



# The presence of Polish, Hungarian and Slovak Publications in the Field of Education in the Web of Science Database. A Bibliometric Comparative Study

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**Abstract:** *The author of this article aims at comparing the publication activity of scholars from Poland, Slovakia and Hungary in education in the period of 1994-2014. Based on the comparative analyses, the author sought to determine: (1) trends in the scholarly performance in the analysed field of study (increase/decrease), (2) leading scientific institutions with the largest number of publications in the field of education, (3) scale of internationalization (international co-authorship). Furthermore (4) the author discusses the participation of scientists from the countries under analysis in the European (EU) and worldwide circulation of scholarly papers in the field of education. To perform the analyses, first the representative source had to be chosen. Considering that what is valued in science, also in Europe, is the prestige of a journal in which a paper is published while the overall science hierarchy is primarily based on the global grading of scholarly journals, we have chosen to use the data from the Thomson/Reuters database (Web of Science™ Core Collection) containing an index of selected papers with the so-called impact factor (IF), a well-known global indication of citation impact. Several publications in the journals with high IF is a confirmation of the high quality of scientific research while it also determines the level of internationalization of science. This study was conducted over twenty years (1994-2014) to make sure it was representative of the publishing activity and international output of scholars from the countries under analysis.*

**Keywords:** Web of Science, bibliometric analysis, education research area

## *Introduction*

It can be well assumed that with a growing importance of the quality of scholarly research, it is important to grasp the characteristics of the structure of the state science policy, its dynamics and the trends of its progress and expansion, both locally and internationally. Helpful in this context are the analyses of the effectiveness and productivity of scholarly output of various state organizations, such as universities, research institutes, academic institutions that take priority in the creation of knowledge-based society.<sup>1</sup>

The competitiveness of scholarly research in the international context and thus the assessment of the scientific potential of a country, region or academic research institution can be analysed through a variety of numerical indicators. This is mainly done by comparing the results of research activity. To this end, the most frequently used are the lists of publications, frequency of citation, obtained patents and licenses as well as the bibliometric indicators aimed at presenting a qualitative rather than quantitative state of science. (Klincewicz, Żemigala & Mijal, 2012; Kwiek, 2015a; Marszakowa-Szajkiewicz, 1996; Nowak, 2006; Pianta & Archibugi, 1991; Wolszczak-Derlacz, Parteka & Kuczyński, 2010; Wróblewski, 2013).

As noted by Marszakowa-Szajkiewicz (1996), the use of the bibliometric method (i.e. quantitative and qualitative analysis of the collections of bibliographic descriptions of documents), including taking into consideration in the research process of data such as the number of citations of individual scholars can be considered as an approximate measure of recognition and validity (understood as usefulness) of scholarly work. Marszakowa-Szajkiewicz also points out that sometimes a high number of citations of a scholarly publication may prove to be a determinant of innovation (a new idea, method or discovery). On the other hand, a group of articles frequently cited in a particular academic specialism is treated by some researchers as a rather specific carrier of its paradigm (Grygiel, Rębisz & Humenny, 2010:66). Thus, bibliometric studies are used to describe and explain phenomena occurring in science through an analysis of a stream of information it produces, the defining of the effectiveness indicators of academic research as well as evaluation of researchers and research organizations (Nowak, 2006:16).

As noted by Drabek (2013), in recent years bibliometric methods have been used increasingly frequently in science policy-making. Thanks to them we can get an up-to-date picture of science, we can anticipate and observe new research trends, influence the emergence of international research groups working disciplines and directions, examine the contribution of individual countries or institutions to the development of science and research.

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<sup>1</sup> The scholarly effectiveness and productivity should be understood as a number of papers published in peer-reviewed journals or patents obtained from e.g. European Patent Office (EPO) or World Intellectual Property Organization (WIPO) (Nygaard, 2015).

