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# Educational Research in Türkiye: A Bibliometric Analysis of the Global Literature

Muammer Maral [1], Yuh-Shan Ho [2]

## Abstract

This study aims to conduct a bibliometric analysis of Türkiye's present role and contributions to international education research literature. For this purpose, a total of 8630 publications covering the years 1992-2021 in four categories in the Web of Science Core Collection (WoS) covering to educational research were analyzed. The investigation used a variety of metrics to examine the number of publications, publication impacts, publication citation histories, the most influential publications, publishers, institutions, and the international collaboration structure. According to the study's findings, almost all of the publications were released after 2006, and there was a significant increase in the number of publications until 2012. Despite this growth, however, the impact of the publications declined. Productivity and publication impact values have further decreased since 2013. The highest number of publications was in the journal Education and Science. The majority of international collaboration has been with the USA, but the most impactful publications have been with Canada. Middle East Technical University has the greatest impact on publications, while Hacettepe University is the most productive institution. The six main areas of educational research that Türkiye has concentrated on are common issues in education, learning and teaching, psychology, science education, teacher training, and scale development.

## Keywords

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## Introduction

The development of science continues to grow today as in the past. However, especially in the last two decades, there has been a significant increase in the number of scientific publications, publishers, and researchers. According to World Bank data, the number of scientific and technical journals, which was approximately one million in 2000, reached approximately two million in 2010 and nearly two and a half million in 2018 (World Bank, 2022). Between 2014 and 2018 alone, the number of researchers worldwide grew three times faster than the global population growth rate. During the same period, global research expenditure increased by nearly 20 per cent, outpacing the growth rate of the global economy (14.6 per cent). In 2019, global science output increased by 21 percent compared to 2015, reflecting a growing trend towards scientific publishing. In some fields, such as environmental sciences, the growth rate reached 46 percent during this period (UNESCO, 2021).

[1] National Defense University, Department of Educational Administration, Türkiye, muammermaral@hotmail.com
[2] Independent Researcher, Taiwan, dr_ysho@hotmail.com

Along with this growth in scientific literature, the accumulation of knowledge has also increased. This development, especially in recent years, has revealed the need for a periodic review of existing knowledge and therefore scientific publications. The aim of these studies in the literature is both to determine the current state of the field by systematically reviewing the publications in a particular subject or field and to provide guidance for future research. The second is to make suggestions for the future by revealing the current situation of researchers, institutions, or countries related to a particular subject or discipline on a performance basis. When the literature is examined, previous studies have shown that the bibliometric method is frequently used to review research in a field, to examine the field comprehensively, to draw a direction for future research or to examine the research performance in a field (Aman & Botte, 2017; Farrukh, Meng, Raza, & Tahir, 2020; Hallinger & Kovacevic, 2019; Kosmutzky & Krucken, 2014).

Bibliometric analysis are widely used to examine scientific knowledge from a comprehensive and broad perspective, identify knowledge gaps, provide new ideas for research, and reveal contributions to the field (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021). Many studies have reviewed scientific knowledge using bibliometric analysis. Research on a specific field (Verma & Gustafsson, 2020), a journal (Farrukh et al., 2020), or a subject (Hallinger & Kulophas, 2020) is conducted using bibliometric analysis.

As in many fields of science, many studies have been conducted using bibliometric analyses in the field of education (Maral, 2024a, 2024b). These studies do not limit educational research to specific countries or subject areas (Maral, 2024c). Sezgin, Orbay, and Orbay(2022) examined the levels of collaboration in educational research between 2011 and 2020 in the WoS database and the rates of open access articles according to educational categories using bibliometric data. The study revealed that the highest number of publications were in the categories of "education and educational research", "education scientific disciplines", "psychology, educational" and "education, special" respectively. In addition, this study found that educational research has become more international as time passes. Ivanovic and Ho (2019), who examined educational research from an international perspective, analysed only the highly cited articles in educational research in the SSCI index until the end of 2016 in the WoS database. This research shows that the USA, UK, Canada, Australia, and the Netherlands have achieved high productivity and publication impact in educational research. Cretu and Ho (2023), on the other hand, bibliometrically analysed educational research in the WoS database in a two-year period during the COVID-19 period. As result of this research, it was found that the USA, UK, Canada, Australia, and the Netherlands have attained high productivity and publication impact in educational research in recent years. Aman and Botte (2017) examined the internationalisation of educational research in Europe based on the WoS database. This study found a strong increase in international co-authorship in educational research and revealed that international collaboration in educational research in general is on the rise. Orbay, Karamustafaoğlu, and Miranda (2021) examined only the journals in the category of "education and educational research" in the SSCI index in the WoS database and found that international collaboration in educational research is approaching 30%. Althouse, West, Bergstrom, and Bergstrom (2009) examined the change in impact factors over time in many disciplines besides educational research and found that the increasing publication impact in educational research is a result of increasing international collaboration. Huang et al. (2020), in their bibliometric research examining the thematic transformation of educational research, revealed that educational research mainly focuses on five main topics of study: (1) Interactive learning environment and teaching/learning strategies, (2) Human capital and educational finance, (3) Teacher education, (4) Higher education, (5) Equity and social justice.

These studies deal with educational research internationally without limiting educational research on the basis of any journal, country, or institution. In these studies, educational research were examined using bibliometric data and educational research were generally analysed by bibliometric science mapping methods. In addition to these studies, there are also studies that evaluate educational research on the basis of a specific subject. Hallinger and Kovacevic (2019), in their bibliometric study of

educational administration (EA) research, revealed the structure of this field by determining the volume, growth trend, most influential authors, and publications of EA research using science mapping technique. Similarly, Kosmutzky and Krucken (2014) examined the growth trend of publications, the network structure, and productivity of countries in their bibliometric study of international comparative higher education research based on the WoS database with data covering the period between 1992-2012. Some of these studies examined the current state of the field in terms of journals, authors, institutions, countries, and themes of the field by examining educational research with scientific mapping and revealed the contributions to educational research. They provided information about the thematic structure of the field cross-sectionally and longitudinally. Some studies have also addressed the research performance of journals, researchers, institutions, and countries among international publications on educational research (Maral, 2024d).

There are some studies in Türkiye that review educational research for similar purposes. These studies that deal with international research in the field of education centred in Türkiye. Gumus, Bellibas, Gumus, and Hallinger (2020) examined 313 Türkiye-based publications in international educational leadership and management journals using the scientific mapping method and examined their thematic, co-authorship, and publication productivity and their impacts. Gulmez, Ozteke, and Gumus (2021) examined the productivity of authors, journals, and institutions, as well as the thematic structure of educational research by using science mapping and descriptive analysis methods based on the data in the WoS database. According to the results of this research, Hacettepe University performs better in terms of the number of articles and Middle East Technical University performs better in terms of the number of citations. This study found that educational research in Türkiye focuses on four themes: research methods, measurement and evaluation, science education, and educational psychology. Ciftci et al. (2016) analysed the research in educational sciences and teacher education in Türkiye using bibliometric techniques such as the number of publications and word frequency. Tosun (2022) analysed educational research in Türkiye with SSCI indexed publications in the WoS database. In this study, he revealed that educational research in Türkiye showed an increasing trend until 2012, after which there was a decrease in the number of publications and then an increase again. In this study, it was concluded that higher education, teacher education, gender, validity, and reliability are the basic concepts of educational research, Hacettepe University is the most productive institution and Middle East Technical University is the most influential institution. Maral and Özdemir (2022), on the other hand, conducted a field-based research and revealed the current state of the field by addressing educational administration research in Türkiye with the social network analysis method and concluded that the research in this field focuses on similar issues.

Most of these studies addressing international education research in the context of Türkiye have used science mapping techniques and analysed the data using basic bibliometric techniques. Although science mapping is a frequently used technique in bibliometric studies and provides basic information about collaborations, the use of science mapping without statistical analyses lacks comprehensive information that will provide insight into the current and future situation of the country. In addition, previous studies analysing educational research in the Türkiye context have some limitations as they focus on a specific year range, research category, index and subject. In particular, the lack of analyses of Türkiye's international collaboration in previous studies is remarkable. Although previous studies measure productivity through the number of publications and publication impact through the number of citations, there is a need to analyse educational research with comprehensive bibliometric indicators that will reflect Türkiye's status in educational research more comprehensively and allow for practical implications for the future from a different perspective. In addition, in this study, indicators that have not been used in previous studies in the context of Türkiye and which are new to the bibliometrics literature have been used. For example, indicators like the number of authors, collaboration patterns, author nationalities, and changes in productivity and publication impact based on such indicators can give insights into researchers' quality and productivity. In addition, such indicators provide in-depth information about the collaboration of authors in a country. This information can provide new insights into publication productivity and quality. The new information obtained may also enable the

development of new strategies to improve research performance. In conclusion, this study differs from previous bibliometric studies in the field of education in Türkiye in two aspects. First, this study does not focus on a specific subject of education, such as educational administration or teacher education, but on the whole of educational research. Second, this study used a more comprehensive methodology using both existing and new indicators in the bibliometric literature.

This study aims to reveal the long-term status of Türkiye in global education research and to provide implications for the future position of Türkiye within the framework of the results obtained. For this purpose, unlike other studies, Türkiye's status in educational research has been analysed with long-term data and indicators that will comprehensively address research performance, and recommendations will be made to improve Türkiye's future position in educational research.

As a result, answers to the following questions will be sought in this research:

1. What is the descriptive structure of educational research in Türkiye and the trend of growth and impact of publications?
2. How is the change in publication productivity according to educational categories in Türkiye over the years?
3. Which journals and institutions are the most productive and influential in educational research in Türkiye? What is the collaboration and authorship structure of these institutions?
4. How is publication productivity and impact at institutional and country level according to authorship status and collaboration structure in educational research in Türkiye?
5. What are the most cited publications in educational research in Türkiye and what is the citation history trend?
6. Which are the focal research topics of educational research in Türkiye?

