

## Science communication impact on journals visibility in Brazil

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### *Introduction*

Increasing pressures for improvements in the quality and visibility of Brazilian science journals demand that editorial teams consider strategies to reach a broader audience. This is not only to fulfill a social role and justify public investment, but also a strategy to disseminate scientific knowledge, increase the credibility and visibility of national journals, attract new and best referees and authors and indirectly help the Brazilian science production to have more impact in the country and abroad.

The use of social media, as Facebook and Twitter, and online reference managers, as Mendeley or ResearchGate can promote broader access to information, recognition of the researcher's work, as well as contribute to alternative metrics that complement the traditional indicators of science production as the Impact Factor. In Brazil, there are more than 41 million users on Twitter and about 99 million active users on Facebook, which makes these social networks powerful vehicles for the dissemination of scientific information, increasingly used by the academic community (Sanchez et al., 2014).

Recognizing the potential of the internet, alternative metrics can measure the access, downloads, shares, comments and other variables that identify the interaction with online information. The Altmetric (Priem, 2010) identify and measure different uses of scientific information by analyzing users interaction with 15 different output including social media, blogs, reference managers, news outlets and policy documents (Davies, 2015).

Science communication can be a key strategy to increase the visibility of Brazilian science journals both among experts and the general public. This strategy has already been implemented by science journals of great prestige as *Science*, *Nature*, *Proceedings of the National Academy of Science*, *Plos One*, the *Journal of the American Medical Association*, the *New England Journal of Medicine* and *The Lancet*, to name only those that frequently appear in the media (Barata and Menezes, 2013).

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The social media, particularly, can raise the possibility of science journals achieving non-experts, decision makers, journalists and others potential readers. Therefore, science results and conclusions can more rapidly been absorbed by society. In the Brazilian case, science journals can conquer an important place in a scenario dominated by less than 10 science journals that often appear in the news (Barata & Menezes, 2013).

Just the fact that science journals make online editions available facilitates the rapprochement between the scientists and non-experts (Valerio & Pinheiro, 2008). Valerio and Pinheiro claim that these publics convergence allows “greater visibility and recognition of the importance of science, promoting the awareness of society in relation to greater participation in the formulation of public policies on science and technology for development” (p.161). However, with the expansion of the World Wide Web and the continuous production of great amounts of information, science content can better reach the public when it is recommended, commented, shared, retweeted, liked by friends or colleagues who work as a very selective information filter and, thus, define what is worth reading.

In the case of science journals, it seems evident a growing effort to approximate the specialized languages with the one used by popular science magazine, by the use of tools that aim to collect and disseminate the main summaries papers, events, theses, awards, press releases and other papers to science journalists and a wider audience. This is the case EurekaAlert!, founded by the AAAS in 1996, and AlphaGalileo, founded by the British Association for the Advancement of Science (BAAS) in 1997, two alert services well known among science journalists. In Brazil, there are efforts to create similar services, such as SciELO virtual library, that launched in 2009 a section of press releases and since 2013 has a blog (<http://blog.scielo.org>).

From July of 2015, the Scientific Electronic Library Online (SciELO) – main open access scientific repository of Latin America and one of the most important in the world, responsible for establishing criteria that has influenced improvements in Brazilian science journals quality. SciELO added another criterion for inclusion and maintenance in its indexing: the use of social media and / or blogs to disseminate the content published by the journals. In your item 5.2.18 concerning the marketing and communication is required:

*“(...) Press releases should also be shared with the SciELO and published on its website. From July 2015 it is expected that journals disseminate new research on the most relevant social media, using Twitter, Facebook and/or other systems. They should also develop mechanisms that promote the presence in systems of information management and communication researchers, as the Academia.edu, Mendeley, ResearchGate, etc. Journals can make use of their own or collective initiatives, including the ones operated by SciELO in social media such as Blog SciELO in Perspective” (SciELO, 2014, p.20).*

This new policy is parallel to a movement that has taken place among the Brazilian science journals mainly from 2013 opened pages on social media, especially Facebook and sometimes other social media or blogs. A survey of 139 scientific journals indexed in the USP Journals Portal, the largest of its kind in the country, found that 50 of them (36%) have Facebook page, and most of them were created between 2012 and 2013 (30) and in 2014 and 2015 they added up other 8, and in 2011 or earlier other 12 journals opened their fanpages. However, many are outdated or cannot be considered active. There are 21 journals fanpages (42%) that can be considered as active, among which: 38,1% from Biomedicine; 28,5% from Human Sciences; 14,3% from Linguistics,

Literature and Arts; 9,5%; Engineering and Exact Sciences; and 4,8% from Social Sciences and Agrarian Sciences, each (data recorded in September 2015).

