

Altmetrics: the right step forward

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New generations of scientists and other academics who have grown up with social networking and view-sharing as a way of life are becoming movers in research communities, ushering in the use of networking as a standard knowledge sharing tool. Additionally, emerging economies, especially the BRIC countries (Brazil, Russia, India, and China), are creating new demand for access and new content. The exponential growth of cheap and reliable Internet access in these emerging economies is enabling access to online materials as never before. India and China are expanding their research capacity by expanding their university base and PhD student enrolment, creating further demand for effective publication and results-sharing channels. Added to this is the need to ensure that such research efforts will be able to contribute truly global solutions to the many challenges we face today. Such efforts require global collaboration and more inclusive shared approaches as research solutions increasingly lie outside a single discipline or organisation. Recognition of this trend is reflected in the growing use of open innovation among corporate research centres and the widespread culture of multi-disciplinary research that is becoming more critical to success.

University academics are also facing an ever increasing deluge of new pressures, the most significant of which is the increased and often sole emphasis on the number of publications in the chase for high rankings. This has resulted in some 1.5 million new peer reviewed

articles published each year in a growing pool of subscription journals (SJ). It is therefore not surprising that scientific publishing is a huge global industry worth billions of dollars each year. Universities are facing increasing pressure due to reduced funding coupled with expectations to grow returns on research investment with wider and faster access to their research output. On the supply side, the SJ themselves find it difficult to keep up with the ever increasing number of researchers and fragmentation as new players, e.g. number of subspecialty and regional publications join the fray. To add to this perfect storm, the arrival of the open access journals may be the final tipping point that precipitates the readjustment of the role of the SJ! As is often the case, the traditional business model is under increasing pressure from a number of disparate forces.

During the past two decades, scientific journal publishing has undergone a veritable revolution, enabled by the emergence of the World Wide Web. The second stage in this revolution is access to articles without any restrictions posed by subscriptions, commonly referred to as "Open Access" [1]. Open access journals can be defined as journals that use an alternative funding model where the readers or their institutions are not charged for access. From the Budapest Open Access Initiative (BOAI) definition [2] of open access, we take the right of users to "read, download, copy, distribute, print, search, or link to the full texts of these articles" as mandatory for a journal to be included in the directory. There has also been an expansion of science networking sites, e.g. Biomed Experts (biomedexperts.com), which has more than 400,000 registered members, almost 2 million pre-generated profiles of life science researchers, and links to over 2,500 academic and corporate organisations. Such networks help bring the right researchers together and

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allow them to network, connect, communicate, and collaborate online.

A study published in 2010 showed that roughly 20% of the total output of peer reviewed articles published in 2008 are openly accessible [3]. This trend is clearly illustrated by the number of online references used for this commentary. The arrival of the new open access journal eLife (elifesciences.org) is going to challenge the top SJ such as Science and Nature. We may be witnessing a tipping point in collaboration, faster access, and new opportunities.

As the volume of academic literature explodes, scholars rely on filters to select the most relevant and significant sources from the rest. Unfortunately, scholarship's three main filters – based on citation counting, references in other peer reviewed journals, and the JIF (Journal Impact Factor, which measures journals' average citations per article) – are failing. Altmetrics [4] represent an emerging set of research into new ways of measuring the significance of research. Altmetrics expand our view of what scholarly impact looks like, but also of what's making the impact (Figure 1). This matters because expressions of scholarship are becoming more diverse. Articles are increasingly joined by:

- The sharing of “raw science” like datasets, code, and experimental designs.
- Semantic publishing or “nanopublication,” where the citeable unit is an argument or passage rather than entire article.
- Widespread self-publishing via blogging, microblogging, and comments or annotations on existing work.



Figure 1 Four ways to measure the impact of an article (adapted from Priem et al [4]).

Altmetrics are not citations or webometrics. These latter approaches are related to Altmetrics, but they are relatively slow, unstructured, and closed. Altmetrics rely on a wider set of measures including tweets, blog discussions, bookmarks, e.g. on Mendeley (mendeley.com), a research network or content management site, citations and HTML views, and other social media sites, e.g. Altmetrics on FriendFeed (friendfeed.com/altmetrics) or LinkedIn (linkedin.com/groups/altmetrics-3917723) and are focused on the creation and study of new metrics based on the social web for analysing and informing scholarship. As a result, Altmetrics aim to measure different forms of significance and usage patterns by

looking not just at the end publication but also the wider process of research, collaboration, and contact around the research publications.

Scientific networking is changing and will almost certainly change expectations of publishing. While the debate continues over the success of dedicated science networking sites such as Nature network (network.nature.com), it is clear that growing numbers of scientists and other academics are attracted to Twitter, Facebook communities, and blogs to share their views and comments. Interest in Altmetrics is on the rise, but it is not quite right to call it a movement. The approach could better be described as a sprawling constellation of projects and like-minded people working at research institutions, libraries, and publishers. Even though projects like Altmetrics are in their early stages with many unanswered questions and difficult challenges ahead, and given the crisis facing existing filters and the rapid evolution of scholarly communication, the speed, richness, and breadth of Altmetrics makes the endeavour a worthy investment [4].

Combined, the exploitation of social media as a collaboration tool for research publication and dissemination is likely to change the current landscape in academic publishing with new ways of finding solutions, contacts, and content being created by the users themselves. Newer, better funded and organised open access journals, new science networking sites and new metrics are embarking on exploring new measures to determine the impact of research and not solely on the current publisher, financial-driven, citation indices.

The Biomedical Imaging and Intervention Journal, which was founded on a philosophy of open access with numerous firsts, should now push the boundaries even further by re-examining the concept of scholarly impact factors by embracing networking and Altmetrics to ensure its continued relevance in the highly competitive and ever changing scientific publishing landscape.

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