## *Objectives and methods*

The aim of this article is to present a comparison of the publication activity in the field of education of academics from Poland, Slovakia and Hungary for the years 1994-2014. Based on a comparative analysis of data, the author aims to define: (1) trends in academic productivity in the area analysed (increase/decrease); (2) scale of the internationalization of this discipline (international co-authorship), as well as (3) identify leading research institutions producing the largest number of works in the field of education, and finally (4) determine the level of presence of researchers from these three CEE countries in the European (EU) and more global output in the in the field of education.

A choice of a suitable source ensuring the representativeness of this research was of primary importance. Considering that in science, including the European science, it is the prestige of a journal in which a publication appears that matters while the overall science hierarchy is largely based on the globally functioning system of journals (Kwiek, 2015b), the author has chosen to use the data drawn from the Thomson/Reuters Web of Science™ Core Collection<sup>2</sup>, which indexes highly selected and significant works (Wróblewski, 2013) with *impact factor* (IF) which is an indicator of scientific impact globally.<sup>3</sup> Thus a number of articles published in high IF journals becomes a measure of the quality of scientific research and determines the level of internationalization of science. In total, the Web of Science database indexes almost 12000 journals (as of the end of 2015), accounting for 234 scholarly disciplines<sup>4</sup>. Among these, publications in the sphere of education have been indexed in four research areas: (1) *Education and Educational Research*; (2) *Education, Scientific Disciplines*; (3) *Education Special* and (4) *Psychology Educational*.

To eliminate unnecessary fluctuations and show the degree of publication activity of academics representing the countries selected for the study, our analyses were based on the data collected over a long period of time, i.e. from 1994 to 2014 (20 years). Based on the breakdowns created in the process, it was easy to see an increasing or decreasing role of

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<sup>2</sup> As of 2015 there were almost 12,000 journals indexed in the Web of Science, including 234 scientific disciplines. In 2015, among all indexed journals 344 were from the sphere of education.

<sup>3</sup> WoS indexes only those journals that fulfill specific requirements, such as (1) include titles, keywords and abstracts of articles in the English language (2) include papers based on “blind reviews” (3) meet the condition of publishing continuity (4) the authorship out to be international (Krysztofiak-Szopa, 2006:4). The role played by the Web of Science is highlighted by the fact that indicators such as *impact factor* (IF) are prepared on its basis (De Bellis, 2009:187).

<sup>4</sup> The number of scholarly disciplines quoted in the article is not only identical with the group of disciplines in a specific country. It results from the databases existing in the Web of Science™ Core Collection, which in this way include natural and technical sciences (SCI database), social sciences (SSCI database) arts and humanities (A&HCI database). It must be remembered that the thematic range of these databases (disciplines) cross-refer, so the publications in the area of scientific information, cybernetics, management can be found both in the natural sciences (SCI) and in social sciences databases. Medical journals on the other hand are mostly found in the natural sciences although some of medical journals are included only in the social sciences (SSCI) (Marszakowa-Szajkiewicz, 1996:18).

states or institutions in international research activity in a given field of knowledge (Drabek, 2013).

Another important issue considered when making these comparisons was to determine the types of included documents<sup>5</sup>. If several publications are to serve as a benchmark for comparing a creative potential, it should include only original scholarly articles, books and book chapters, conference proceedings and reviews. Other types of publications are derived from these original documents and often serve to overestimate the actual number of analysed works (see: Przyłuska & Maczuga, 2011). So, the author of this work took into his consideration only articles, book chapters, books, papers of conference proceedings and reviews published in the sphere of education and indexed in the database under discussion in 1994-2014<sup>6</sup>. The indicators were based on the *whole counting* method, i.e. each institution analysed by co-authors of texts was assigned one publication. The search criterion was related to publications<sup>7</sup> in which at least one author from the field of education was affiliated with one of the analysed countries: Poland, Hungary or Slovakia.

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<sup>5</sup> The Web of Science (WoS) database contains among others original scholarly papers, abstracts, reviews, books, book chapters, editorials, letters to the editor, comments, conference proceedings etc.