The new criteria required by SciELO, the Brazilian journal index that has contributed to setting standards of editorial quality, can cause a ripple effect in other Brazilian journals, especially those that want to be indexed in SciELO, and thus expand science communication within their reading public, the media, and society.

This study has evaluated the impact of the disclosure of articles published in Brazilian science journals at Facebook. The ten most accessed posts of four Brazilian science journals on Facebook with good public engagement (over a thousand likes) and weekly publishing contents were selected, namely: *História, Ciência, Saúde Manguinhos (HCSM)*: 7,838 likes (<https://www.facebook.com/RevistaHCSM/>); *Psicologia USP*: 5,568 likes (<https://www.facebook.com/RevistaPsicologiaUsp/>); *Revista Brasileira de Educação Física e Esportes (RBEFE)*. 4,867 likes (<https://www.facebook.com/reveefe/>); *Revista de Medicina*: 21,197 likes (<https://www.facebook.com/revistademedicina/>). All data was collected in April 2016. The same analysis was done for the Divulga Ciência blog (<https://blogdivulgaciencia.wordpress.com/>), dedicated to communicate the Brazilian science journals through science communication, funded by FAPESP (process: 2013 / 10075- 8) and SciELO em Perspectiva Blog.

The goal of this analysis is to measure whether the papers communicated by Facebook can produce more access/downloads in their full content, using the statistics of SciELO (for journals *HCSM*, *Psicologia USP* and *RBEFE*) and at USP Journals Portal (*Revista de Medicina*, *Psicologia USP* and *RBEFE*).

### *Method*

We have considered the ten posts with the greatest visibility on 4 Facebook pages (Fanpages) of Brazilian science journals and 2 blogs about Brazilian science journals that included a link to the full paper content. The top ten posts have been sent by the staff from each fanpage and blog and collected in September 2015. For Facebook the top ten posts were considered for a 6 month period, and the blogs from the whole period of publication. We have also registered the figures of public engagement – likes, comments or sharing – on Facebook, and the date of publication of all posts.

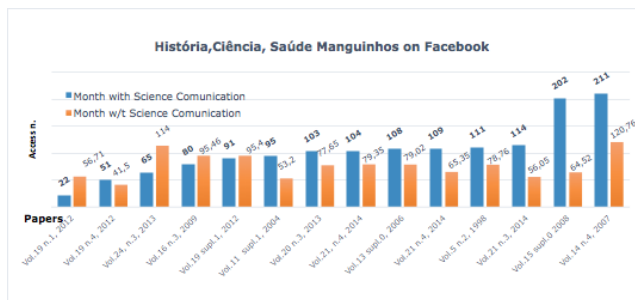
We have compared the access of each paper that has been released as a post on Facebook or Blog with access data registered in the science journal site before and after the period in which it was published in the social media.

Access values in the month of posting on Facebook/Blogs were then compared with the accesses during the previous month and the average number of hits the paper received monthly since its publication in the journal's website (SciELO or USP Journal Portal), excluding the value of the month in which the paper was published.

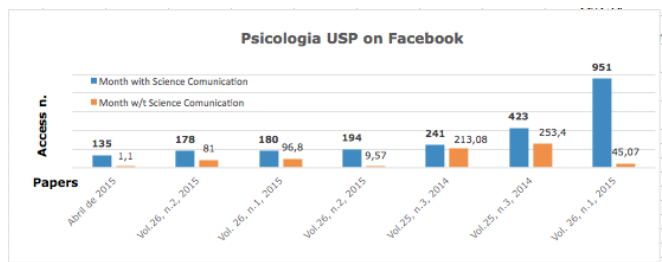
### *Results*

There were 45 valid papers analyzed (4 posts were discarded since they were about the whole journal edition or the paper link was missing) on Facebook; 5 negative results (11,1%); average people reached 3,827 per paper. From the 41 posts that generated greater audience reach on the

Facebook, there is a clear increase on the access of papers in the month when they were published in the social media (blue) comparing to their average access in the other months (red), as shown in the Graph 1, 3 and 4.

