

AN ANALYSIS OF TEACHER EDUCATION RESEARCH IN THE WEB OF SCIENCE

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Abstract: *The goal of this study is to analyze the scientific literature in the field of teacher education, indexed in the Web of Science (WoS) Core Collection database, one of the citation index for scientific and scholarly research. A bibliometric analysis was carried out looking at the period between 2000-2019. In total, 23327 documents on the topic of teacher education were indexed in the WoS, where it was found that: a) the Education and Educational Research category had the most documents; b) 2017 was the year with most publications (3298); c) English was the dominant language in these documents; d) the most numerous documents are the journal articles; e) the articles are much cited then proceedings papers and book chapter; f) the USA is the leading country in the field; g) Romania ranks 13th in the ranking of countries contributing to research in the field. For more impact and visibility of the research made by Romanian authors, there is a need to publish more articles in the indexed journals in WoS and to strengthen the collaboration relations with authors from other countries.*

Keywords: teacher education; teacher training; bibliometric analysis; Web of Science;

1. Introduction

Teacher education research has increased over the years and has become a popular subject in the educational field. The term “teacher education” refers to programs for the training of teachers with the knowledge, skills, and attitudes necessary to cope with the professional requirements. In line with the European Commission (2013), three stages can be identified under the cover of this initial concept: initial teacher education (education and training before any form of qualification or certification); early career period or induction (for newly qualified teachers); continuing professional development (training that teachers receive throughout their careers, and lifelong learning). Another term that is used for this reality is teacher training.

Teacher education is obviously a priority on the political agenda in many countries, where solutions are sought in terms of improving the teacher quality, over different stages. Hattie (2009) reminds us that there are significant correlations between teacher quality and student performance. Although teacher training programs vary considerably among the countries around the world, teachers face challenges in their classrooms, at school and system level. The teaching profession is becoming more and more complex, the demands placed on teachers are increasing and the environment in which they work is becoming more and more challenging (Commission of the European Communities, 2007). These pressures are valid not only at European level, but at a global level, too. Within this context, it is relevant to analyze the global productivity of research on teacher education. Scientific production is indexed into different databases. One database for scientific and scholarly research, which includes high-quality scientific publications, is Web of Science Core Collection. This is an “abstract and citation database which serves as the premier resource for research discovery, covering authoritative and multidisciplinary content: 20.000 of the highest impact journals worldwide, including open access journals, 90.000 scholarly books and over 170.000 conference titles”

(Web of Science, 2018). The database covers highly selective scientific publications from sciences, social sciences, arts, and humanities, starting with 1900.

The goal of this study is to search and analyze the scientific teacher education-related literature, indexed in the Web of Science database. We used bibliometrics analysis to obtain a broader image of teacher education research, by exploring the numbers and trends related to the articles and journals, countries, and authors.

According to Okubo (1997), bibliometrics is a generic term based on the enumeration and statistical analysis of scientific output in the form of articles, publications, citations, patents and other, more complex indicators. Aksnes, Langfeldt, and Wouters (2019) affirm that “in recent years, bibliometric indicators have increasingly been applied in the context of research evaluation as well as research policy more generally” (p.1). For instance, indicators are used for rating the scientific performance of institutions or individual researchers, for allocation of research funding, for university rankings, etc. The measurement of scientific research applies to a variety of fields, including education. For example, Panczyk, Woynarowska-Soldan, Belowska, Zarzeka, & Gotlib (2015) conducted a bibliometric analysis of the scientific literature in the field of research in education. In other cases, a bibliometric analysis has been done in the field of educational sciences in a specific country, in this case in Switzerland (Diem & Wolter, 2013), or in different areas of interest in education, such as: teacher motivation (Viseu, de Jesus, Quevedo-Blasco, Rus, & Canavarró, 2015) or leadership model in education (Gumus, Bellibas, Esen, & Gumus, 2016). The results of such studies allow the identification of trends and directions in education research, the discovery of areas of interest to researchers in the field, the development of cooperation networks for research at the level of organizations or people from different countries or continents.

The bibliometric analysis on teacher education literature will give us an idea about this field, in terms of number and types of documents, countries and organizations involved, journals and language of publications. By its results, this study provides informative data that may be used by individual researchers or by research groups, looking for the development of research networks.