<sup>6</sup> What is important in a thorough bibliometric analysis is not only contextualization or temporal contextualization, but also normalization in view of the type of document. Different citation behaviors exclude the comparisons of publications of completely different types, such as traditional scientific articles published in continuous editions, with occasional editorials, bibliographies or authors or other outstanding figures. *Article* is the type of document used in the analysis of citation behaviour and citation impact. An additional type of document used in calculating the Journal Impact Factor is a *review*. A very important carrier of content and research presentation, third as to its popularity is *conference proceedings*. Also, *conference papers* presented at various symposia and events and subsequently published play a vital role as do *books* which play a key role in humanities. As books are often collections of many different chapters of varied authorship *book chapters* are also significant in this context, often being a reworked paper or article. It is for these reasons that the author has decided to take these types of documents in his analysis as most commonly used measures of publication impact defined through citation behaviour, and at the same time similar in form and obtaining a similar citation behaviour in a given discipline, giving up other forms of publications which fail to represent those qualities, are of a lesser almost marginal importance for bibliometric analyses.

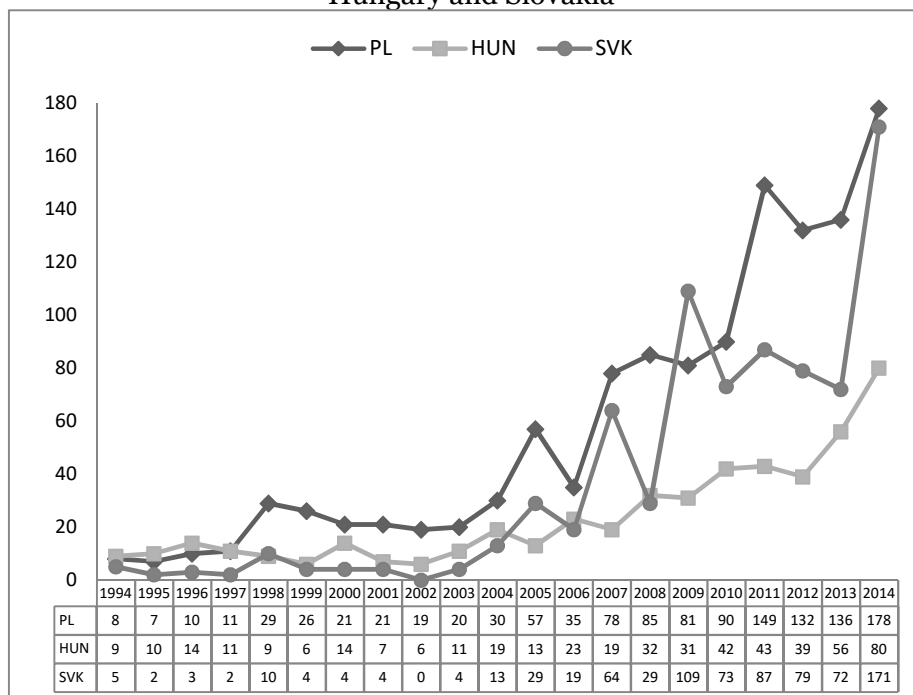
<sup>7</sup> Whenever publications or works indexed in the WoS database are mentioned in this article, the author means only articles, book chapters and books, reviews and conference proceedings indexed in that database.

## Analysis of results

### Number of publications in the sphere of education in the Web of Science™ Core Collection: Poland, Hungary and Slovakia

The number of works with Polish affiliation published in the sphere of education and indexed in the Web of Science™ Core Collection (at least one author was affiliated with Poland) in 1994-2014 was 1, 223 which comprised approximately 0.35% share in the global resources of all works in this area indexed in this database.<sup>8</sup> In case of the texts with Hungarian affiliation, the number of records found in the field of education was 494, which was equivalent to about 0.14% of the total works in the WoS database. The rate for Slovakia, however, was 783, i.e. 0.22% of the total number of publications in the world's resources. In total, the share of publications from the three countries, studied in the world output of works indexed in the WoS database in the years 1994-2014 was 0.71% and constituted 2.72% of the total achievement of all 28-member states of the European Union.