***Higher Education and Research in Türkiye***

Higher education institutions play an important role in research activities in Türkiye. A brief examination of the WoS database shows that approximately 90 percent of the scientific publications produced in Türkiye are produced by higher education institutions (Web of Science, 2023). As of 2023, there are 208 higher education institutions in Türkiye. Of these institutions, 129 are public higher education institutions, 75 are foundation higher education institutions and, four are foundation vocational colleges. The number of higher education institutions, that play an important role in research activities, has generally increased from the past to the present. The number of higher education institutions in Türkiye increased from 51 in 1992 to 71 in 2000, 164 in 2010, and 208 in 2020. However, the number of institutions decreased from 194 in 2015 to 183 in 2016. Along with the increase in the number of higher education institutions in Türkiye, the number of academics has also increased. The number of academics, which was approximately 38 thousand in 1992, increased to 67 thousand in 2000, approximately 110 thousand in 2010, 180 thousand in 2020, and 185 thousand in 2023. The number of academics has increased continuously, but as an exception, the number of academics decreased by approximately five thousand in 2016 (YÖK, 2023a, 2023b).

Academic staff in Turkish higher education benefit from academic incentives in various ways in their research activities. Academic incentive refers to the monetary support paid to academic staff by calculating according to criteria based on projects, research, publications, designs, exhibitions, patents, conference paper, citations and awards. This incentive is paid annually according to the performance of academics in the specified fields and academic title (Akademik Teşvik Ödeneği Yönetmeliği, 2018). The aim of academic incentives in Türkiye is to increase the research, project and publication productivity of academics. Research activities of academics in Türkiye are also taken into consideration in academic promotion. In Türkiye, academic promotions are made within the scope of some regulations. In order to receive the title of associate professor, academics must meet the criteria specified in these regulations. In order to receive the title of associate professor, an academic must have completed his/her doctorate,

have at least 55 points from the foreign language exam, and have conducted scientific studies in the minimum number and quality determined. For an academic in the field of education to become an associate professor, it is obligatory to publish international articles, national articles, publications produced from graduate theses, be cited in these publications, and teach at least one semester (Doçentlik Yönetmeliği, 2018). However, it is noteworthy that there is no publication requirement for associate professorship applications in the field of education in SSCI, SCIE indexed journals. In terms of publication requirements, a candidate can become an associate professor only with the indexes in the field of education in WoS and national articles.

Research funds play an important role in research activities in Türkiye and in academic incentives and promotion opportunities. In Türkiye, there are some institutions where academics can receive funding while conducting their scientific publication activities. However, these resources are limited compared with many developed countries. In Türkiye, only 6 percent of the scientific publications in the field of educational research between 1992 and 2021 were funded, whereas this rate was 16.41 per cent in the Netherlands during the same period (Web of Science, 2023). Therefore, although some organizations provide funding for research in Türkiye, the amount and sources of research funding are low compared with those in developed countries.

The size of higher education and academic staff in Türkiye is larger than that in many other countries. Having a large system in terms of quantity, Türkiye's research performance in educational research is expected to be higher than that of many other countries. Here, it is seen that the size of the higher education system alone is not a factor that determines research performance. However, this size emphasizes Türkiye's high performance potential in educational research. Second, one of the driving forces for academics to conduct scientific research in Türkiye is academic promotion. Conditions for academic promotion are determined by a central board. These requirements are considered as determinant factors for the productivity and publication impact of researchers. Because, facilitating and complicating the conditions may encourage researchers in these directions. This study discusses the research findings by considering the current size of Turkish higher education and the determinants of research performance, such as the current academic promotion requirements and research funding structure. While interpreting the components of research performance, such as Türkiye's productivity in educational research and the impact of publications, research collaboration, etc., knowing Türkiye's current conditions mentioned above will help to interpret the findings more clearly.

## Materials and Method

Research data were exported from the WoS's "SSCI" and "SCIE" online databases to conduct a bibliometric analysis of the global education literature (on December 3, 2022). There are 3,568 journals in 58 WoS categories indexed in SSCI and 9,649 journals in 178 WoS categories indexed in SCIE, according to the Journal Citation Reports [JCR] 2021 published by Clarivate on June 30, 2021. Among these, 401 journals were categorised as “Education and Educational Research” (270 journals in SSCI), “Educational Psychology” (61 journals in SSCI), “Special Education” (44 journals in SSCI) and “Scientific Disciplines Education” (44 journals in SCI-Expanded). To identify publications by Turkish researchers in the field of education, bibliometric analyses of all education categories were conducted.

The following search strategy was employed: WC=("education & educational research" or "education, scientific disciplines" or "education, special" or "psychology, educational") (CU="Turkey") (PY=1992-2021)

In four education categories related to education from 1992 to 2021, a total of 8630 publications—8363 of which were articles—were found using this search strategy. The complete record and the number of annual citations for each publication were checked and then imported into the MS Excel program. Additional manual coding was performed. The MS Excel document uses the Counta, Concatenate, Match, Vlookup, Proper, Rank, Replace, Freeze Panes, Sort, Sum, and Len functions. Journal impact factors are based on the recently published JCR by Clarivate.

The SCIE database defines the concept of "corresponding author" as "reprint author". In contrast, the idea of the "corresponding author" was preferred in this study (Chiu & Ho, 2007). The sole author of the publication was accepted as the first and responsible author in works with a single author whose authorship/authors was unclear. Publications from institutions were also subject to this. This institution has been identified as the first and responsible author in the publication where there is only one institution (Ho, 2014). All authors, institutions, and nations are considered for publications with multiple authors. Publications with the corresponding author that only contain addresses rather than the names of the institutions were checked in SCIE, and the addresses were transformed into membership names. Institutions in England, Scotland, Wales, and Northern Ireland are now referred to as United Kingdom institutions. In addition, authors who used various names for the same institution were grouped together and given the same institution name. For instance, the name "Hacettepe Univ" was created by combining several names, such as Hacettepe Univ, Univ Hacettepe, and Hacettepe Univ Beytepe.

The following six citation indicators were used to examine the collected publications.

1. $C_{year}$: Number of citations from WoS in a given year (e.g., $C_{2021,}$ represents the citations from 2021). This indicator refers only to the number of citations a publication has received in a given year, not the total number of citations since its publication (Ho, 2012).
2. $TC_{year}$: represents the total number of citations that a publication has received from WoS between the year of publication and the most recent year (2021 in this study, $TC_{2021}$). This indicator is the total number of citations of a publication from the year it was first published until today. This indicator is not based on a specific year, but on citations from the year the publication first entered WoS (Wang, Fu, & Ho, 2011).
3. $CPP_{year}$: Represents the average number of citations per publication ($CPP_{2021}=TC_{2021}/TP$), TP: total number of publications). This indicator shows the average number of citations of a publication in a given year. The average number of citations is the total citations divided by the total number of publications. For example, $CPP_{2021}$ is all citations received by publications up to 2021 divided by the number of these publications (Ho, 2013).

Due to their immutability and repeatability, $TC_{year}$ and $CPP_{year}$ indicators are more reliable and more advantageous than using citation numbers directly from WoS (Ho & Hartley, 2016).

The performance of nations and institutions in terms of publications was examined in this study using the following six publication indicators (Hsu & Ho, 2014):

1. TP: Total number of publications
2. IP: Total number of single-country publications (IPC) or total number of single-institution publications (IPI). This indicator refers to the number of publications by a single country or a single institution.
3. CP: Total number of international publications (CPC) or total number of publications published through institutional collaboration (CPI). This indicator refers to the number of international publications or publications conducted by more than one institution.
4. FP: Number of first author publications. Refers to the number of publications with first author. For example, this indicator shows how many out of 100 papers a country or organisation has the first author.
5. RP: Number of corresponding author articles. It is an indicator that expresses the number of corresponding authors in publications. For example, it is an indicator that can reveal how many of the publications of an institution or country have corresponding authors from that institution or country.
6. SP: Number of single-author articles. Refers to the number of single-authored publications. For example, this indicator shows how many out of 100 papers a country or organisation has a single-authored publication.

## Findings

### *Characteristics of Document Types*

Ho's research team defined the characteristics of the document type based on $CPP_{year} = TC_{year}$ and the average number of authors per publication (APP) as the fundamental understanding of publication types on a research topic in 2017 (Monge-Nájera & Ho, 2017). From 1992 to 2021, a total of 11 document types, which are listed in Table 1, yielded 8,630 publications by Türkiye in the WoS categories of education and educational research, scientific disciplines education, special education, and educational psychology.

Of the 8,630 documents included in this publication count, 8,363 articles (or 97% of them) have an APP of 2.3. Reviews, which comprised 91 documents, had the highest $CPP_{2021}$ value of 25, which was 2.9 times higher than that of articles. Reviews "Advantages and challenges associated with augmented reality for education: A systematic review of the literature" (Akçayır & Akçayır, 2017) with a $TC_{2021}$ of 462 and "The flipped classroom: A review of its advantages and challenges" (Akçayır & Akçayır, 2018) with a $TC_{2021}$ of 207 were two of the top ten most frequently cited documents. These two reviews were published by Murat Akçayır from Kirikkale University and Gökçe Akçayır from Gazi University in Türkiye.