2. Method

In this study, the research on teacher education was investigated through the bibliometric analysis. The search period was between 2000-2019 (the last almost 20 years). Through this analysis, a series of indicators have been following, such as the number of publications, the Web of Science categories, types of documents, the target journals for the publication of articles on teacher training, highly active countries and institutions, etc. Two questions conducted this research:

What trends have been in the last two decades at international level in research on teacher education field in terms of number and types of documents, web of science categories, organizations involved, countries, journals and language of publications?
How does Romania position itself in the international context in research on teacher education field, in terms of number and types of documents, organizations involved and language of publications?

The data used in the present study are downloaded from the Web of Science on April 3, 2019 and were collected from the following 8 citation indexes: Science Citation Index Expanded; Social Sciences Citation Index; Arts & Humanities Citation Index; Emerging Sources Citation Index; Conference Proceedings Citation Index-Science; Conference Proceedings Citation Index-Social Science & Humanities; Book Citation Index-Science; Book Citation Index-Social Sciences & Humanities.

3. Findings

This section provides the results of the bibliometric analysis on the Web of Science database, drawing on a broader picture of teacher education at international level. First, we did an advanced research, choosing the option TS (topic) = teacher education or teacher training, enclosing the phrases in quotation marks, using Boolean operators (OR) and a wildcard symbol (*). Thus, the search using this formula TS = “teacher education” OR TS = “teacher* training” generated 23327 documents, published in the selected citation indexes, from 2000 to 2019, which contain in their title, in the abstract or among the keywords the desired syntax. Of these records, 5241 are Open access (23.23%). Although open access documents enjoy good visibility, the amount that publishers charge for open access, the reticence of some researchers to publish in such journals (perhaps less well known than others in the field) may be possible explanations for the fact that the number of documents open access is lower.

The number of works registered during the mentioned period represents 87.67% of the total of Web-indexed publications. Practically, between 1974 (when the first work on the subject of teacher education was registered) and 1999 (for 26 years) only 3290 works were registered, representing only 12.32% of the output.

The first finding was that there has been a marked increase in the number of publications since 2000 (Figure 1). The lowest output appears in 2001 with only 197 publications, and the highest output is recorded in 2017, with 3298 publications. The production of scientific works has increased over 16 times in nearly two decades. Three periods can be delimited:

A slow, but constant growth period in the first decade of the analyzed period (between 2000-2009), when a total of 3793 documents were published (between 197 and 802 per year), representing 16.26% of the total amount;

an obvious growth period in the first half of the second decade (2010-2014), when 6844 papers have been published (with a number of publications between 1205 and 1614 per year), which accounts for 29.34% of the total amount. The number of publications has almost doubled over the previous period.

An impressive growth period (2015-2018) when 12210 scientific papers (between 2908 and 3298 papers per year) were published. To this, we added the 480 papers indexed until April 3, 2019. Together these represent 12690 works (54.40% of the total amount). Again, the number of publications has almost doubled over the previous period.

