turnover.
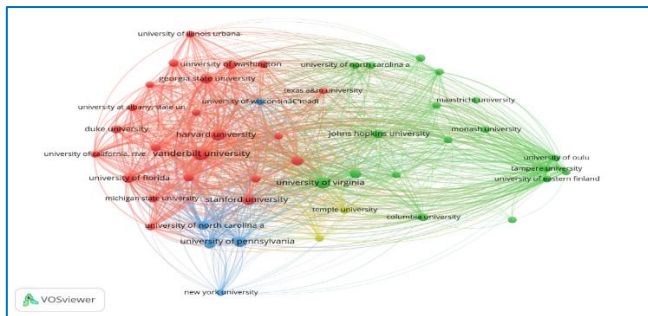
Source: Prepared by the Author (2024)
Figure 7. Coupled Biographies of Organizations with Publications on Teachers' Turnover, 1932-2022

The green cluster is an international group of universities such as Johns Hopkins University, University of Virginia, Columbia University, Maastricht University, Monash University, University of Oulu, University of Eastern Finland, and Tampere University. This group connects American and international universities, such as those in Australia and Finland. Finally, the blue and yellow group of other universities acts as a link between the major clusters.

FINAL CONSIDERATIONS

The objective of this paper was to map and analyze the publications of scientific papers on the phenomenon of teachers' turnover in the global education system. This study identified different types of scientific papers that were published during the selected period, i.e., 1932 to 2022. The article showed the increasing evolution of the scope of scientific research on teachers' turnover over the years. It is understood that the objective of this article was achieved within the plausible limits related to the volumes of data available from the Dimensions database, which allowed for the identification and analysis of 1.456 scientific articles on the phenomenon of teachers' turnover.

The research conducted on the phenomenon was related to the teachers' turnover in the world school system, and the methodology used was the prism method related to descriptive techniques.

The bibliometric results of this study at the level of performance analysis showed that the majority of articles that were written on this phenomenon were published most in English (87.1%), Korean (8.0%), Portuguese (2.2%); in the publication by country, the United States (45. 8%), South Korea (10.8%), China (5.1%), Kenya (3.2%), Indonesia

(3.0%) and Brazil (2.9%) published more articles on this phenomenon; and the analysis by continent in the geolocation showed that it was the American continent (51. 8%), the Asian continent (28.6%), Europe (8.0%) and the African continent (7.4%) that had the highest rate of publication on this phenomenon in the world; finally, the results also showed that it was the years: 2021 (13.8%), 2020 (10.8%), 2019 (9.7%) and 2022 (9.2%) in which the scientific production of these articles was the highest on this phenomenon in the period from 1932 to 2022.

On the level of the cartographic analysis, we could see that on the analysis of the number of publications, the author Redding Christopher and Loeb Suzana have published the most articles (8) on this subject; then, comes the American author Richard Ingersoll and Nguyen Tuan D with 7 published articles each. Then, on the number of citations, the American author Richard Ingersoll is at the top of the list with 2.600; then, comes the author Loeb Suzanna in second position with 1.537 citations. All of this shows that spin is invading the world's school system and doing damage. For every time a teacher leaves a school in the world, it reduces a school's ability to develop programs and implement curricula, and the ability of teachers is also hindered in the process of improving its teaching standards over time [26], and it is generally more difficult to fill vacancies in these types of schools with qualified teachers [26].

This study has made a scientific contribution by mapping a large number of studies on the phenomenon of teachers' turnover around the world, and these articles have been used in various approaches and literature by multiple authors who have published on the phenomenon of turnover. Despite this contribution, the study is limited because it does not consider all countries in the world (approximately 193); in this context, it covers only 74 countries in its study of this phenomenon. Furthermore, there are also limitations in terms of the sources used, as the research platform (Dimensions) was the only platform used in the analysis of this phenomenon, where two Excel databases were found and analyzed.

Hence the possibility for other researchers to expand the search in other sources in order to find many more scientific papers on the subject. Given these limitations, much more bibliometric work needs to be done on this phenomenon using various other scientific publishing platforms to generate more knowledge on this phenomenon, as teachers' turnover is a global challenge and very complex in nature [26].

Indeed, the teachers' turnover is very detrimental to the school system, so it must be reduced, as an enemy of the proper functioning of public and private organizations, as well as the school system, it must be avoided at all costs [27]. Given the originality of this article, the information presented can be used for useful purposes of educational public policy in the school system worldwide, so that states can develop targeted interventions on teachers' turnover, in order to find a way to solve this problem that gangrene organizations and the

school system in the world, mainly the countries that have been most affected by this phenomenon.

This phenomenon raises major policy challenges for education systems, often reflected in precarious working conditions, insufficient institutional support, and poorly adapted personnel management policies. From a policy perspective, turnover calls for structural reform to improve salaries and incentives, strengthen training and support programs, and implement retention policies to retain qualified teachers. Furthermore, the article shows that turnover affects several countries, making it an issue for the proper functioning of schools and the quality of education. Thus, reducing turnover is not only a matter of administrative management, but a strategic priority for state education policy, an essential condition for ensuring teacher stability and the effectiveness and equity of school systems.

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