

**Science blogs: communication, participation
and public engagement**

Vanessa Oliveira Fagundes

Universidade Estadual de Campinas (Unicamp)

vafagundes@yahoo.com

Abstract

The communication of science is in the core of science production. More than showing the peers the results of researches, scientists are increasingly engaging themselves in initiatives that seek to share information with people in general, which is related to an attempt to search for accountability and legitimacy. In this context, the internet emerged as an ally, offering a large range of tools that allow people with no technical knowledge to post and share information with a wide and diverse audience. One of these tools is the blogs, a specific category of websites characterized by short and frequent texts, organized in a descending chronology, usually with space for readers' comments. By tracking a Brazilian science blogs condo - ScienceBlogs Brazil, this article proposes to analyze the communication strategies used by scientists / bloggers to attract and interact with people. The intention is to discuss the effectiveness of these strategies in terms of audience and construction of knowledge through the comments left by readers.

Introduction

Theoretical physicist John Michael Ziman (1925 - 2005) made important contributions to the field of Sociology of Science. More than defending scientific research as a social activity, a "well-defined conscious artefact of mankind, with well documented historical origins, with a definable scope and content" (ZIMAN, 1979, p.17), he believed this "institution" was supported by two pillars: the study of nature and the communication of achieved results (GRECO, 2006). For him, science could be divided into an initial "private" phase, carried out by groups of scientists in their labs, and a next stage, "public", as important as the first, which is the communication of the acquired knowledge. The first one, by itself, would not be enough; without the second one, there would be no science.

Science communication, to Ziman, ensures the continuity of science because, from its dissemination, other researchers could develop their studies, corroborate or refute data and define new fields of study. Through communication, consensus would be established around what is correct. As he points out, the aim of science is not only acquire information or stating indisputable postulates; Its goal is to reach a consensus of rational opinion covering the widest possible field (ZIMAN, 1979). As so, reporting the results and the latest findings would be a fundamental part of the activity of scientists. To ZIMAN (1984), the basic principle of academic science is that research results must be published. Whatever scientists may say or believe as individuals, their discoveries could not be deemed a part of scientific knowledge until they have been reported and recorded permanently. As a consequence, the communication system would be the fundamental institution of science.

The communication of science can be made by many channels, from scientific journals, research reports and scientific articles to conversations and public conferences. Today, an effective channel for access scientific information is the internet. To DELFANTI (2008), the world of research, which is based on communication and on the exchange of information, is now fully exploiting the collaborative instruments that are at the core of the production of web contents we know as web 2.0.

The expression web 2.0, or second generation of the World Wide Web, refers to a new phase of the internet, where interactivity is increased to the maximum level, allowing anyone to be, at the same time, a producer and a consumer of information. According to ROSA and ISLAS (2009), web 2.0, or the social internet, enabled and fostered communication and interaction and gave rise to communities of interests and social networking, information exchange and collaborative work in real time.

For science, web 2.0 opened new possibilities by offering tools that are easy to use and does not require specific technical knowledge. Through blogs, wikis and social networks, a growing number of scientists publicize their production, sometimes even before the publication in a traditional scientific journal. In 2009, the scientific magazine *Nature* released the article "Science journalism: supplanting the old media". Based on interviews with scientists and journalists, it has shown that there was a great amount of material available on the Internet by scientists and research institutions. To the magazine, it would indicate that, from the point of view of science communication, we would be living in a kind of golden age.

The blog¹ communities dedicated to the discussion of science and technology seem to be an interesting place to investigate the emergence of a new type of scientist who uses the internet as a playing field. In blogs, it is possible to observe the construction of knowledge through the interaction between readers, the attempts to engage a community around specific subjects, the construction of new identities, among others. These points were explored in FAGUNDES (2013), based on the observation of a Brazilian community of science blogs: the ScienceBlogs Brazil. In this article, the proposal is to highlight the communication strategies used by these scientists to reach their target audience - reportedly, lay persons, or the ones who are not scientists.