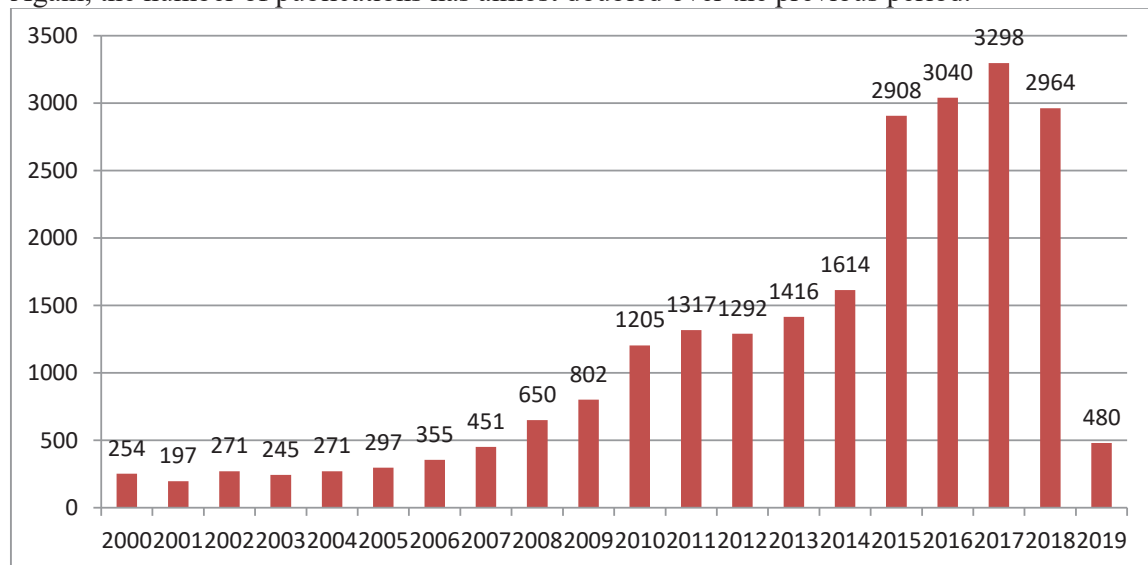


Figure 1. The numbers of publications between 2000 and 2019

We can say that there is an increased interest in the research in the field, which is confirmed by the increasing trend in the number of publications over the last two decades.

Most publications - 19,723 (representing 84.55% of the total), are written in English. Statistics show that 1685 documents are registered in Spanish (7.22%), 1025 in Portuguese (4.39%), 335 in German (1.43%), 116 in Turkish (0.49%). Therefore, English is the most used language for writing and communicating the research results in the field, which is explained by the fact that the scientific literature indexed on the platform was mostly published by US researchers. These works have been indexed in several Web of science categories. Most papers - 18276 (78.34%) were indexed within Education and Educational Research category. In the Web of Science, this category covers resources on the full spectrum of education: pedagogy, methodology, history of education, reading, curriculum studies, educational policy, sociology and economics of education, as well as the use of computers in the classroom. Other categories in which these papers were indexed were: Education scientific disciplines (4.92%), Linguistics (4.43%), Social Science inter-disciplinarity (3.48%), Language Linguistics (3.11%), Educational Psychology (2.73%) etc.

According to the Web of Science, indexed documents for the field of teacher education are grouped into several categories, three of which are more important: articles, proceedings papers, and book chapter (Figure 2).

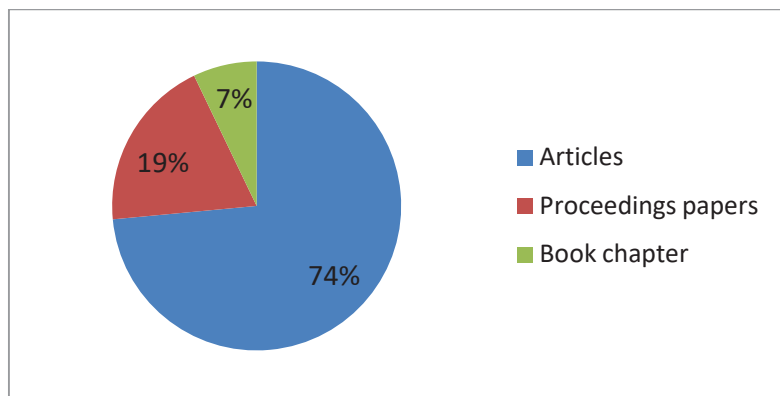


Figure 2. Document types on teacher education field on Web of Knowledge

Articles represent the category with the most records - 17366, representing 74% of total publications. The second category is represented by proceedings papers, with 4563 documents, representing 19% of total publications, and the third category refers to the book chapter, amounting to 1,684, representing 7% of the total. The greater importance that journal articles have in comparison with proceedings papers in scientists' research is an explanation for the generous number of articles compared to the number of papers presented at conferences. We mention that, in the Web of Science, some papers can be identified as both articles and proceeding papers. This is the case of papers that were initially presented at a conference or workshop and later adapted for publication in a journal (González-Albo, & Bordons, 2011).

One indicator for measuring the impact of the research over the scientific community is citation. The most quoted types of documents within the teacher education field on the Web of Science database are the articles. The 17366 articles received 135630 citations (with an average of 7.81 citations/article) over the past 20 years, while 4563 proceedings papers received only 5329 citations (averaging 1.16 citations/paper). For example, the most cited three articles in the field have a number of citations between 495 and 458 and are published in the top two top-ranked journals in the field (Table 1).