**Table 1.** Document Types

| Document type | *TP* | % | *AU* | *APP* | $TC_{2021}$ | $CPP_{2021}$ |
|---|---|---|---|---|---|---|
| Article | 8.363 | 97 | 19,221 | 2.3 | 72.709 | 8.7 |
| Proceedings Paper | 154 | 1.8 | 435 | 2.8 | 1.239 | 8.0 |
| Review | 91 | 1.1 | 233 | 2.6 | 2267 | 25 |
| Book Review | 70 | 0.81 | 78 | 1.1 | 14 | 0.20 |
| Editorial Material | 63 | 0.73 | 139 | 2.2 | 282 | 4.5 |
| Letter | 18 | 0.21 | 57 | 3.2 | 23 | 1.3 |
| Meeting Abstract | 11 | 0.13 | 46 | 4.2 | 0 | 0 |
| Correction | 10 | 0.12 | 27 | 2.7 | 0 | 0 |
| News Item | 3 | 0.035 | 10 | 3.3 | 6 | 2.0 |
| Retracted Publication | 2 | 0.023 | 5 | 2.5 | 18 | 9.0 |
| Software Review | 1 | 0.012 | 1 | 1.0 | 6 | 6.0 |

TP: total number of publications; AU: number of authors; APP: average number of authors per publication; $TC_{2021}$: total number of citations from WoS since publication year to the end of 2021; $CPP_{2021}$: average number of citations per publication ($TC_{2021}$/TP).

The contributions of the different document types are not the same. Generally, articles contain an introduction, methods, results, discussion, and conclusion. Articles were chosen for further analysis. A total of 8,363 articles were presented in seven different languages. The most commonly used language was English, with 7,407 articles (89% of 8,363 articles), followed distantly by Turkish (938 articles), German (6), French (5), Slovenian (1), and Welsh (1). Non-English articles had fewer citations, with a $CPP_{2021}$ of 4.9, while English articles had a $CPP_{2021}$ of 9.2. Non-English articles had a lower APP of 1.8, while English articles had an *APP* of 2.4.

### *Characteristics of Publication Outputs*

To assess the growth trends and impacts of articles on the topic under study, Ho (2013) proposed a correlation between the annual number of articles (TP) and the average number of citations per publication (CPP). A total of 8363 articles from Türkiye were published in four categories of global education research between 1992 and 2021. The changes in the number of articles and the number of citations per publication in ten-year periods are shown in Figure 1, Figure 2 and Figure 3. Figure 1 demonstrates that from 1992 to 2001, the annual average for articles did not exceed 20. Figures 2 and 3 show a significant increase from 83 articles in 2006 to 937 articles in 2012. The total number of publications published after 2006 makes up 97.5% of the total.

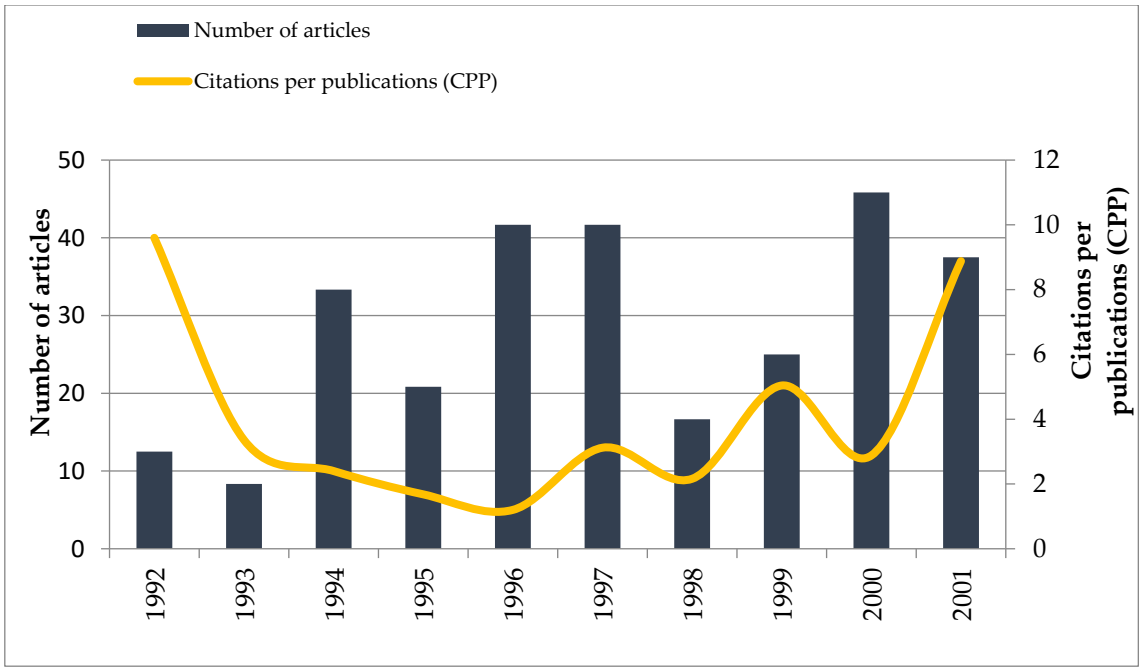


**Figure 1.** Number of Articles by Türkiye in The Four Education-Related Categories and Citations per Publication by Year (1992-2001)

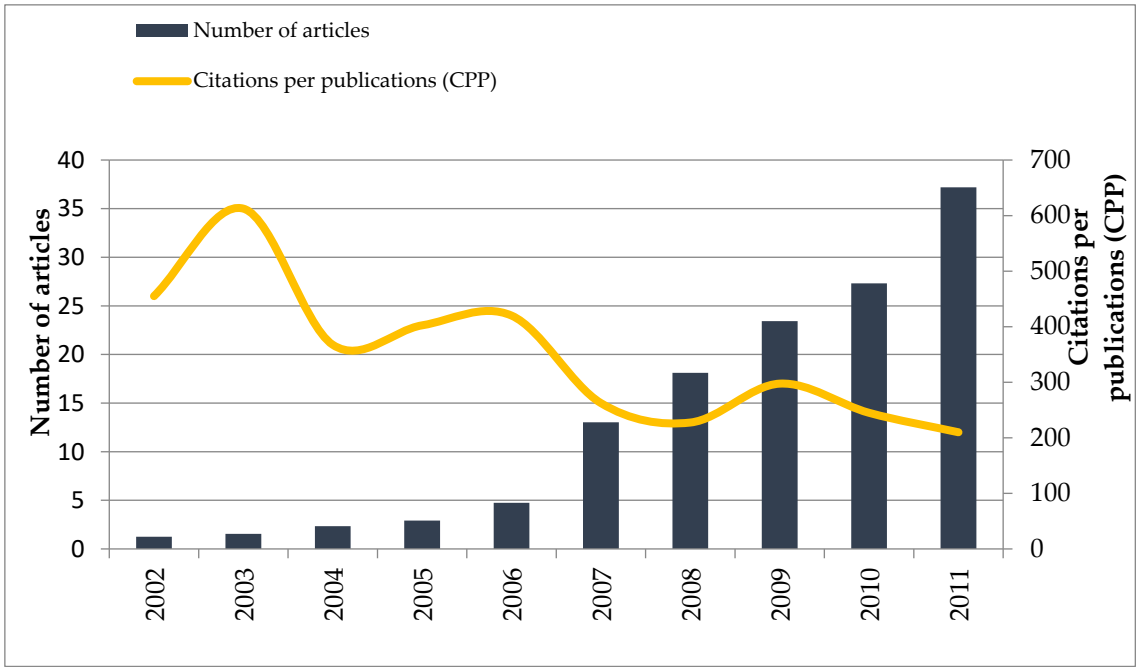


**Figure 2.** Number of Articles by Türkiye in The Four Education-Related Categories and Citations per Publication by Year (2002-2011)

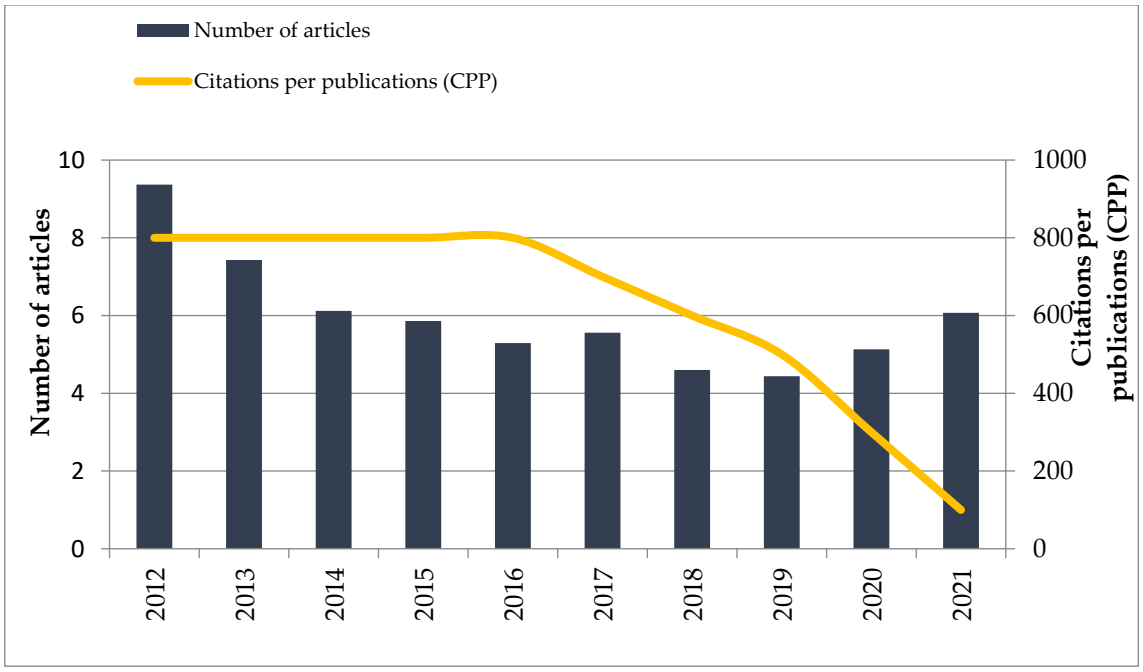


**Figure 3.** Number of Articles by Türkiye in The Four Education-Related Categories and Citations per Publication by Year (2012-2021)

***Web of Science Categories and Journals***

Overall, 8,363 articles from Türkiye in the four education-related categories were published by 335 journals. A total of 7,081 articles (85% of 8,363 articles) were published in the category 'Education and educational research' with 2.1 APP and 8.5 $CPP_{2021}$. This category was followed by scientific disciplines education (1,473 articles; 18%), with an *APP* of 2.8 and a $CPP_{2021}$ of 9.7; educational psychology (258 articles; 3.1%), with an *APP* of 3.1 and a $CPP_{2021}$ of 15; and special education (218 articles; 2.6%), with an *APP* of 3.6 and a $CPP_{2021}$ of 10.

