

# **The Digitalization in Evaluation of Scientific Efficiency: Bibliometric Analysis of the Publication Activities and Citation of the Teachers and Psychologists**

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## **ABSTRACT**

In the last decades, the digitalization more and more actively penetrates into the sphere of scientometrics. The problem of objective evaluation of the results of scientific activities, including the issue on the possibility of using bibliometric (statistical, mathematical) evaluation of the publication activities, citation, and, at the last, of the scientists’ authority, is in the center of discussions in the last decades. This article provides the materials of bibliometric analysis of the publication activities and citation of the widely known contemporary teachers and psychologists, based on the data of the Russian Science Citation Index (RSCI). The data on ranking scientists by the number of publications, by the number of citations and by Hirsh-index (h-index) have been compared. The factors, favouring active citation and, simultaneously, high h-index have been distinguished: relevant authority of the correspondent magazines and publishers, belonging to the actively developing scientific directions, work in the leading universities and academic scientific institutes.

The provided materials not only reflect the scientific merits of the leading specialists, but also show methodological and paradigmatic tendencies of the Russian science development in whole. In particular, it has been revealed, that the scientific ratings of the psychologists, as a rule, are higher, than the ratings of the pedagogics specialists. It is also demonstrative, that the increased publication activity and citation are characteristic for the scientists, who work in the sphere of special psychology and pedagogics. The scientometric ratings may be intended not only for precise scientists, but also for the scientific collectives or scientific organizations. In particular, the examined materials show, that the absolute majority of the specialists with high h-index work at the academic institutes and leading metropolitan universities.

The article materials may be used at discussion of the scientists’ activity efficiency criteria.

**Keywords:** *scientology, bibliometrics, teachers, psychologists, citation, Hirsh-index (h-index)*

## **1. INTRODUCTION**

In last decades, the digitalization has been more and more actively penetrating into the scientometric sphere. Within such approach the evaluation of scientists’ efficiency and authority is based on the static (quantitative, mathematical) analysis of the scientific publications. Within the frames of such study, the number of publications, their citation, genre characteristics, volume and means of representation to the society (printed or electronic publications; magazine’s and/or publisher’s authority, review publication, science editor’s authority, etc.) are accounted. Such methodology doesn’t have only supporters, it has also the opponents.

The critics of bibliometry notice its numerous disadvantages, including the increasing self-citation and duplication of publications in various magazines

[Berezovich 2019, Sternin 2019, Bar Ilan 2008, AKSNES, SCHNEIDER, GUNNARSSON 2012, PRAUS 2019, EGGHE, ROUSSEA 2019, Zhengra 2018, Mikhailov 2017a, 2017b and others]. These discussions certify, first of all, the necessity of the careful analysis of the existing experience and searching for new ways of advancing evaluation criteria of the scientific activity efficiency.

From long ago, the scientific activities, and, wider – a scientist’s authority – have been evaluated mainly, by the number of scientific publications and by their genre characteristics (monograph, research article, review article, textbooks, thesis, etc.).

It is demonstrative, that the correspondent data has been regularly provided in the articles, dedicated to the scientists’ anniversaries, in encyclopedias, guides, in the publications, dedicated to the scientific schools.

Along with that, the specialists always understood, that the number of publications itself (even if such performances, as genre and volume, are accounted)

doesn't always correspond to the real authority of a scientist and quality of his/her scientific works. In particular, the possibility of plagiarism and, especially, of "auto-plagiarism", which is the repetitive publication of the same scientific results, shall be taken into consideration. Nowadays, the number of scientific and learning and teaching publications is accounted to one degree or another (typically, with the accountance of their genre, volume, date of publication and other factors) at election as one or another position on a competitive basis, in the process of scientific nomination, at planning and evaluation of the scientific activity results. Simultaneously, the search for other methods, applicable for the objective bibliometric analysis of the scientific activity results, continues.

In last decades, the publication citation is more and more often mentioned in the quality of sufficiently objective performance of the scientist's scientific authority. The easiest mean of determination of citation is the calculation of the total number of references to the works of a specific researcher with accountance of both recent publications and issues, came out long time ago. At such approach, the publication's up-to-dateness, its relevance exactly for the contemporary stage of science development, isn't taken into consideration to the full extent. That's why it is often preferred to account only citation for the specific period of time (usually, for the last five-ten years). More complicate methods of calculation of the citation index and corresponding ranking of the scientists by the citation index, also exist.