Table 1. The most cited articles on teacher education field on Web of Knowledge database

The most cited articles	Number of citations
Darling-Hammond, L. (2006). Constructing 21st-century teacher education. <i>Journal of Teacher Education</i> , 57(3), 300-314.	495
Zeichner, K. (2010). Rethinking the connections between campus courses and field experiences in college- and university-based teacher education. <i>Journal of Teacher Education</i> , 61(1-2), 89-99.	493
Korthagen, F.A.J. (2004). In search of the essence of a good teacher: towards a more holistic approach in teacher education. <i>Teaching and Teacher Education</i> , 20, 77-97	458

Proceedings papers receive fewer citations than journal articles, although the percentage of open access documents is comparable for the two types of documents (22.97% for articles and 22.92% for conference papers, respectively). This reality can be explained by the fact that articles are usually considered to be more elaborated and more mature than proceedings papers and enjoy greater weight and influence in the scientific literature. In the case of books chapters, the number of citations is significantly lower (the three most quoted chapters each have between 30 and 33 citations, recorded on the WoS database.) An explanation for this could be the fact that only 1.76% are open access documents. In addition, chapters in books are not as visible as articles in journals.

As shown in Table 2, 15.76% of articles were published in the top 10 most prolific journals in the field. The top-ranked journal is *Teaching and Teacher Education* (Impact Factor = 2.472 in 2017), which published 921 papers in total, containing 5.31% of all articles in the field. It is followed by other journals, but with fewer works. The authors have numerous (over 100) and various journals in which they can publish their work related to teacher education.

Table 2. The most prolific journals for the field of teacher education

Rank	Journal	Record count	Percent
1	Teaching and Teacher Education	921	5.31 %
2	Journal of Teacher Education	384	2.21 %
3	Journal of Education for Teaching	254	1.46 %
4	European Journal of Teacher Education	249	1.43 %
4	Australian Journal of Teacher Education	216	1.24 %
6	Asia Pacific Journal of Teacher Education	188	1.08 %
7	Teachers and Teaching	147	0.84 %
8	International Journal of Science Education	140	0.80 %
9	Advances in Research on Teaching	126	0.72 %
10	Teachers College Record	112	0.65 %

In terms of geographic distribution, more than 100 countries contribute to research in the field of teacher education. The most active countries are shown in Figure 3.

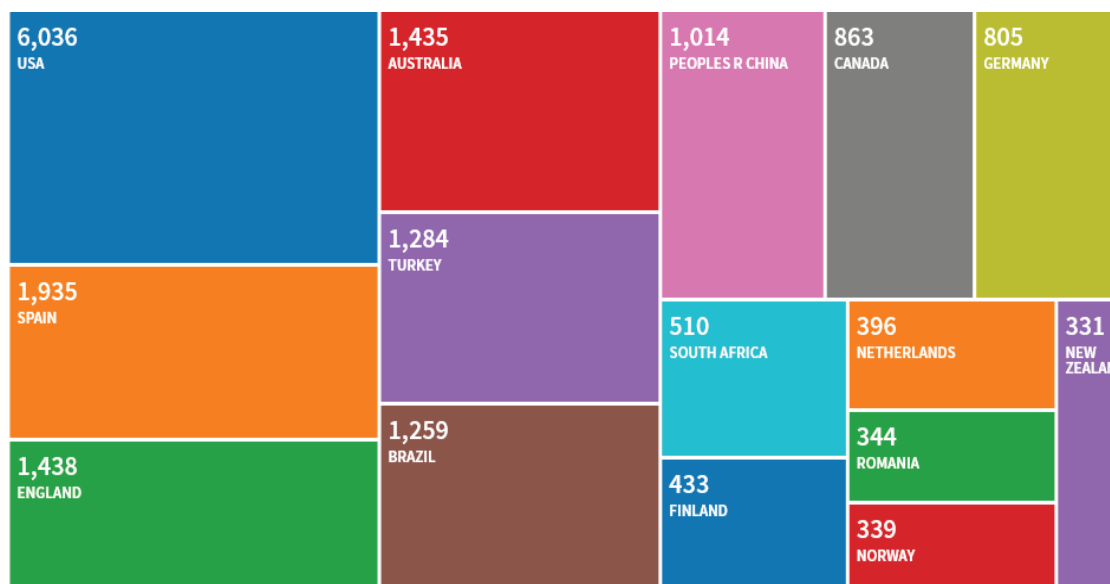


Figure 3. Rankings of countries that contribute to the scientific literature regarding teacher education (Source: Web of Science database)

With 6036 papers, representing over one-quarter of total works (25.87%), the United States leads the rankings of countries for the production of research in the field of teacher education. The American universities most productive in the field of teacher education are State University System of Florida (304 records), University of North Carolina (304 records), University of Georgia (296), California State University System (201) and they dominate the rankings. The USA is followed, at a great distance, by a wide range of countries, such as Spain (8.29%), England (6.16%), Australia (6.15%), Turkey (5.5%), etc.