Figure 1. The dynamics of changes in the number of publications from the education sector \* indexed in the WoS database in the years 1994-2014: Poland, Hungary and Slovakia



Source: \* The study included publications in the WoS database from the education sector, indexed in the following 4 research areas: Education and Educational Research; Education, Scientific Disciplines; Education Special and Psychology Educational (InCites Dataset, 2016)

In the countries analysed, there was a steady increase in the number of educational works indexed in the database in the period under discussion,

<sup>8</sup> In 1994-2014, the total number of all works in the area of education (articles, book chapters and books, reviews and conference proceedings) in WoS was approximately 352,660 including 91,880 publications from the 28 EU countries.

although the dynamics was uneven (see Figure 1). There was some stagnation in the years 1994-2003, when the number of publications varied for all analysed countries, within the limits of 19-48 per year. By contrast, since 2004 we could witness an unprecedented and consistent increase in the number of publications indexed in the WoS database with an affiliation to one of the countries of interest to us.

By comparing the bibliometric indicators of the four areas of research related to education: *Education and Educational Research*, *Education Disciplines*, *Education Special* and *Psychology Educational*, we can assume that over the two decades under analysis (1994-2014) works in *Education and Educational Research* dominated. Publications indexed in this area made up for almost 72% of all works with Polish affiliation and 65% with Slovakian. The highest percentage of texts in this area, which is 84%, appeared in Hungary. The lowest number of publications by authors from Poland, Hungary and Slovakia appeared in the *Education Special* area. These works were 2.53% (PL), 3.24% (HUN) and 0.38% (SVK) of all the texts from the education sector in the countries analysed, indexed in the WoS database.

### *International co-authorship*

Universities are active participants in international research projects, and publications with co-authors representing foreign institutions are a good testimony to transnational research cooperation. It can be therefore of interest to us to compare the degree of internationalization of research conducted by universities in the discussed area of knowledge i.e. education in individual countries. An indicator of this kind is a good reflection of measurable results of joint research.

And so, the next analysis involved measuring the degree of internationalization of scholarly institutions in the countries selected for this study, from the field of education, as a share in total number of the articles written jointly with representatives of scholarly institutions from other countries (Table 1).

Table 1. A total number of publications with international co-authorship, from the education sector, indexed in the WoS database in 1994-2014: Poland, Hungary and Slovakia

1994-2014	WoS Docs	%WoS Docs	Internat. Collab.	%Internat. Collab.
Global	352 660	100%	21 128	5.99%
UE-28	91 879	26.05%	11 967	13.02%
PL	1223	0.35%	132	10.79%
HUN	494	0.14%	114	23.08%
SVK	783	0.22%	59	7.54%

Source: InCites Dataset, 2016

Among the 352,660-works indexed in the WoS database in education in 1994-2014 only 5.99% were internationally co-authored (Table 1). The data for EU looks much better against this background, as the share of

internationally co-authored publications was twice as high - 13.02% (Table 1).

A comparative analysis of the number of papers from the countries included in the study, co-authored by foreign institutions, showed that the highest level of transnational cooperation in the field of education was achieved by publications with Hungarian affiliation. As it turned out almost every fourth (23.08%) Hungarian text in the period studied was created with the participation of a foreign co-author. In the case of publications with Polish affiliation, the figure was 10.79% representing every ninth Polish paper in the WoS base. International co-authorship occurred even more rarely in the case of articles with Slovakian affiliation (7.54%) (see Table 1).

### *Citation impact*

In order to capture the scholarly effectiveness of academics in the field of education in the countries investigated, analyses were carried out within one of the sections of scientometry/bibliometry (De Bellis, 2009, pp. 1-22), i.e. the citation theory (Leydesdorff, 1998, p. 5)<sup>9</sup>. The assumption is that a scholar by citing another scholar acknowledges the value of the cited work, and consequently that the work which is cited often is understood to significantly contribute to science, in other words it becomes influential. In this analysis we considered the so-called *Citation Impact*<sup>10</sup> and *Category Normalized Citation Impact (CNCI)*<sup>11</sup>.