Along with that, the bibliometry critics provide multiple arguments, certifying the fact, that the citation index itself doesn't always reflect the true scientific authority of a scientist and his/her role in development of the corresponding knowledge area.

That's why the search for new means of the scientist's scientific authority determination (and also of the scientific collective, scientific publisher or university). In particular, in the beginning of current century, Hirsh, Jorge (Argentine physicist from the California University in San Diego) suggested the alternative mean of the determination of the public recognition of the scientist's work authority, known publicly as the Hirsh-index or h-index. The correspondent methodology allows to account not all, but only the most important publications and references to them in the publications of other authors (Hirsch, 2005). It is important to notice, that, shortly, the specified methodology has attracted specialists' interest, although, it took some time to achieve global recognition [CRONIN, MEHO 2006, KELLY, JENNIONS 2006 and others]. Other scientometric indexes also exist, including g-index and i-index, which are, however, used significantly less frequently, than h-index (Zhengra, 2018; Budaev, Chudinov 2019).

## 2. TERMS OF REFERENCE

To continue discussion on the efficiency of using bibliometry as a tool of evaluation of a scientist's

(scientific collective's, scientific institution's) achievements and his/her authority in academic society, define the most efficient options of the bibliometric analysis of separate scientists and scientific collectives, give characteristics to the additional factors, favouring high citation and Hirsh-index correspondent increase.

## 3. STUDY MATERIALS AND METHODS

At scientometric studies execution, it is important to differentiate global and national databases. It shall be accounted, that the scientometric indexes of the same scientist may essentially differ at addressing to various databases and at using various ranking methodologies. The best-known global English-language databases (Scopus, Web of Science и Google Scholar). The largest Russian scientometric database – the Russian Scientific Citation Index (RSCI). This study is based on the materials of RSCI, which, naturally, doesn't mean disregard to the foreign sources. The comparison of the English-language and Russian-language database materials is one of the outlooks of our scientific work.

The issue, related to self-citation accounting, remains debatable. Some people use it excessively, but, at the same time, sometimes it is impossible to go without references to the proper publications. Particularly, it refers to the cases, when the correspondent publication is the appropriate continuation of the previous one, or when the author considers necessary to ascertain somehow previously received scientific results, comment them in a new way. In this study the materials of RSCI are considered without accountance of self-citation.

RSCI refers to the number of continuously supplementing databases. Our article accounts the RSCI materials (number of researchers, number of publications and citation, affiliation, etc.) as of 5 February 2020. The provided study has been executed in two stages: at the first of them, the RSCI data itself was in the center of the authors' attention, and at the second stage – the data on publications, provided as in RSCI, as in the international databases Scopus and Web of Science.

As long as it was enough complicate and hardly reasonable to consider data on each Russian teacher or psychologist, we decided to limit ourselves to the data, related to the scientists, elected to the Russian Academy of Education presidium, which initially presupposes high authority and significant scientific achievements. As it will be shown below, in the number of cases, the materials of the considered databases essentially differ.

## 4. MAIN RESULTS OF STUDY

At the first stage of our study, the results of ranking of the members of the Russian Academy of Education presidium on the basis of RSCI data were considered. The number of publications and the number of citations were accounted. In the quality of additional information, the Table No. 1 also provides the data on Hirsh-index and

specialist's affiliation with the scientific institution, essential for the further consideration. In case of equality by Hirsh-index, the highest rank is determined by the number of citations. At the second stage of the study, the results of Russian specialists ranking, on the one hand, according to the RSCI data, and on the other hand, according to the data of the global databases Scopus and Web of Science, were compared.