Methodology

The communication of science, related to accountability and to greater transparency in the process of knowledge production, emerges as a new challenge for scientists (GIBBONS, GRECO, CASTELFRANCHI). According to POLINO and CASTELFRANCHI (2012), the communication of science would be, nowadays, not only a moral duty for scientists, or a necessity for the publics, nor only a tactical need for scientific institutions that try to legitimate politically their activity or to gain funds and sponsors; moreover, it would be a spontaneous and necessary process in the functioning of techno-science. After all, science also happens in front of cameras, with public funding being decided in accordance with the visibility of the causes and scientific controversies being solved within the internet.

ScienceBlogs Brazil (SbBr) is the national version of the largest condo of scientific blogs in the world. It was created in August 2008 with the name "Lablogatórios", as a result of a personal project of two biologists from the Institute of Biosciences of the University of São Paulo, Carlos Hotta and Atila Iamarino. The idea was to share credibility and achieve greater audience to an area that, according to Iamarino, would still not have a large visibility. For him, the logic was simple: each blog already had a number of readers who followed their publications. By bringing them together in one place, this audience could be shared with others and expanded, and the credibility that each blog already had would serve as a recommendation for the reading of "neighbors". Today, the condo hosts 48 blogs by authors from different science fields. Despite having journalists and curious among the authors, most of them

¹ Blogs are a specific category of website characterized by the publication of short and frequent texts, organized in a descending chronology, usually with space for readers' comments (AMARAL et al, 2009).

are scientists in the early stages of their careers, many still attending postgraduate courses (master and doctorate).

This study has an ethnographic inspiration. We followed the authors of the blogs in their work of science communication, seeking to notice how they show themselves through texts and covered topics and how they interact with the readers. We will use the data collected for the research for the master's degree, conducted at the State University of Campinas and finished in 2013. For this reason, the observation of the dynamics of this community refers to the period of July 2011 to July 2012. Worth pointing out that, before this, we already followed the community by personal interests and at the end of it, we continued to access the material. In order to find the interests and motivations of these scientists / bloggers we also did some interviews with characters that are part of this universe, in person and by telephone.

Results

In order to speak directly to the public, not using the traditional intermediates (journalists and research institutions), some journalism resources were appropriated by the scientists/bloggers, many of which are often criticized by them when used in the mainstream media articles. The explanation of terms, for example, even those that might be considered commonplace in scientific groups, and the use of metaphors, approaching scientific concepts to daily and common experience, are some of these strategies. The majority of bloggers from SbBr also prefer a more colloquial language, including slangs.

From the observation of the texts published in the period mentioned, it is also possible to make inferences about the choice of the covered topics. End of the world in 2012, homosexual marriage and healthy food - issues that usually arouse the interest and curiosity of people - are some of the issues that were discussed in the SbBr. The use of topics that are on the agenda of other communication channels - and not necessarily in science's agenda - demonstrates the effort to attract readers who do not belong to academia.

Another point is the use of appealing titles to draw attention. In journalism, it is called sensationalism. For example, some years ago it was easy to find articles about "God particle", the way the Higgs boson has become known. The "nickname" was spread by the scientists themselves, in an attempt to make a complex topic of physics more seductive. We find similar cases inside the SbBr. According to Iamarino, the most

visited post of the condo has the title "Wild sex in the seaside", published by the blog Caapora. The text, in fact, talked about two flies copulating in the sand. The post reached 10,000 visits per day, but the comments made it clear that readers expected another type of subject when accessing the page.

To Roberto Takata, one of the interviewed bloggers for the study, the three most searched topics on the internet are sex, sports and music. And, sometimes, bloggers from SbBr benefit from it. He says that one of his posts with greater impact discussed statistical probabilities, but used as an example Paul, the Octopus - animal that became famous in the 2010 World Cup for guessing who would win matches. It reached four thousand daily visits, a number well above the average of 200 daily visits. This type of strategy is commonly used by scientists in order to increase the penetration and impact of their communication.

Hoping to attract more readers and comments, some bloggers use strategies such as raffles and surveys. An example is a game proposed by the blog Ciêna a Bessa, in a post from June 27, 2011. A kind of cultural contest promised copies of a newly released book for the best comments. As a result, 24 people expressed themselves on the subject. The examples above demonstrate knowledge about the process of news production and about how to use it for their own benefit, in order to achieve the purpose of communication with the public in general.