Table 2. Citation impact of the works published in education, indexed in the WoS database in 1994-2014: Poland, Hungary and Slovakia

	WoS Docs	Times Cited	% Docs Cited	Citation Impact	CNCI*
Global	352 660	2 536 926	55.2%	7.19	0.91
UE-28	91 879	596 554	56.36%	6.49	1.06
PL	1223	2249	30.01%	1.84	0.91
HUN	494	2689	42.71%	5.44	1.04
SVK	783	1003	26.56%	1.28	1.91

Source: \* CNCI - Category Normalized Citation Impact; (InCites Dataset, 2016)

<sup>9</sup> Bibliometrics is a research discipline using qualitative methods in the analyses of publications. Its origins are linked with the foundation of *Science Citation Index* by Eugene Garfield in 1963, which was a register of scholarly publications and citations.

<sup>10</sup> *Citation impact* defines the average number of citations of a publication from a given country, i.e. a ration of the total number of citations to the total number of publications from a given country.

<sup>11</sup> *Category Normalized Citation Impact (CNCI)* is the most important tools from the group of InCites standardized indicators. It contextually presents the impact of a publication or a group of publications in its discipline. The calculation of CNCI presents the number of citations per publication to the group of all other works in a thematic area, a year and type of document. Its average value in the global context is always 1 therefore all works with the indicator >1 are considered distinguished and show higher impact than expected. The Category Normalized Citation Impact allows for reliable comparisons of the scientific achievements of persons groups, institutions also simultaneously in many disciplines. It is also a reliable measure of publishing effectiveness and not merely productivity.

The data presented in Table 2 reveal significant differences in the degree of citation impact of the works in education between the analysed countries as well as in relation to the global and regional indicators (EU-28). The data demonstrates that over 55% of all publications (globally) indexed in the WoS database were cited. Even higher citation quotas were identified in the context of publications from the 28 EU member countries (56.36%).

In the analysed countries, however, the highest proportion of citations concerned works with Hungarian affiliation (42.71%). In the case of Polish and Slovakian publications the analogous figures were 30.01% and 26.56% respectively. The citation rates for Polish, Hungarian and Slovak works were significantly lower than those for the EU and globally. Unfortunately, the articles in the field of education affiliated with these EEC countries were rarely cited. The majority, which is approximately 57% of Hungarian and about 70% of Polish and Slovak publications were never cited in other works indexed in WoS.

Similar situation obtains in case of the average citation per publication of a given country. The citation impact for works with Polish (1.84) and Slovak (1.28) affiliation is three to four times lower than the number of citations of Hungarian publications (5.44) (see Table 2). The situation is similar about the average number of citations for education-related texts globally (7.19) and regionally in EU-28 (6.49).

In the author's opinion it is also worth referring to the discussed problem of citation impact in the context of *Category Normalized Citation Impact* (CNCI). The calculation of this indicator involves a few citations per publication about the group of all other works in a thematic area, year and type of document. All works with the indicator value  $>1$  are considered distinguished and indicate an impact higher than expected. As we can see the CNCI indicator allows for a reliable comparability of the scholarly achievement among countries and institutions working in a given area. It is also a legitimate measure of publishing effectiveness and not just of its productivity.

With the CNCI indicator in mind (Table 2) we noted that publications with Slovakian (1.91) and Hungarian (1.04) affiliations could be considered as outstanding, having a higher than expected impact level ( $CNCI > 1$ ) whereas for Polish works indexed in the WoS database the index was lower than 1 (0.91), which meant that these texts had weaker impact than Hungarian and, in particular, Slovakian publications in the field of education broadly understood.

Table 3. Citation impact of the works published in education, co-authored by international authors, indexed in the WoS database in 1994-2014: Poland, Hungary, and Slovakia

	WoS Docs	Internat. Collab.	%Internat. Collab.	Times Cited	% Docs Cited	Citation Impact	CNCI*
PL	1223	132	10.79%	1003	62.12	7.6	1.25
HUN	494	114	23.08%	1634	65.79	14.33	1.61
SVK	783	59	7.54%	398	72.88	6.75	1.22

Source: InCites Dataset, 2016



It is also worth considering whether international cooperation can have an influence on the rising of the international position of research and articles published in the field of education (i.e. their citation impact). To review this correlation, we compared the indicators of *citation impact* and *Category Normalized Citation Impact* and the number of all the works originating in the countries studied, and the publications which resulted from international cooperation (Table 3).