A graph showing the number of publications in relation to the publication year was used to discuss the interactions between the development of publications across WoS categories (Ho, Satoh, & Lin, 2010). Four different education categories' growth trends are presented in Figure 4.

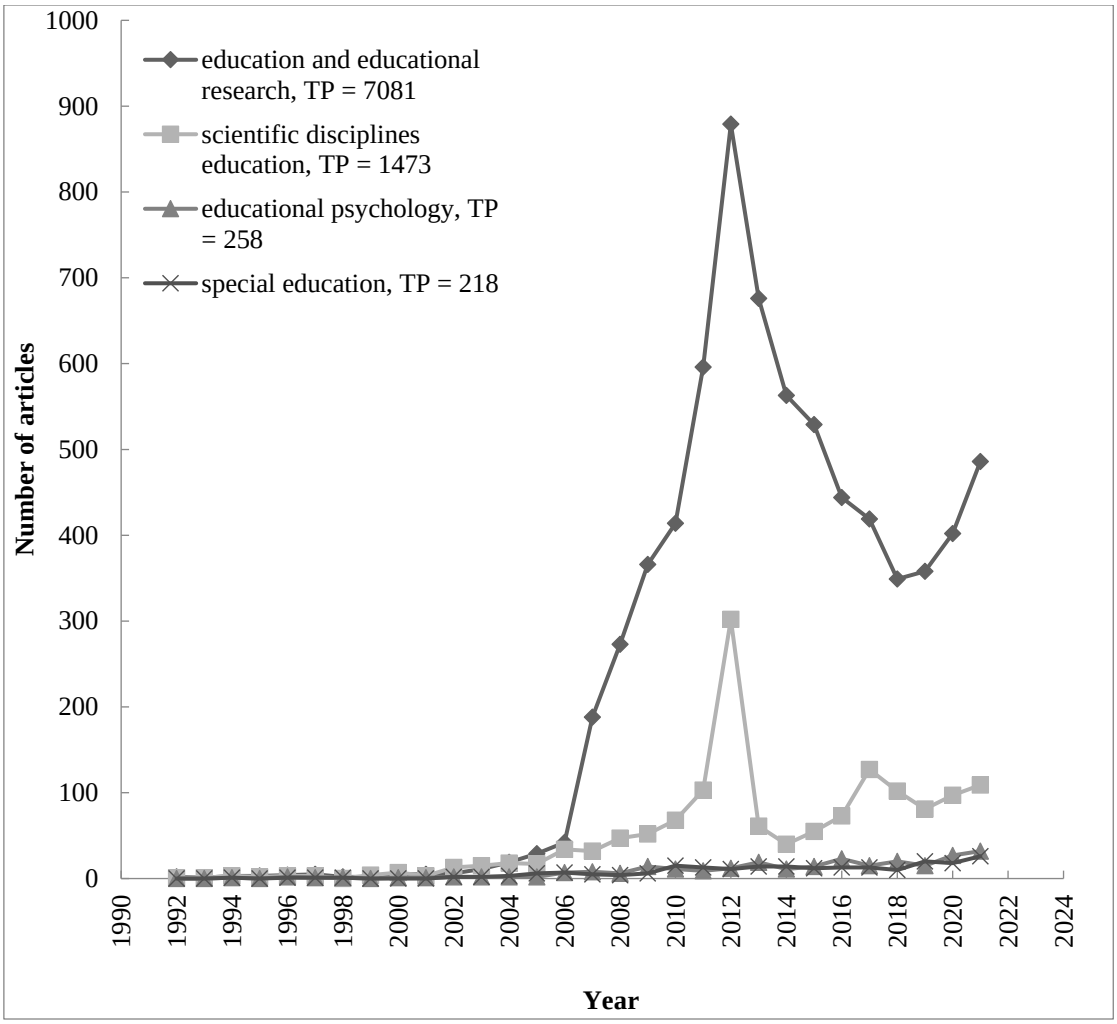


**Figure 4.** Growth Trend of The Four Education Categories

Education and educational research are clearly superior to the other categories among the four areas of education. Seventy-eight percent of all publications fall under this category. With 16% of the publications, the scientific disciplines education category comes in second. Each of the categories for special education and educational psychology makes up approximately 3% of all publications.

Table 2 shows the top 10 most productive journals. Six of the top 10 productive journals were not classified in the SCIE or SSCI after stated years in the table. Out of 8,363 articles, *Education and Science* ($IF_{2021}$ = 0.650) published 1,193, which is 14%. Additional research into the top 10 productive journals reveals that *Energy Education Science and Technology Part B-Social and Educational Studies*, which published Turkish articles, had the highest $CPP_{2021}$ of 13, while the *Journal of Baltic Science Education*, which published articles with an $IF_{2021}$ of 1.232, had a $CPP_{2021}$ of 3.8 and articles in the *Education and Information Technologies* (IF2021 = 3.666) had a $CPP_{2021}$ of 10.2.The average number of authors per publication (*APP*) varied from 1.7 in *Computer Applications in Engineering Education* to 2.5 in *Energy Education Science and Technology Part B-Social and Educational Studies*. The journal with the highest $IF_{2021}$ of 11.182 was the *Computers & Education* which recorded 131 article and followed by the *Educational Research Review* with one article ($IF_{2021}$ = 10.207). The most frequently cited Turkish article in the education field was published in the *Computers & Education* with a $TC_{2021}$ of 559 while the most impact article in 2021 was published in *Research in Science Education* ($IF_{2021}$ = 2.469) with a $C_{2021}$ of 87.

**Table 2.** The Top 10 Most Productive Journals

| Journal | *TP* (%) | $IF_{2021}$ | *APP* | $CPP_{2021}$ |
|---|---|---|---|---|
| Egitim ve Bilim-Education and Science | 1193 (14) | 0.650 | 2.0 | 4.1 |
| Kuram ve Uygulamada Egitim Bilimleri/ Educational Sciences-Theory & Practice | 1022 (12.2) | *After 2014 and 2018 | 1.9 | 5.3 |
| Hacettepe Universitesi Egitim Fakultesi Dergisi-Hacettepe University Journal of Education | 666 (8.0) | *After 2015 | 1.9 | 4.2 |
| Energy Education Science and Technology Part B-Social and Educational Studies | 330 (3.9) | *After 2012 | 1.7 | 13 |
| Journal of Baltic Science Education | 227 (2.7) | 1.232 | 2.1 | 3.8 |
| Eurasia Journal of Mathematics Science and Technology Education | 215 (2.6) | *After 2018 | 2.3 | 6.4 |
| Eurasian Journal of Educational Research | 205 (2.5) | *After 2013 | 1.7 | 5.2 |
| Turkish Online Journal of Educational Technology | 183 (2.2) | *After 2012 | 2.0 | 10 |
| Computer Applications in Engineering Education | 169 (2.0) | 2.109 | 2.5 | 7.7 |
| Education and Information Technologies | 162 (1.9) | 3.666 | 1.52 | 10.2 |

TP: total number of articles; %: percentage of articles in all articles; IF2021: journal impact factor in 2021; APP: average number of authors per publication; CPP2021: average number of citations per publication (TC2021/TP); *: journals were not classified in SCIE or SSCI after the mentioned year.

***Publication Performances: Countries and Institutions***

It is generally recognized that scientific publications have two distinct categories of authors. The authors who contribute the most to an article are generally the initial and responsible authors (Riesenberg & Lundberg, 1990). At the institutional level, the study's starting point or source could be the designated institution of the corresponding author (Ho, 2012).

**Table 3.** Top 10 Most Collaborative Countries with Authors from Türkiye

| Country | $CP_C$ | $CP_C$ | | *FP* | | *RP* | |
|---|---|---|---|---|---|---|---|
| | | *CPR* (%) | $CPP_{2021}$ | *FPR* (%) | $CPP_{2021}$ | *RPR* (%) | $CPP_{2021}$ |
| USA | 633 | 1 (7.6) | 15 | 1 (2.9) | 17 | 1 (3.1) | 16 |
| UK | 161 | 2 (1.9) | 15 | 2 (0.73) | 14 | 2 (0.73) | 13 |
| Germany | 59 | 3 (0.71) | 12 | 3 (0.25) | 10 | 3 (0.28) | 10 |
| Netherlands | 55 | 4 (0.66) | 16 | 5 (0.22) | 24 | 4 (0.25) | 22 |
| Australia | 39 | 5 (0.47) | 13 | 6 (0.17) | 6.1 | 6 (0.18) | 6.1 |
| Canada | 38 | 6 (0.45) | 22 | 8 (0.12) | 24 | 8 (0.12) | 24 |
| China | 35 | 7 (0.42) | 13 | 11 (0.11) | 3.8 | 13 (0.1) | 4.1 |
| Spain | 34 | 8 (0.41) | 10 | 15 (0.072) | 10 | 16 (0.072) | 10 |
| TRNC | 34 | 8 (0.41) | 5.6 | 4 (0.24) | 5.8 | 5 (0.24) | 5.6 |
| Israel | 32 | 10 (0.38) | 10 | 6 (0.17) | 8.6 | 7 (0.17) | 12 |

$CP_C$: total number of collaborative articles with Türkiye; $CP_CR$ (%): ranking of internationally collaborative articles and percentage of all articles from; FPR (%): rank of first-author articles and percentage in all first-author articles; RPR (%): rank of corresponding-author articles and percentage in all corresponding-author articles; $CPP_{2021}$: average of number of citations per publication ($TC_{2021}$/TP); N/A: not available.