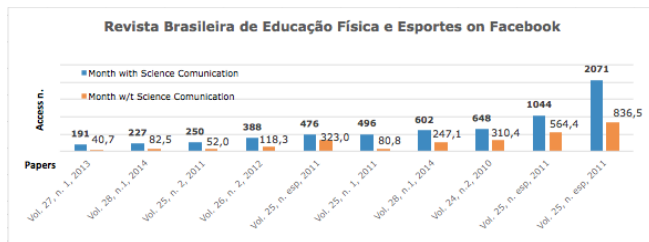


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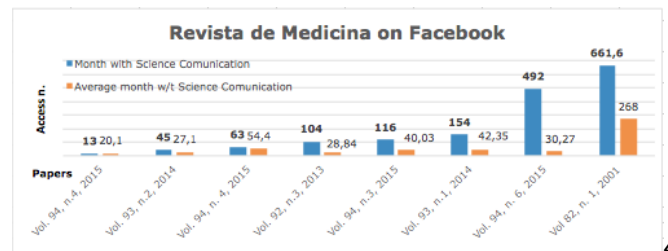


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**Graphs 1, 2:** Access to papers in the month they were communicated on Facebook (blue) comparing to the average access in the month without science communication on Facebook (red) in two Brazilian journals



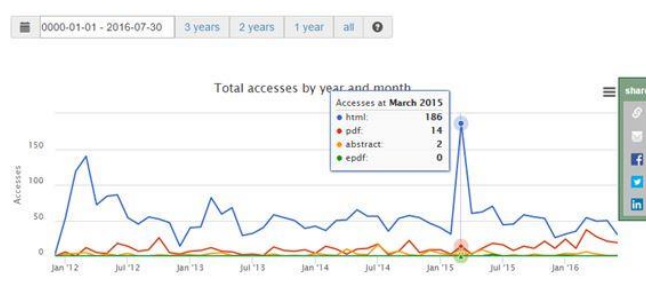
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**Graphs 3, 4:** Access to papers in the month they were communicated on Facebook (blue) comparing to the average access in the month without science communication on Facebook (red) in two Brazilian journals

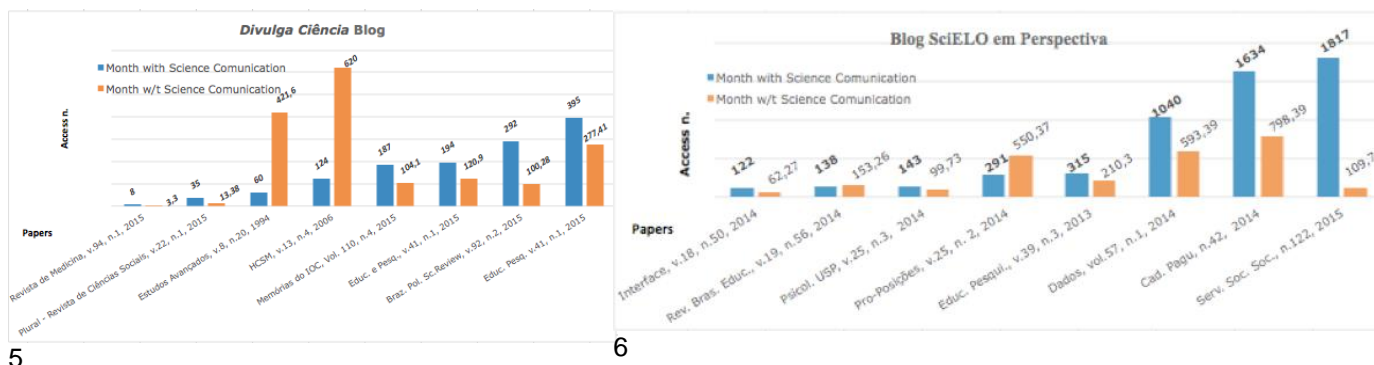
For the *Revista de Medicina* the average increase on the paper access was 222,6% in the month when the posts were released on Facebook. The access was 140,7% higher for papers of *RBEFE*; 229% for *Psicologia USP*; and impressively 388,3% for *HCSM*. Although the percentage varies within the papers of those journals, it shows a raise in the access of papers in the month they were releases as post news on Facebook. The data become even more interesting when we take a look at specific papers. “Prominence in the media, renown in the sciences: the construction of a paradigmatic feminist and a scientist at Rio de Janeiro's Museu Nacional” (Vol.5, supl.0, 2008, *HCSM*) was mentioned in the post “Tsunami feminino” on Facebook in 8<sup>th</sup> of March 2015, International Women’s Day and it got 80 shares and 67 likes. Considering that this is an old paper (2008) that was a reading suggestion in 7 years later, the access pick after science communication on Facebook is clear (figure 1).



**Figure 1:** Pick of access of paper published on *HCSM* in 2008 and suggested as reading at the end of a post on Facebook.

At the two blogs analyzed there were 16 valid papers considered (4 discarded), 4 negative results (25%) and an average of 1,004 people reached per paper.