In this way we demonstrated that international cooperation was beneficial in case of all analysed countries, significantly increasing the citation of publications. In the case of texts with Hungarian affiliation written in international co-authorship this ratio was 14.33 against 5.44 for all the works whereas the citation of internationally co-authored texts with Polish affiliation reached the level of 7.6 citations against 1.84 for all the works. Similar situation obtained in the case of the Slovakian texts (6.75 and 1.28 respectively).

The comparison of the second indicator (CNCI) also points to the positive impact of international cooperation on the number of citations of the publications written in transnational cooperation (Table 3). More than anything this concerned the works with Polish (1.25 against 0.91) and Hungarian (1.61 against 1.04) affiliation. In fact, the level of impact of these publications was much higher. The situation looked slightly different in case of the Slovakian texts. In 1994-2014 the CNCI for these works was 1.22, compared to 1.91 for all the works<sup>12</sup>.

### *The most scientifically productive institutions in education*

In 1994-2014, the WoS database included publications from 68 academic institutions from Poland, 15 from Hungary and 18 from Slovakia. Among the Polish institutions 10 academically most productive were responsible for almost half (44.5%) of all the Polish works indexed at the time in the sphere of education (544). In Slovakia, 10 leading academic institutions were responsible for almost 76% of all indexed Slovakian works (598) and in Hungary the equivalent figure for the top 10 institutions was nearly 90% of the 443 publications indexed in the Web of Science (Table 4.).

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<sup>12</sup> The lack of increase in the number of citations per publication when comparing the articles co-authored with foreign authors and the entire publishing achievement of authors with the Slovakian affiliation, in the context of CNCI indicator, may be the result of the high rank of research conducted by Slovakian researchers independently of international context.

Table 4. The leading academic institutions producing the highest number of publications in the sphere of education, indexed in the WoS database in 1994-2014: Poland, Hungary, Slovakia

1.	10 leading academic institutions (Poland)	WoS Docs	Docs Cited	% Docs Cited	Times Cited	% International Collaboration
POLAND	<i>University of Silesia</i> <sup>13</sup>	110	30	27.27	56	0.91
	<i>Jagiellonian University</i>	80	27	33.75	341	16.25
	<i>University of Warsaw</i>	70	27	38.57	220	10.0
	<i>Gdynia Maritime University</i>	59	5	8.47	5	1.69
	<i>Silesian University of Technology</i>	48	16	33.33	129	8.33
	<i>Adam Mickiewicz University</i>	47	23	48.94	135	12.77
	<i>AGH University of Science &amp; Technology</i>	34	7	20.59	20	0.0
	<i>Medical University Warsaw</i>	33	8	24.24	76	6.06
	<i>Gdansk University of Technology</i>	32	10	31.25	35	0.0
	<i>University of Wroclaw</i>	31	18	58.06	67	3.23
2.	10 leading academic institutions (Hungary)	WoS Docs	Docs Cited	% Docs Cited	Times Cited	% International Collaboration
HUNGARY	<i>University of Pecs</i>	100	32	32.0	210	10.0
	<i>Eotvos Lorand University</i>	96	64	66.67	1559	28.13
	<i>Szeged University</i>	57	43	75.44	333	45.61
	<i>Hungarian Academy of Sciences</i>	53	31	58.49	535	33.96
	<i>University of Debrecen</i>	43	18	41.86	69	9.3
	<i>Corvinus University Budapest</i>	20	9	45.0	27	20.0
	<i>Semmelweis University</i>	20	17	85.0	94	35.0
	<i>Budapest University of Technology &amp; Economics</i>	19	6	31.58	52	5.26
	<i>Szent Istvan University</i>	19	3	15.79	4	10.53
	<i>Central European University</i>	16	5	31.25	18	37.5
3.	10 leading academic institutions (Slovakia)	WoS Docs	Docs Cited	% Docs Cited	Times Cited	% International Collaboration
SLOVAKIA	<i>Slovak University of Technology Bratislava</i>	97	25	25.77	90	2.06
	<i>Comenius University Bratislava</i>	86	28	32.56	175	11.63
	<i>Constantine Philosopher University Nitra</i>	84	44	52.38	129	9.52
	<i>Matej Bel University</i>	81	13	16.05	15	0.0
	<i>University of Zilina</i>	70	13	18.57	18	0.0
	<i>Technical University Kosice</i>	62	23	37.1	113	8.06