A total of 7,179 articles (86% of 8,363 articles) were independent with a $CPP_{2021}$ of 7.9, while 1,172 articles (14%) were of international collaboration with 95 countries with a $CPP_{2021}$ of 14. The three publication indicators (Trang, Monge-Nájera, & Ho, 2020) and each of the related citation indicators ($CPP_{2021}$) (Ho & Mukul, 2021) were applied to compare international collaborations. Table 3 shows not only international collaboration quantities with the three publication indicators *CP*, *FP*, and *RP* but also their qualities with the citation indicators ($CPP_{2021}$) for each publication indicator. The USA was the most collaborative country, dominating in the three publication indicators with a *CP* of 633 internationally collaborative articles with Türkiye (7.6% of 8,363 Turkish articles), an *FP* of 242 articles (2.9% of 8,363 single-author articles), and an *RP* of 256 articles (3.1% of 8,357 corresponding-author articles). Compared to the top 10 countries that collaborated with Türkiye the most, The *CP* and *RP* for Canada have the highest CPP2021 with 22 and 24 respectively. Articles that collaborated with the Netherlands had the highest $CPP_{2021}$ for *FP*, with 24.

Regarding the institutions, 4,866 Turkish articles (58% of 8,363 articles) originated from single institutions with a $CPP_{2021}$ of 8.3, while 3,497 articles (42%) were institutional collaborations with a $CPP_{2021}$ of 9.2. The top 10 most productive Turkish institutions and their characteristics are presented in Table 4. Hacettepe University dominated in 5 of the 6 publication indicators with a *TP* of 843 articles (10% of 8,363 articles), an $IP_I$ of 432 articles (8.9% of 4,866 single-institution articles), an *FP* of 612 articles (7.3% of 8,363 first-author articles), an *RP* of 592 articles (7.1% of 8,347 corresponding-author articles), and an *SP* of 177 articles (6.4% of 2,781 single-author articles). The Middle East Technical University ranked top with a $CP_I$ of 446 articles (13% of 3,497 inter institutionally collaborative articles). Compared to the other top ten productive institutions in Table 4, articles by the Middle East Technical University had the highest $CPP_{2021}$ for *TP*, $IP_I$, $CP_I$, *FP*, *RP*, and *SP*, with 17, 22, 15, 19, 19, and 20 publications, respectively.

**Table 4.** Top 10 Productive Institutions

| Institution | *TP* | *TP* | | *IP*$_I$ | | *CP*$_I$ | | *FP* | | *RP* | | *SP* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *TPR* (%) | *CPP*$_{2021}$ | *IP*$_I$*R* (%) | *CPP*$_{2021}$ | *CP*$_I$*R* (%) | *CPP*$_{2021}$ | *FPR* (%) | *CPP*$_{2021}$ | *RPR* (%) | *CPP*$_{2021}$ | *SPR* (%) | *CPP*$_{2021}$ |
| Hacettepe Univ | 843 | 1 (10) | 7.3 | 1 (8.9) | 6.8 | 2 (12) | 7.9 | 1 (7.3) | 7.2 | 1 (7.1) | 7.3 | 1 (6.4) | 5.3 |
| Middle East Tech Univ | 644 | 2 (7.7) | 17 | 4 (4.1) | 22 | 1 (13) | 15 | 3 (4.0) | 19 | 3 (4.1) | 19 | 10 (2.3) | 20 |
| Gazi Univ | 552 | 3 (6.6) | 6.6 | 2 (4.9) | 6.8 | 3 (8.9) | 6.5 | 2 (4.2) | 6.3 | 2 (4.1) | 6.4 | 2 (4.9) | 6.8 |
| Ankara Univ | 365 | 4 (4.4) | 6.5 | 7 (2.7) | 5.4 | 5 (6.7) | 7.1 | 5 (2.5) | 6.9 | 6 (2.5) | 7.0 | 8 (2.4) | 5.1 |
| Anadolu Univ | 363 | 5 (4.3) | 11 | 3 (4.4) | 11 | 7 (4.3) | 10 | 4 (3.2) | 11 | 4 (3.4) | 10 | 3 (3.3) | 7.5 |
| Marmara Univ | 308 | 6 (3.7) | 7.2 | 6 (2.9) | 6.9 | 6 (4.7) | 7.4 | 7 (2.4) | 7.4 | 7 (2.3) | 7.5 | 3 (3.3) | 9.0 |
| Minist Natl Educ | 288 | 7 (3.4) | 4.1 | 73 (0.29) | 2.9 | 4 (7.8) | 4.1 | 14 (1.4) | 4.0 | 24 (1.2) | 3.9 | 49 (0.58) | 4.4 |
| Karadeniz Tech Univ | 254 | 8 (3.0) | 13 | 5 (3.0) | 13 | 11 (3.1) | 13 | 6 (2.5) | 14 | 5 (2.6) | 14 | 10 (2.3) | 15 |
| Dokuz Eylul Univ | 252 | 9 (3.0) | 7.8 | 8 (2.6) | 7.5 | 9 (3.6) | 8.1 | 8 (2.1) | 7.8 | 8 (2.2) | 7.9 | 8 (2.4) | 7.2 |
| Ataturk Univ | 235 | 10 (2.8) | 13 | 12 (2.1) | 10 | 8 (3.9) | 14 | 11 (1.9) | 13 | 9 (2.0) | 12 | 12 (2.2) | 10 |

TP: total number of articles; TPR (%): the rank and the percentage of total articles in the total number of articles; IP$_I$R (%): the rank and the percentage of single-institution articles in the total single-institution articles; CP$_I$R (%): the rank and the percentage of inter-institutionally collaborative articles in the total inter-institutionally collaborative articles; FPR (%): the rank and the percentage of first-author articles in the total first-author articles; RPR (%): the rank and the percentage of the corresponding-author articles in the total corresponding-author articles; SPR (%): the rank and the percentage of the single-author articles in the total single-author articles; CPP$_{2021}$: average of number of citations per publication(TC$_{2021}$/TP).

Previous studies have proposed 11 publication criteria for a country and their $CPP_{year}$ comparison (Monge-Nájera & Ho, 2017). The number of articles and CPP2021 for 11 publication types are shown in Figure 5, which include TP: total articles, NFR: both first and corresponding authors are not from Türkiye, NR: corresponding author is not from Türkiye, NF: first author is not from Türkiye, IC: internationally collaborative articles, NC: nationally collaborative articles, II: institutional independent articles, CI: Türkiye independent articles, FP: first author is from Türkiye, RP: corresponding author is from Türkiye, and FR: both first and corresponding authors are from Türkiye. The mean value of $TC_{2021}$ was 8.7 with 559 as the maximal value for an article. The $CPP_{2021}$ of internationally collaborative articles and Turkish independent articles were found to be 14 and 7.9, respectively. Türkiye published more FR (93% of 8,363 articles), RP (93%), FP (93%), CI (86%), and II (58%). However, article types NFR, NR, NF, and IC had lower $CPP_{2021}$ values of 15, 14, 15, and 14, respectively.