The posts published in the blogs show a smaller advantage when comparing to communication done through Facebook, probably reflected by the diminished number of people reached. For Blog SciELO em Perspectiva there was an increase of 113,4% in paper access in the post month, comparing to only 4,4% on papers communicated by *Divulga Ciência* blog. Two papers received got much more access monthly than during the month *Divulga Ciência* blog published a post: both related to Math and were secondary to the main topic which was the authors rather than the research, which might have contributed to public interest to their biography but not to their paper, that was only mentioned at the end. Although more data is necessary, blogs potentially have less visibility than Facebook and, therefore, count on posts on Facebook to boost their readership, as *Divulga Ciência* and SciELO do (Graphs 5 and 6).



**Graphs 5, 6:** Access to papers in the month they were communicated on blogs (blue) comparing to the average access in the month without science communication on blogs (red) in two Brazilian journals

Interesting to notice that 56,1% of all posts included papers already published a year before, which shows both that the topics are still relevant and interesting for public debate. An example is the two most accessed papers (v.25, n.esp) from *Revista de Medicina* were published in 2011 and were a reading suggesting in posts on Facebook in July 2015. Although it is desirable, from the journalistic point of view, that communication occur immediately after the publication of a new paper, for the present study it was particularly important to compare the access to those “old papers” in the month of posting on Facebook or Blogs (i.e. figure 1), with the access in the other average months. It is common that the papers recently published have a pick of access, and therefore it could be difficult to affirm if the accesses were a result of communication on Facebook.

A future study can be conducted in order to measure if science communication on social media can not only contribute to increasing visibility, access/downloads to papers, but also more citations as it has been indicated (Phillips et. al., 1991). We can predict that more visibility could lead to more citations, since one can only cite a paper once – at first place – the paper is known and read.

As for the Altmetric, the majority of papers (except from *Revista de Medicina*, that are not indexed at SciELO and, therefore does not have Altmetric) generated scores. Yet, they are not related to greater shares or likes on Facebook. The paper from RBEFE (v.26, n.2, 2012) with the highest Altmetric (6) was the 8<sup>th</sup> post in public range (2.169) and produced 25 shares on Facebook, comparing to a paper (v. 25, n. esp., 2011) with the most shares (36) and public range (5791) that only produced 1 score at Altmetric. The scores at Altmetric mainly considered science communication on Facebook due to science communication efforts of the journals.

It is still missing an effort to make the Altmetric identify efforts in blogs and Fanpages as the project *Divulga Ciência* that publish news about Brazilian papers but which are not visible to Altmetric search tool. In order to be identified by Altmetric it is necessary to publish the original paper link



(Paper DOI), and the media and blogs must be part of their collection, included in their system. The paper "First report of autochthonous transmission of Zika virus in Brazil" (v.22, 2015) published in *Memórias do Instituto Oswaldo Cruz*, for instance, was mentioned in a post at Divulga Ciência blog in 19<sup>th</sup> of June, 2015. It is the highest score at Altmetric in this analyzes (167) yet it does not register the blog, which posted much sooner than the first blog registered (On Biology on 4<sup>th</sup> of February 2016).

We have also observed that even interviews published on Brazilian journals and that have been suggested in a post on Facebook could produce an increase in the number of downloads when it was compared to another interview in the same issue. This also happened comparing papers in the same issue: the one that has produced a post on Facebook, on average, generated more access than the others which have not been on the social media.

### *Conclusion*

Our results point to a positive relationship between science communication on Facebook and blogs and the increased in paper access/downloads. Further studies should be conducted in order to understand the social impacts of science in engaging the public and the different types of engagement produced by each social media.

There are already important changes in the culture of science communication performed by Brazilian science journals and they are just beginning. Science publishers have increasingly demonstrated interest and openness to implement more ambitious communication strategies and abandoning the traditional role of communicating just to limited expert readers.

The fact that Facebook is a free social media, however, does not exclude the need to invest in staff (hiring or training) to develop appropriate, frequent and varied communication strategies to increase the visibility and appreciation of Brazilian journals inside and outside the academic community.

Brazilian science journals have the potential to attract public attention through science communication on Facebook and blogs, since they produce qualified and relevant content, especially for Brazilian society and therefore can generate science. This is a practice already adopted by some traditional international and prestige journals and some International journal publishers that work as gatekeepers of science information. Brazil, which has been considered an example in open access journals, can take advantage of science communication through social media and blogs since its content can be easily and freely shared. Therefore, science communication efforts should be considered as a way to value and expand access to scientific knowledge published by Brazilian journals.

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