<sup>13</sup> In the period under analysis (1994-2014), in 2009-2012 the WoS database indexed only one educational journal with the Polish affiliation (University of Silesia), i.e. *The New Educational Review*. Hungary and Slovakia had no journals in the sphere of publication indexed in the WoS database.

<i>University of Trnava</i>	41	28	68.29	372	53.66
<i>Slovak Academy of Sciences</i>	32	15	46.88	139	37.5
<i>Slovak University of Agriculture Nitra</i>	26	7	26.92	22	19.23
<i>University of Pavol Jozef Safarik Kosice</i>	19	9	47.37	96	10.53

Source: InCites Dataset, 2016

In Poland, most of the texts in the education sector, indexed in the WoS database, were published by the researchers of the University of Silesia (110), in Hungary by the scholars affiliated with the University of Pecs (100), and in Slovakia by the representatives of the Slovak University of Technology Bratislava (97). The highest percentage of Polish citations belonged to the works written by scholars from the Adam Mickiewicz University of Poznań (48.94%). In Hungary the Szeged University led the way as the works by its scholars were referred to at the level of over 75%. In Slovakia it was the authors affiliated with the University of Trnava that were cited most often when it comes to the sphere of education - of all the works published by this institution, more than 68% were cited. What these publications had in common and what made for their high citation impact was that they were more often than others written in international cooperation.

### *Discussion and final comments*

Our analysis of data for 1994-2014 demonstrated a growing number of publications in the sphere of education with the Polish, Hungarian and Slovakian affiliation in the WoS database, although the dynamics of this increase was uneven. In 1994-2003, we observed a stagnation, as in this period the number of publications for all analysed countries was between 19 and 48 a year. By 2003, we found the total of 172 texts with Polish affiliation, 97 Hungarian and only 38 Slovakian. Since 2004, however, there was an unprecedented, consistent increase in the number of works in the field of education. For the following ten years (up to 2014) additional 1051 publications with Polish affiliation, 397 with Hungarian and 745 with Slovak was found in the WoS database (see: Figure 1.).

An upward trend in the number of analysed publications, observed since 2004, may have been due to the fact that the first decade of the 21st century was a period of widespread implementation or adoption of special political documents that laid out strategic priorities for state reforms for the coming years, and the development of broadly understood science and research, including the consolidation of the transnational position of science in these countries through its intensive internationalization (Beblavý, 2005; Górnaiak, 2015; *Higher Education Governance in Europe*, 2008:119; Kwiek, 2015a). As Kwiek observed (2015c) the internationalization of research, which was one of the main objectives of reforms in the countries under analysis, was supposed to develop along two pillars (Knight, 2012): an increase in the number of Polish publications on the international scholarly stage as part of the “internationalization at home”, and consolidation of international

cooperation as part of “internationalization abroad” (Kwiek, 2015c:40). Moreover, Poland, Hungary and Slovakia began to function well in the new reality relating to their joining the EU in 2004 by fully participating in the process of creating the European Research Area.

Nevertheless, it should be noted that the overall share of education publications from Poland (0.35%), Hungary (0.14%) and Slovakia (0.22%), in the WoS database was not very impressive, especially when compared with other Central and Eastern European countries, also members of the European Union. In the period under analysis, authors with Romanian affiliation certainly stood out (4486), followed by Czech Scholars (2191), representing 1.27% and 0.62% respectively of the total texts in the sphere of education indexed in WoS. Taking into consideration its academic potential (number of academics in the country) Latvia also stood out against the analysed countries. Publications with Latvian affiliation comprised 0.24% (864 texts) of all indexed publications in the WoS database.

