

Supporting biomedical research and evaluation: bibliometrics for information specialists

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Abstract

Supporting research is one of the most important tasks for biomedical librarians and information specialists. This support can be offered in several ways. Libraries are responsible for access to information, covered by the more traditional activities as Resources Purchases and Subscriptions Management, Document Supply and Interlibrary Loan Services, or Reference Service. Moreover, libraries can assist researchers on their needs related to the assessment and evaluation of their scientific research.

The aim of the EAHIL workshop session on Bibliometrics was to introduce biomedical librarians to the fundamentals of this discipline and to provide them with tools, techniques and methodologies on this subject in order to improve their services.

Key words: bibliometrics; research support; research evaluation.

Introduction

One of the most significant areas in universities and research institutions nowadays is to monitor and measure the impact of research outcome, based on informetric methodologies and tools. Informetrics is defined as the study of the quantitative aspects of information, and covers the production, dissemination, and use of all forms of information. This includes Bibliometrics, Scientometrics, Cyber- and Webometrics (1). Moreover, with the impact of social web and the new technologies and new communication forms, alternative metrics have also been developed in order to cover other aspects of the impact such as article views, downloads, or mentions in social media and news, the Altmetrics. Biomedical librarians find themselves more and more often in situations where they need to provide researchers or institution's managers with information to measure the impact of research outcome. That's why it is essential for them to know about the fundamentals, methodologies and sources related to bibliometrics. Additionally, librarians need to be updated about new trends and the development of indicators and resources in order to be able to offer top assessment services, beyond

simple impact factors, citation counts and h-index values.

The workshop session on bibliometrics was intended to provide guidance about the potential services librarians can provide in the context of assessment and scientific research evaluation, as well as go through the commonly used evaluation tools and resources, offering some hands-on practice. As no prior knowledge was needed, we slightly revised general concepts before going in depth into the possible services librarians' can offer.

Some details about indicators

An "indicator" can be defined as a sign or a value that shows a measurement both in qualitative and quantitative ways. Bibliometrics was defined by Pritchard in 1969 (2) as "the application of mathematical and statistical methods to books and other media of communication data". Bibliometric basic indicators are for instance the number of publications, citations or basic journal metrics as the Impact Factor (IF), which was introduced by Garfield in 1955 (3).

Although the journal IF is a universally recognized measure which indicates that the papers published

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in that journal have passed quality filters, this cannot be the only indicator of the quality of publications (4). There are other impact indicators as the quartil and decil classification of journals, the immediacy index or the Eigenfactor score, among others, that should also be taken into account (5). The same occurs with citations counts and other consequent indicators, as the h-index. There are other indicators such as the article influence score, normalized and relative citation rates, or the g-index, which depends on the full citation count of very highly cited papers, not on the age of the author (6). As an example, while the h-index increases with the age, the g-index corrects the disadvantages that the first presents for younger authors.

In conclusion a combination of several indicators should be used to define the quality and to evaluate researchers and institutions; and librarians have to be aware about these more specific metrics. This data can also be complemented with new metrics, as usage indicators, including downloads and views, as well as altmetric indicators considering counts or mentions in social media.

Main resources and tools

It was a requisite of the workshop to cover commonly used evaluation tools and resources and offer some hands-on practice. First, we talked about the two main citation databases: Web of Science and Scopus, not forgetting Google Scholar, with its pros and cons: poor quality control and no standardization versus broader coverage and a greater y as a results of its condition as a resource free-of-charge. Other basic resources to be familiar with for the evaluation of journals are the Essential Science Indicators, the Journal Citation Index (Thomson Reuters) or the Scimago Journal Rank (Elsevier), and applications that allow forward-looking metrics such as InCites (Thomson Reuters) and SciVal (Elsevier). Finally, we should also bear in mind the Book Citation Index and the Data Citation Index for other document types.

Assessing and supporting evaluation given by the library

Libraries can offer an important support using bibliometric information. Main activities could be to monitor the institution's scientific output,

including an internal alerts workflow that allows the register of the publications signed by the institution, and developing bibliometric reports. The most significant indicators evaluated could be associated to:

- Productivity / Activity → number of publications to reflect the research output
- Visibility → count of publications in recognized databases; number of articles in peer reviewed journals; measurement of IF; quartiles or deciles
- Collaboration → number of co-authors or co-affiliations to reflect national and international networking
- Impact → citation rates (several citation indicators)
- Cognitive structures → co-occurrences of words, classifications relations between citations, etc.
- Others → main authorship, percentage of contribution, characterization of publications and disciplines, disciplinary vs cross-disciplinary vs interdisciplinary etc.

In addition, in a broader context, we can offer other forms of assessment:

- Identify new research lines and possibilities for collaboration, as well as front research subjects or investigate citation patterns between research groups or journals
- Evaluate external candidates and assist researchers with evaluations or grants requests
- Assess researchers regarding publication sources and strategies
- Evaluate the differences in citation tendencies between research fields
- Do benchmarking comparing research groups or institutions
- Evaluate the technological impact of research through patent citation to journal articles, etc.

Further Library assessment should include help researchers in preparing CVs for appraisals and funding applications, support researchers filling out profiles as Science Experts Network Curriculum Vitae (SciENCv), or in managing their unique digital identifiers as Researcher ID, Orcid, Scopus ID. As a final point, questions related to open access should also be considered, offering consultancy on the available publishing options and how to manage self-archiving, as well as in the evaluation of the impact of open access in research.

Conclusion

Bibliometric assessment can turn out to be an indispensable activity for biomedical librarians. Therefore information specialists need to have a good command of these concepts and practices. In addition, talking about bibliometrics there are some questions regarding the use of metrics in assessing research performance that we should care about. Some of the issues are include in the statement on the “Publication practices and indices and the role of peer review in research assessment”, published by the Committee on Freedom and Responsibility in the conduct of Science (CFRS) of the International Council for Science (ICSU):

- Consider the optimal balance between direct peer reviewing, and the use of quantitative measures.
- Consider the weight applied to the number of publications, the type of publications (primary publication vs review) and other journal or article metrics (IF, quartile, citations, normalized citation impact, etc.)
- Consider the order or the number of authors, as well as the order of signing (first or last, middle, or corresponding authorship), depending on the discipline.
- Consider the weight that should be given to other quantitative measures of research output, such as patent applications, patents granted or patents licensed.
- Consider possible penalizations for authors with more than, say, 20 publications per year or publications with more than perhaps 20 authors.

Summarizing, bibliometric data per se is not enough to evaluate a researcher or an institution, and should be complemented in order to obtain research evaluation results. The principles collected and

released this year in the Leiden Manifesto (7) also remind that research evaluations has to be balanced, based in both, quantitative and qualitative evidence.

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