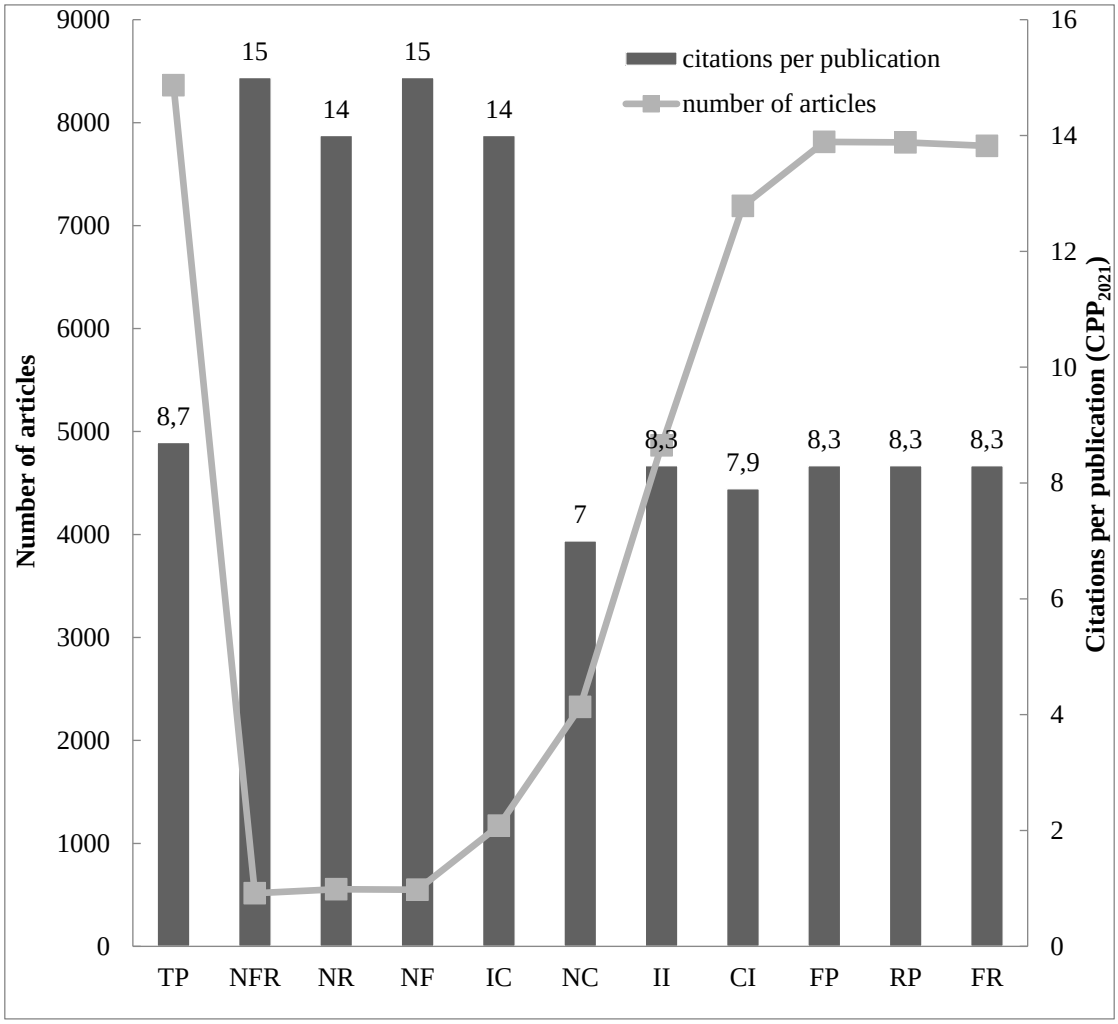


**Figure 5.** Number of Articles and Citations per Publication from Türkiye 11 Publication Types in the Four Education-Related WoS Categories. (TP: total articles, NFR: both first and corresponding authors are not from Türkiye, NR: corresponding author is not from Türkiye, NF: first author is not from Türkiye, IC: internationally collaborative articles, NC: nationally collaborative articles, II: institutional independent articles, CI: Türkiye's independent articles, FP: first author is from Türkiye, RP: corresponding author is from Türkiye, FR: both first and corresponding authors are from Türkiye)

***Citation Histories of the Ten Most Frequently Cited Articles***

On WoS, the overall citation count is continuously updated. The total number of citations made from the WoS was applied from the year the publication was published to the end of 2021 ($TC_{2021}$) to enhance the bibliometric analysis using the publication data directly taken from the databases (Wang et al., 2011). To comprehend the citation history of the publication, the impact histories of the most frequently cited publications evaluated with $TC_{year}$ in a researched area have been proposed (Ho, 2012). Not all publications with many citations have a large impact (Hsu & Ho, 2014). In the four education-related WoS categories, Figure 6 displays the citation histories of the ten most frequently published Turkish articles.

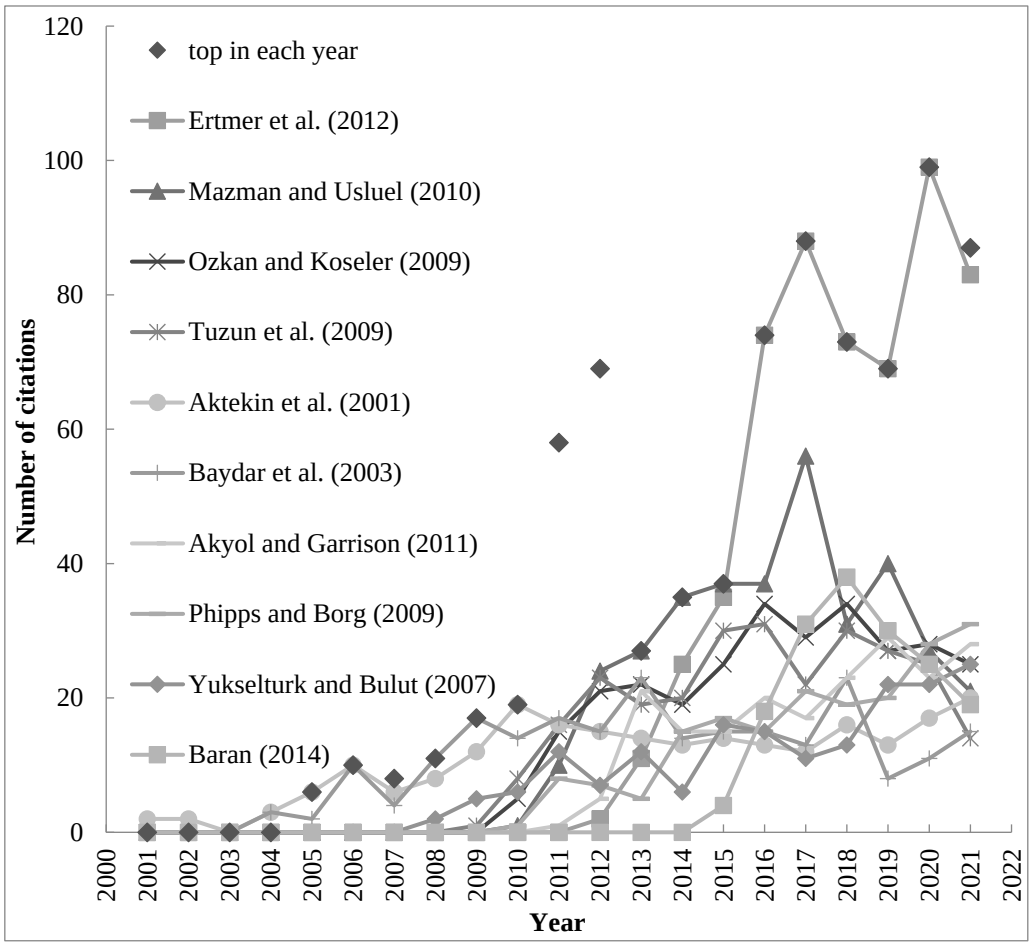


**Figure 6.** The Citation Histories of Top Ten Most Frequently Cited Articles from Türkiye in the Four Education-Related WoS Categories

The number of citations has generally increased over time, according to an analysis of the articles' citation histories. These ten studies focus on a variety of topics, but the work of Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, and Sendurur (2012), Mazman and Usluel (2010), Ozkan and Koseler (2009), and Tüzün, Yılmaz Soylu, Karakuş, Inal, and Kızılkaya (2009) is based on the interaction between education and technology. These four studies were published in the journal "Computers and Education". On the other hand, the psychological component of education was the focus of Akyol and Garrison (2011), Aktekin et al. (2001), Baydar, Reid, and Webster-Stratton (2003), and others. Online and mobile learning are the subjects of Yukselturk and Bulut's (2007) and Baran's (2014) research. The focus of Phipps and Borg's (2009) research was on teachers' instructional strategies.

Table 5 presents a list of the articles that were cited the most. Six of the top ten most frequently cited articles were solely from Türkiye; the other four were co-written by authors from the United States, the United Kingdom, and Canada. Among the top ten publications, four articles that involved international collaboration appeared. The rankings of all the articles except for two have decreased more.

**Table 5.** The Top Ten Most Frequently Cited Articles

| Rank ($TC_{2021}$) | Rank ($C_{2021}$) | Title | Country | Reference |
|---|---|---|---|---|
| 1 (559) | 2 (83) | Teacher beliefs and technology integration practices: A critical relationship | USA, Türkiye | Ertmer et al. (2012) |
| 2 (346) | 28 (21) | Modeling educational usage of Facebook | Türkiye | Mazman and Usluel (2010) |
| 3 (284) | 18 (25) | Multi-dimensional students' evaluation of e-learning systems in the higher education context: An empirical investigation | Türkiye | Ozkan and Koseler (2009) |
| 4 (266) | 69 (14) | The effects of computer games on primary school students' achievement and motivation in geography learning | Türkiye | Tüzün et al. (2009) |
| 5 (231) | 33 (20) | Anxiety, depression and stressful life events among medical students: A prospective study in Antalya, Türkiye | Türkiye | Aktekin et al. (2001) |
| 6 (230) | 60 (15) | The role of mental health factors and program engagement in the effectiveness of a preventive parenting program for head start mothers | USA, Türkiye | Baydar et al. (2003) |
| 7 (197) | 12 (28) | Understanding cognitive presence in an online and blended community of inquiry: Assessing outcomes and processes for deep approaches to learning | Türkiye, Canada | Akyol and Garrison (2011) |
| 8 (187) | 8 (31) | Exploring tensions between teachers' grammar teaching beliefs and practices | Türkiye, UK | Phipps and Borg (2009) |
| 9 (174) | 18 (25) | Predictors for student success in an online course | Türkiye | Yukselturk and Bulut (2007) |
| 10 (165) | 39 (19) | A review of research on mobile learning in teacher education | Türkiye | Baran (2014) |

$TC_{2021}$: the total number of citations from WoS since publication year to the end of 2021; $C_{2021}$: the number of citations of an article in 2021 only.

Only two of the articles received top rankings on both $C_{2020}$ and $TC_{2020}$, and their summaries are as follows:

1. A critical relationship exists between teacher beliefs and technology integration practises (Ertmer et al., 2012). With a $C_{2021}$ of 83 (ranked 2nd) and a $TC_{2021}$ of 559 (ranked 1st), this article was written by five authors from Purdue University and Indiana University in the United States and Middle East Technical University in Türkiye. Ertmer et al. (2012) investigated how well teachers' technological classroom practices aligned with their pedagogical beliefs.
2. Examining the conflicts between teachers' grammar instruction and usage (Phipps & Borg, 2009). With a $C_{2021}$ of 31 (ranked 8th) and a $TC_{2021}$ of 187 (ranked 8th), this article was published by S. Phipps from Bilkent University in Türkiye and S. Borg from the University of Leeds in the UK. In this study, Phipps and Borg (2009) examined the attitudes toward teaching grammar that English teachers in Türkiye hold.