The presence of education-related researchers from the surveyed countries on the European (EU) and global stage, measured by the number of citations of their works, was also found to be low. The majority, i.e. approximately 57%, in the case of Hungarian, and about 70% in the case of Polish and Slovak publications were never cited in other works indexed in WoS. In fact, the citation indicators for Polish, Hungarian and Slovak texts which are, after all, a measure of their recognition and scholarly validity as well as their overall usefulness were found to be significantly lower than those obtaining globally and in the EU. The average number of citations per publication in 1994-2014, the so-called *citation impact*, for works with the Polish (1.84) and Slovakian (1.28) affiliations was three to four times lower than the number of citations of Hungarian publications (5.44). These differences are even higher in respect to an average number of citations of texts in the sphere of education interpreted regionally (EU-28) - 6.49 and globally (7.19).

Current research also confirmed that, apart from financial input, the internationalization of science and research had a significant influence on the level and quality of scholarly productivity (Kwiek, 2015a, 2016; Wolszczak-Derlacz et al., 2010). In the case of the three analysed countries, a degree of their internationalization in the field of education, understood as a share of publications created jointly with representatives of academic institutions from other countries, varied, being higher than the global index (5.99%) and slightly lower than the regional (EU-28) - 13.02%.

In the context of the examined countries, an exception were the publications with Hungarian affiliation, as almost every fourth text from this country concerning education was written with the participation of a foreign co-author (23.08%). In the case of publications with Polish affiliation it was only every ninth publication (10.79%). The lowest level of international co-authorship was found for texts with Slovakian affiliation (7.54%). This, in turn, affected the citation impact of these works. Our analysis found the appearance of statistically significant differences between the results for all publications and those that were internationalized, demonstrating that international cooperation was beneficial for all analysed countries, considerably raising the citation

indicators of the analysed publications (both *citation impact* and *Category Normalized Citation Impact*).

These conclusions send a clear message. To improve scholarly productivity of academics in the analysed countries (both quantitatively and qualitatively) and at the same time enhance their impact on education, it is desirable to expand on international research cooperation.

There are obvious limitations to this analysis, imposed also by the volume of this article. The author managed to consider only some of the most basic indicators used to measure a scholarly activity of researchers. The results are not reflecting fully on the potential of Polish, Hungarian and Slovakian academia in education. They should be merely treated as the diagnosis of the presence of authors with the affiliation of these countries in the international bibliometric database such as the Web of Science, which mostly indexes publications from natural sciences, technical engineering and medicine (over 80%). It is only a small percentage of the total that is devoted to social sciences, arts and humanities. In the period under discussion (1994-2014) 18% of all articles indexed in WoS pertained to social sciences, arts and humanities.

It can be also safely assumed that a small number of publications in the field of education, indexed in this database (including those affiliated with the countries included in the study), is probably related to their double "local" character: first, of the method, and secondly and primarily of the subject matter. What follows is that the language of publication is also local (Nowak, 2006, pp. 27-31). Local problems are of interest to local academic circles and do not require the use of the universal language (English) for communication. As Kokowski (2015) observes this does not mean that the local character of the problems tackled by humanities and social sciences is of lower value but they are always formulated in a specific language, historic and cultural context while the WoS database does not index local issues with the obvious exception of the English cultural area (Kokowski, 2015). Generally speaking, because of the way they are construed all international databases available are Anglocentric in nature (Van Leeuwen, Moed, Tijssen, Visser, & Van Raan, 2001). In consequence, they are not very useful in comprehensive bibliographic analysis (also considering national dimension) of authors from outside of the Anglo-Saxon world, although they enable the evaluation of their *presence* in the international exchange. The question is, *therefore, to what extent is the potentially local nature of educational sciences a real issue? Or does it perhaps serve as a form of excuse for those researchers who chose to operate within the local bounds?*

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