Discussion

Observation shows that there is indeed an effort to attract an audience different from the academic peers. This effort is noticed in language, in the selection of issues and in the use of strategies such as sensationalist titles and raffles. It is effective, at least in relation to new readers. Concerning comments, however, such strategies are not sufficient to ensure a more participative community, since not all visitors write the impressions about what they just read.

In SbBr, most bloggers identify this exchange with readers as the main reason to start writing a blog. The interviewed bloggers were unanimous in highlighting the importance of this space. Iamarino, for example, believe the comments are the best way to learn more about something, because they usually bring tips, references to other papers or suggestions that ends up expanding that information initially posted. To him, there would be many advantages in science communication in the Internet: low cost, long range, simplicity of use and the possibility of adding material in different media

are some of them. The main one, however, would be the possibility of exchange information between users. "In blogs, there is a real exchange. The discussion leads to a process of constructing knowledge. It is the opposite of what happens, for example, in the comments of newspapers' or magazines' websites, where you merely see single opinions."

Even succeeding in the choice of strategies to encourage new visitors, what we saw, in the comments space, was the frequent presence of the bloggers from the community, who have the habit of posting about their neighbors' texts. In one hand, this is positive because adds new insights to the debate and works as an indication of reading for their own public. On the other hand, it seems that the discussion is limited to a group of "initiated in science", raising questions about the potential for science communication to lay public. Despite the efforts to write texts to this group of non-experts, using colloquial language or focusing on controversial issues, it is questionable whether the work achieves its goal.

We emphasize, however, that the lack of comments does not mean lack of readers. We should consider, in this sense, the integration of blogging with social networks like Facebook and Twitter. After the changes in the condo's layout in August 2011, the links to those sites became more visible. As a consequence, it seems that many visitors, rather than leaving a comment, choose to indicate the post to his friends.

We can verify this hypothesis by checking the considerable number of recommendations in the form of "like" or "tweet". For example, the post "The second most beautiful thing to see on Earth ... ", published in the blog Nightfall in Magrateha on March 17, 2012, received no comments, but was "liked" for 31 people and "tweeted" by 3. It means that 34 visitors read the text, but had not written in the space for the comments, preferring the recommendation to their network on Facebook and Twitter. In the blog SocialMente, the post "Do you have talent for psychology?", from October 23, 2012, received 22 comments. However, it was recommended on Facebook by 1,282 people and on Twitter, by 18.

Such social networks serve, at the same time, as a gateway to other readers, who end up knowing the condo by suggestion of friends, and also as an exit. After all, the discussions that would be originally found in the blog scape to other channels, making it difficult to observe the effects. For the communication of science, whose goal is to achieve the greatest possible number of readers, this is not a problem, since the information will be circulating in heterogeneous environments. But for blogging is a

dilemma, especially within a proposal for interaction and exchange of knowledge.

Conclusion

Today, not only the communication to the peers, but also the dialogue with society, seems to have become an essential part of scientific work, deserving attention and commitment of scientists, both those who are already known in their area and the ones in the early stages of scientific career. This perception opened way for new experiences of communication, many of them on the internet. Science blogs are an example.

In 2010, the microbiologist Rosemary Redfield, a researcher at the University of British Columbia in Canada, gained notoriety by contesting on her blog a scientific article published by NASA. Besides debates about the validity of experiments and publications made in the Internet, opened to collaboration, she started a discussion about the need to communicate science to the public and the importance of greater transparency in the production of knowledge. To her, talk to the society had become a necessity. “To my mind, what’s changed for the worse is the public appreciation of/trust in science. Especially in the USA, many people distrust scientists, and this is exploited and increased by political groups. Good examples are anthropogenic global climate change and vaccinations. So we can no longer count on public support - we need to actively work to build it”.

In SbBr, this concern is expressed in the dedication to science communication and in the search for strategies to attract a multiple audience. From the observation of the condo, it seems possible to say that, regarding to the audience, they succeed and managed to attract a significant number of visitors. We must also mention the sophisticated use of communication, with an investment in audiovisual content (like videos and podcasts), and the work with social networks. However, regarding to the construction of knowledge through interaction with readers, we believe that the transformation of these channels in arenas of discussion is still in a construction and legitimation process. Blogs have a latent potential for the exchange of information and experiences. But reach a broad audience and transform the community into a space of debate on science is still a challenge that the group seeks to overcome.

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