**Table 1** Ranking of the supreme leaders of the Russian Academy of Education by Hirsh-index, number of citations and publications in RSCI

Full name and affiliation	Hirsh-index	Citations	Publications
1. Strikhanov Mikhail Nikolaevich, Academician-Secretary of the Department of Professional Education of RAE	68	20204	575
2. Zinchenko Yury Petrovich, President of RAE	24	2575	241
3. Malykh Sergey Borisovich, Academician-Secretary of the Department of Psychology and Age-specific Physiology of RAE	23	2145	299
4. Malafeev Nikolay Nikolaevich, Vice-President of RAE	22	2939	129
5. Galazhinsky Eduard Vladimirovich, Vice-President of RAE	17	2016	106
6. Tsvetkova Larisa Aleksandrovna, acting for Vice-President of RAE	10	434	111
7. Levitsky Mikhail Lvovich, acting for Academician-Secretary of the Department of Education Philosophy and Theoretical Pedagogics of RAE	10	320	82
8. Bogdanov Sergey Igorevich, acting for Academician-Secretary of the Department of Russian Language Arts of RAE	10	214	73
9. Gaydamashko Igor Viacheslavovich, Chief Academic Secretary of RAE presidium	9	461	72
10. Garbovsky Nikolay Konstantinovich, Academician-Secretary of the Department of Education and Culture of RAE	8	1616	51
11. Karaev Boris Anatolyevich, acting for Academician-Secretary of the Department of General Secondary Education of RAE	8	133	58

The materials of this Table once again confirm the fact, that high publication activity is really often accompanied by the often citation. For example, first five leaders by Hirsh-index (Strikhanov, M.N., Zinchenko, Yu.P., Malykh, S.B., Malofeev, N.N., Galazhinsky, E.V.) are simultaneously distinguished by high citation. The very high performances of Strikhanov, M.N. are explained by the fact, that the absolute majority of his publications are dedicated to the problems of physics and technologies,

and the scientists, working in these sciences usually have higher scientometric performances (also due to the fact, that they have works published as a part of large author collectives). We shall also notice, that the number of citations doesn't always correlate directly with the number of publications. Thus, there are Garbovsky, N.K.'s 51 publications and 1616 citations, recorded in RSCI, i.e. the number of citations exceeds the number of publications by 39 times. Unfortunately, quite often occur the cases, when the number of publications significantly exceeds the number of citations.

The comparison of the data on ranking, provided in the Russian and global databases, may be of considerable interest. In relation to it, we would like to define the Russian specialists with the utmost high indexes of publications and citations in the databases Scopus and Web of Science: Strikhanov, M.N. (395 publications and 19461 citations), Malykh, S.B. (963 publications and 108 publications), Galazhinsky, E.V. (420 citations and 42 publications), Zinchenko, Yu.P. (397 citations and 81 publications), Tsvetkova, L.A. (145 citations and 44 publications).

## 5. DISCUSSION

It shall be accounted, that the provided materials don't only reflect the scientific merits of the specified scientists, they also demonstrate the methodological and paradigm tendencies of the Russian science development in whole. In particular, it is easy to notice, that the psychologist scientific ratings are usually higher, than the pedagogics specialist ratings.

The scientometric ratings may be calculated not only for the specific scientists, but also for the scientific collectives or scientific organizations [Budaev, Chudinov 2019, GINGRAS, KHELFAOUI 2018 and others]. In particular, the considered materials on the affiliation of the scientists with high Hirsh-index show, that the absolute majority of the specified specialists work at the academic institutes and leading metropolitan universities (Institute of Psychology of Russian Academy of Sciences, Russian Academy of Education, Lomonosov Moscow State University, Saint Petersburg State University, Moscow Pedagogical State University, Herzen State Pedagogical University, etc.).

The presence of scientific publications is, perhaps, the mandatory sign of high scientific activity, however, the scientist's evaluation can't be based exclusively on the number of his/her publications. The new methods (including the scientometric ones) of studying scientists' scientific activity shall be searched for and tested.

## 6. MAIN CONCLUSIONS AND STUDY PERSPECTIVES

Certainly, the rating, calculated on the basis of RSCI, doesn't completely reflect real contribution into science of

one or another scientist (and also of one or another scientific collective) and his/her perception from the side of contemporary researchers. It is easy to mention, that many distinguished scientists appear far from the first hundred of the most cited authors, however, it doesn't mean, that the scientometric analysis of the publication activity isn't worth noticing at all. We shall expect the appearance of new and, maybe, more objective methodologies of the scientific activity evaluation, but as of today, the bibliometric methodologies are actively used as in Russia, as in many other countries.

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