This ranking also allows us to address research question 2, regarding Romania's contribution to research in the field of teacher education. With 344 registered works (representing 1.47% of all publications), Romania ranks 13th in the hierarchy of countries contributing to research in the field of teacher education. It is a quite honorable position if we take into account the fact that it is only from 2008 that we can talk about a constant presence of works written by Romanian authors on the platform. After only two works were recorded in 2008, a peak reached in the production of scientific publications in 2014 and 2015, with a record of 65 works per year for two years.

Regarding document types, 314 (ie 91.27% of the works) are classified as proceedings paper (314), and only 30 (8.72%) are classified as articles. The most cited article (with 24 citations), written by a Romanian researcher - Singer, F.M., in collaboration with a US researcher - Moscovic, H., is called "Teaching and learning cycles in a constructivist approach to instruction" and was published in 2008, in the best quoted journal of the field - Teaching and teacher education, in vol. 24, issue 6, pages: 1613-1634. The most cited conference paper (10 citations) is also written by Singer, F.M., in collaboration with a Romanian author Stoicescu, D. It is called "Use blended learning as a tool to strengthen teaching skills" and was presented at the 1st World Conference on Information Technology (WCIT), Bahcesehir University, Istanbul, Turkey in 2010 and published in 2011. We can conclude that Singer is the most cited Romanian author on the platform in the field of teacher education.

The work of the Romanian authors, indexed on the platform, is 99.41% written in English, which is explicable considering that most of the international conferences that bring

materials to the platform are being conducted in English. There are only two works in Romanian indexed on the platform. Collaborations between Romanian researchers and researchers from other countries are quite few (7 with the USA, 4 with Germany, two with Canada, two with Spain, etc.). It is necessary to multiply and strengthen international collaborations of Romanian researchers in order to increase the quality and visibility of the research. Identifying the institutions with a larger number of research articles in the Web of Science can be a first step to initiating collaborative research.

From Romania, the most active organizations publications in the field of teacher education are: University of Bucharest (70 record counts, representing 20.34% of the national contribution), “Babes-Bolyai” University from Cluj-Napoca (with 36 papers, 10.46%), “Alexandru Ioan Cuza” University (24 papers, 6.97%). According to the Web of Science rankings, with 14 papers published in this field (4.07%), “Lucian Blaga” University of Sibiu ranks 7th in the ranking of Romanian universities that contribute with publications in the field of teacher education.

The focus of recent years on performance-related indicators in the assessment of universities, but also in the assessment of scholars, may be a possible explanation for the fact that Romania has become a more visible presence in international teacher education research over the last decade, although the number of articles is rather modest, compared to the number of proceedings papers. It would be necessary to focus the creative energies of the Romanian authors in this direction and to strengthen the collaboration relations in order to increase the quantity and quality of the articles.

4. Conclusions

In this paper, the research of teacher education at the international level from 2000 to 2019 is over-viewed from a bibliometric perspective. It has been found that the interest in research in the field of teacher education has increased over the past two decades, which is objectively reflected in a large number of journals and articles, conferences organized in the field, or published books. A generous international community made up of researchers and scholars, organizations, departments or foundations do or support research in this field. English is the dominant language in these works, due to the fact that the United States of America leads by far in the ranking of countries contributing to scientific production in the field. In addition, most scientific journals and international conferences organized for the communication of research results are in English. The main focus of teacher education in the world was article production in journals indexed in Web of Science. Several prolific journals were also identified. This is relevant for researchers looking for quality materials and identifying those journals in which they can publish their papers. Also, Romania's contribution to research in the field of teacher education has been identified and analyzed, in terms of number, types of papers, contributing institutions, and language of publications. Due to the importance of the teacher education field and the trends reported as a result of annual publication outputs, we estimate an increase in the number of studies in the coming years at international and national levels.

Finally, this study offers a global overview of teacher education research, but it has some limitations. Due to a large number of papers, a more in-depth analysis of selected papers has been difficult. This could, for example, identify the main themes, research directions in the field of teacher education, the purposes of these studies, the methods used by researchers, the population surveyed, etc. The study can be continued by integrating the bibliometric data provided by other platforms (Scopus, Google Scholar, etc.). The use of combined data from different databases could provide a more comprehensive picture of research performance in the field of teacher education. Further analyses dealing with teacher education fields would be needed.

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