***Research foci***

The most crucial details about the research are communicated in the article title, abstract, author keywords, and keywords plus. Word distribution analysis is therefore very helpful for assessing research focuses and their trajectory in a given research topic (Ho & Hartley, 2016). To identify research focuses and trends in research topics over the previous ten years, Ho's research team proposed word distributions in article titles and abstracts, author keywords, and Keywords Plus (Ho et al., 2010; Ho & Hartley, 2016). Table 6 lists the most used author keywords and their distribution over the three sub-periods (1992-2001, 2002-2011, and 2012-2021).

**Table 6.** The Most Frequently Used Author Keywords

| **Author keywords** | ***TP*** | **1992-2021** | **1992-2001** | **2002-2011** | **2012-2021** |
|---|---|---|---|---|---|
| | | **Rank (%)** | **Rank (%)** | **Rank (%)** | **Rank (%)** |
| Türkiye | 209 | 1 (2.8) | N/A | 2 (3.2) | 1 (2.6) |
| Teacher Education | 199 | 2 (2.6) | N/A | 1 (3.4) | 2 (2.3) |
| Science Education | 165 | 3 (2.2) | N/A | 4 (2.3) | 4 (2.1) |
| Higher Education | 160 | 4 (2.1) | N/A | 8 (1.8) | 3 (2.2) |
| Gender | 136 | 5 (1.8) | N/A | 3 (2.4) | 8 (1.6) |
| Self-Efficacy | 132 | 6 (1.7) | N/A | 18 (1.1) | 5 (2.0) |
| Scale Reliability | 129 | 7 (1.7) | N/A | 5 (2.1) | 10 (1.6) |
| Attitude | 127 | 8 (1.7) | N/A | 6 (1.9) | 8 (1.6) |
| Scale Validity | 126 | 9 (1.7) | N/A | 9 (1.8) | 7 (1.6) |
| Academic Achievement | 124 | 10 (1.6) | N/A | 11 (1.5) | 6 (1.7) |
| Motivation | 108 | 12 (1.4) | N/A | 12 (1.3) | 11 (1.5) |
| Pre-Service Teachers | 99 | 13 (1.3) | N/A | 18 (1.1) | 12 (1.4) |
| Teacher | 93 | 14 (1.2) | N/A | 15 (1.2) | 14 (1.2) |
| Mathematics Education | 82 | 15 (1.1) | N/A | 17 (1.2) | 15 (1.0) |
| University Students | 71 | 16 (0.94) | N/A | 21 (1.0) | 19 (0.90) |
| Physics Education | 70 | 17 (0.92) | N/A | 44 (0.65) | 16 (1.0) |
| Distance Education | 65 | 19 (0.86) | N/A | 32 (0.79) | 20 (0.88) |
| Scale Development | 65 | 19 (0.86) | N/A | 64 (0.50) | 18 (1.0) |

TP: number of articles; %: percentage in each period; N/A: not available.

Türkiye, teacher education, science education, higher education, and gender were the most commonly used author keywords. The outcomes of the word analysis may reveal the primary areas of interest in Turkish educational research. The findings of word analyses may reveal the six main areas of study in Turkish educational research. For each of the six topics, supporting words from the word analysis were discovered.

***Topic 1. General education***

Supporting phrases: social studies, early childhood education, preschool education, curriculum, preschool, middle school, preschool children, secondary school students, preschool period, high school, elementary school, and middle school students.

***Topic 2. Learning and teaching***

Supporting phrases: interactive learning environments, technology, improvement classroom teaching, learning, technology integration, cooperative learning, learning strategies, problem-based learning, teaching, blended learning, e-learning, mobile learning, online learning, educational technology, teaching practice, teaching profession, technology acceptance, technological pedagogical content knowledge, and teaching methods.

***Topic 3. Psychology***

Supporting phrases: psychology, gender, self-efficacy, attitude, academic achievement, motivation, attitudes, achievement, high school students, meta cognition, and anxiety.

***Topic 4. Science education***

Supporting phrases: science education, mathematics education, physics education, professional development, misconceptions, nature of science, problem-solving, nursing students, critical thinking, environmental education, chemistry education, engineering education, science, and argumentation.

***Topic 5. Teacher education***

Supporting phrases: teacher education, teacher training, preservice teachers, teacher, prospective teachers, teachers, preservice teacher education, teacher candidates, preservice science teachers, student teachers, preservice teacher, prospective teacher, teacher candidate, science teacher education, teacher beliefs, preservice teacher training, professional teacher development, teacher self-efficacy, teacher opinions, primary school teachers, prospective science teachers, mathematics teachers, and preschool teachers.

***Topic 6. Scale development***

Supporting phrases: scale development, reliability, validity, and confirmatory factor analysis.

The general education topic area focuses on the educational levels of educational research in Türkiye. It shows the focus of studies according to the educational grades in educational research. Table 6 shows it is seen that higher education studies are a dominant field of study for each period. In support of this view, the concept of "university student" is among the most frequently repeated concepts. The second topic is learning and teaching. This subject area generally focussed on types of learning and pedagogical practises. Cooperative learning, problem-based learning, blended learning, mobile learning, etc., are included in this topic area. In addition, studies dealing with pedagogical practises such as teaching profession and teaching methods are within the boundaries of this subject area. The studies in the third topic area are related to different areas of psychology. This topic area deals with social cognitive and behavioural aspects of psychology such as gender, motivation, meta cognition, attitude, and anxiety. When examined periodically, it can be said that gender and attitude studies have decreased in the last decade. However, academic achievement, motivation, and especially self-efficacy studies have found more research areas in the last decade. The subject area of science education includes various disciplines of pure science. Studies on different disciplines of science education, such as mathematics education, physics education, chemistry education, and engineering education are included in this subject area. In the subject area of teacher education, there are studies on teacher education and development, such as teaching profession, teacher training, preservice teachers, and teacher professional development. The fact that the concept of teacher education is among the most frequently repeated words shows that teacher education is one of the most frequently examined subject areas in educational research in Türkiye. Finally, many studies have been conducted on scale development in Türkiye. Scale development, reliability, validity, and confirmatory factor analysis are the terminologies related to scale development. When evaluated together with the results in Table 6, scale development studies have an important place in educational research in Türkiye.

## Conclusion, Discussion, and Suggestions

This study aims to reveal Türkiye's long-term status in global educational research and to provide inferences about Türkiye's future position in educational research within the framework of the results obtained, 8630 publications in the categories of "education and educational research", "scientific disciplines education", "educational psychology" and "special education" in the Web of Science Core Collection covering the period between 1992-2021 were analysed by bibliometric analysis method.

According to the results of the study, almost all (97%) publications in educational research in Türkiye are articles. The average number of authors per article was 2.3, and review articles had the highest publication impact. Previous studies have shown that review articles receive higher citations and thus make authors, institutions and countries more prestigious in terms of research performance in a field (Aksnes, 2006; Asaad et al., 2020; Lei & Sun, 2020; Ma, Li, & Zhang, 2020). A brief examination of the WoS database shows that the world average of the ratio of review articles in all publications in educational research is 2.37% (Web of Science, 2023). Therefore, this shows that Türkiye, which publishes only 1% review articles, is below the world average. Therefore, publishing more review studies will increase the publication impact of the authors, the institution and Türkiye's reputation in educational research.

This study revealed that the number of publications in educational research in Türkiye was relatively low and stable until 2006, but after 2006, there was a significant increase, especially until 2012. Peaking in 2012, the publication productivity showed a rapid decline from 2013 onwards and entered an upward trend again as of 2020. This result supports the research results of Tosun (2022). The main reason for the significant growth trend in publications in educational research, especially after 2005, may be related to the establishment of new universities and thus the increase in the number of academicians. The reason for the decline since 2013 may be related to the significant decrease in the number of universities and academicians in Türkiye in 2015-2016. One of the possible reasons for the decline in the number of publications is the removal of Türkiye-based journals indexed in SSCI or SCI-Expanded from these indexes. As revealed in the productivity and impact analyses of the journals in this study, many journals that have made significant contributions to educational research in Türkiye have been removed from these indexes since 2013. This situation may have led to the orientation towards abroad-centred journals that deal with more intense article demand. However, since the acceptance rates in these journals may be lower, it may have caused a decrease in the number of international publications in Türkiye's educational research.

One of the important results of this study is that although there has been an increase in the productivity of educational research in Türkiye over time, there has been a significant decline in publication impact over time. From 1992 to 1996, the publication impact declined and reached its highest level in 2001 and then started a downward trend. Since 2010, this decline has stabilised and publication impacts have reached their lowest levels in recent years. There may be some main reasons behind this decline in publication impacts. The first of these may be the lack of funding and support for research and publication. This is because previous research has shown that research funding has positive effects on scientific productivity (Barletta, Yoguel, Pereira, & Rodríguez, 2017; Defazio, Lockett, & Wright, 2009; Kyvik & Aksnes, 2015; Lee & Bozeman, 2005). The second is the knowledge and skills of academic staff in making qualified publications. Studies in the literature have revealed that the research-oriented high status of the institution to which an academic is affiliated (Long, Crawford, White, & Davis, 2009), the employment of qualified academics (Thoenig & Paradeise, 2014), and thus the quality of the academic staff are directly effective in producing qualified publications.

Another reason is the strategies and policies of universities related to research performance. It is known that qualified and highly ranked institutions determine many strategies, especially recruitment and reward systems for highly qualified and productive academics (Douglas, 2013; Ter Bogt & Scapens, 2012). Research performance of academics is evaluated periodically and strategies are determined accordingly. Because, performance evaluation and especially the quality of the academics are of great importance not only for the individual but also for the institution and the community and also constitute the main criterion for the efficient allocation of resources (Thoenig & Paradeise, 2014). The results of this study and the practical implication that can be drawn based on the literature is that Türkiye should prioritise quality in academic recruitment and academic promotions.

Another reason for the low level of publication impact and thus the low level of research performance in education is the structure of the institutions. There is evidence that there is a relationship between the autonomy of universities and academic performance (Aghion, Dewatripont, Hoxby, Mas-Colell, & Sapir, 2009). Values such as high autonomy of a university, being in a competitive environment, belonging to the institution, mutual trust and respect create a synergistic effect and contribute positively to research performance (Thoenig & Paradeise, 2014). Another factor is the foreign language skills of academics, especially in English. Some studies have shown that native English-speaking countries produce more qualified publications, while academics in non-English speaking countries have some disadvantages (Ferguson, Pérez-Llantada, & Plo, 2011; Li & Flowerdew, 2007). Therefore, it can be said that the recruitment of academics in the field of education in Türkiye with an English exam that measures four language skills will positively affect research performance.

This study revealed that the highest number of publications in educational research in Türkiye were published in "education and educational research", "scientific disciplines education", "educational psychology" and "special education" respectively. This result of the study is consistent with the results of Sezgin et al. (2022), who examined educational research in the world. One of the factors for the consistency of the number of publications in Türkiye's educational research in the four educational categories in WoS with the world is related to the number of journals in these categories in WoS. In WoS, the highest number of SSCI/SCI Expanded journals in four educational categories is in the category of "education and educational research", while the lowest number of journals are in the category of "scientific disciplines education" and "special education" (Web of Science, 2022). Therefore, as in the world, researchers in Türkiye find more publication opportunities in the category of "education and educational research" and as a result, more productivity has been shown in this category.

This research also identified the most productive and influential journals in the field of education in Türkiye. According to the results of the research, the most productive journal in educational research in Türkiye is "Egitim ve Bilim-Education and Science". As of 2022, the number of journals in all fields of science included in the WoS database in Türkiye is 257. While 57 of these journals are included in the SSCI/SCI Expanded index, there is only one journal in the categories related to education. This journal is "Egitim ve Bilim-Education and Science" and it has been publishing research in the field of education since 1976 and has been included in the SSCI index in the WoS database since 2007. Therefore, it has an important place in educational research in Türkiye due to the fact that it has become the focal point of educational researchers in Türkiye in terms of quality, is still included in the SSCI index in WoS and therefore has an international readership and author audience. Eight of the remaining nine journals with the highest number of publications were removed from the WoS database at different dates. Previous studies have shown that the number of a country's journals in prestigious and large international databases such as WoS and Scopus has a direct positive relationship with productivity (Basu, 2010; Erfanmanesh, Tahira, & Abrizah, 2017; Moed, Markusova, & Akoev, 2018; Najari & Yousefvand, 2013). Therefore, in order for Türkiye to be more productive in educational research and to achieve a higher performance in educational research, it is clear that more journals should be indexed in SSCI and SCI-Expanded indexes. For this reason, journals publishing on educational research in Türkiye should be encouraged in line with this goal.

This study revealed that Türkiye has the most international publication collaboration with the USA in educational research, but the highest publication impact is attained through publications with Canada. The findings for both first author and corresponding author reveal that Türkiye achieves higher publication impact in educational research where the first or corresponding author is Canada. Recent studies show that USA, UK, Canada, Australia and the Netherlands have achieved high productivity and publication impact in educational research (Cretu & Ho, 2023; Ivanovic & Ho, 2019). These countries show both high productivity and high impact in educational research due to their advantages such as having many journals in SSCI and SCI-Expanded indexes in the field of education, having a developed higher education system, giving more importance to quality than quantity in the employment of academics, attracting highly qualified academics and students to their countries, obtaining higher funding, and being English-speaking countries. Therefore, it is especially important for researchers in Türkiye to collaborate with researchers from these countries.

This study also revealed the co-authorship collaboration structure in educational research in Türkiye, which resulted in remarkable findings. First of all, according to the results of this study, the most productive institutions in educational research are well-established and large institutions with a longer history. While Hacettepe University contributes the most to educational research on an institutional basis, the institution with the highest publication impact is Middle East Technical University. This result supports the research results of Gulmez et al. (2021) and Tosun (2022). One of the factors contributing to the high publication impact of Middle East Technical University is its greater emphasis on inter-institutional collaboration in its publications. Another factor is that Middle East Technical University ranks last in single-authored studies. This shows that institutions producing collaborative publications are more productive and effective, confirming previous evidence in the literature (Abramo, D'Angelo, & Di Costa, 2009; Aksnes, 2003; Goldfinch, Dale, & DeRouen, 2003; Lancho Barrantes, Guerrero Bote, Rodríguez, & de Moya Anegón, 2012; Ramsden, 1994; Wagner, Whetsell, & Mukherjee, 2019). This finding reveals that institutions with more institutional and international collaboration produce more qualified publications.

This study found that publications with international collaboration had a higher impact than publications by independent Turkish researchers. In support of this finding, it was also found that publications with national co-authors had the lowest publication impact. Therefore, it is noteworthy that collaboration in educational research, especially international collaboration, is a very important factor in terms of productivity and publication impact. In Türkiye's educational research, the proportion of publications made with international collaboration is only 14%. However, previous research in the global context reveals that educational research is becoming more internationalised (Sezgin et al., 2022). Recent studies have shown that the proportion of internationally collaborated publications in educational research is approaching 30% (Aman & Botte, 2017; Orbay et al., 2021). As proven by many other disciplines, it is known that the rising publication impact in educational research is a result of increasing international collaboration (Althouse et al., 2009). These results show that Türkiye needs to publish more with international collaboration in order to produce more productivity and especially more qualified publications in educational research, and that this collaboration should be carried out with countries such as Canada, Netherlands and UK, which are at the forefront with their quality in educational research.

This research has revealed on which topics educational research in Türkiye is focussed. According to the results of the research, educational research in Türkiye is focussed on six main subject areas: (1) general education issues, (2) learning and teaching, (3) psychology, (4) science education, (5) teacher education and (6) scale development. This result supports the research results of Gulmez et al. (2021) and Tosun (2022). The important issue here is whether the main trends of educational research in Türkiye are in line with the world. Huang et al. (2020) found that educational research is mainly on five main topics of study: (1) Interactive learning environment and teaching/learning strategies, (2) Human capital and educational finance, (3) Teacher education, (4) Higher education, (5) Equity and social justice. It is observed that the general trend of educational research in Türkiye is partially similar

to global educational research. The fact that scale development is one of the main themes of educational research in Türkiye shows that Türkiye is partly different from the global educational literature. The analysis of the transformation of educational topics over time presented in this study shows that scale development studies have experienced rapid growth trend especially in the last decade. On the contrary, it has been revealed that Türkiye has published less on teacher education and science education, which are among the main topics in global education studies.

In conclusion, this study has shed light on important issues by analysing Türkiye's productivity and impact in global educational research with long-term data. It has been revealed that Türkiye has some problems in terms of both productivity and publication impact in educational research. For improving productivity and publication impact, first, researchers and higher education institutions should be provided with more funding and support for research and publication. In today's world where open access publishing is becoming more popular, it is known that countries that provide the necessary financial support are more productive. Second, the knowledge and skills of academic staff in publishing are important. Although funding and research environment affect research performance, the quality of the researcher has a similar effect on research performance. The quality of academic staff can be achieved by improving employment strategies. While the language of science is English, previous studies have shown that staff with high English proficiency are more productive and produce effective publications. Therefore, the current practice of using exams that measure only reading skills in the employment of academics should be abandoned and new arrangements should be made so that the scores obtained from English exams that measure four language skills are valid. Periodic evaluation of the research performance of currently employed and working academics can play an incentive role in increasing the performance of researchers.

In Türkiye, there is only one journal in SSCI index in the field of education. This situation can be considered as one of the reasons for Türkiye's low productivity and publication impact in educational research. Because the relationship between the number of journals in a country and its productivity has been proven by previous studies. As a result, in order for Türkiye to increase its productivity and impact in educational research, more educational journals should be indexed in SSCI. For this purpose, incentive strategies can be developed by institutions such as the Council of Higher Education and TUBITAK, which can produce policies related to research.

One of the factors that can increase Türkiye's productivity and publication impact is research collaboration. However, this research shows that researchers and institutions in Türkiye are more oriented towards national collaboration than international collaboration. However, it is well known that international collaboration increases both productivity and publication impact. If academics in the field of education pay more attention to publishing in collaboration with international researchers, research performance can be improved. Similarly, monitoring departments, institutes, faculties and universities in terms of publication collaboration, preparing reports on this issue and determining and implementing strategies in line with these reports may result in higher research performance. However, it should not be forgotten that all the suggestions mentioned here are interrelated. For example, more research collaboration may require more funding. Similarly, the low productivity of current academics may be related to previous employment strategies. Therefore, it is clear that strategies should be developed with a holistic perspective and by taking into account all factors rather than focusing on a specific aspect of the recommendations offered by this research.

The limitation of this research is that it analysed Türkiye's educational research based on data from the WoS database. Although there are large databases such as Scopus other than WoS database, the reason why WoS was preferred in this research is that it is a database with a wide enough scope for the examination of international publications (Auranen & Nieminen, 2010). In future studies, the results of this study can be compared with the results of this study by analysing the educational research in Türkiye with the data in the Scopus database.

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