

“Science in the air”: Old-fashioned media meet digital tools for Science Communication

Alan Sales Barbosa

Departamento de Fisiologia e Biofísica, Instituto de Ciências Biológicas (ICB), Universidade
Federal de Minas Gerais (UFMG), Belo Horizonte, Brazil

Daniella do Valle

Departamento de Biologia Geral, Instituto de Ciências Biológicas (ICB), Universidade Federal de
Minas Gerais (UFMG), Belo Horizonte, Brazil

Elisa Gonçalves Andrade

Departamento de Bioquímica e Imunologia, Instituto de Ciências Biológicas (ICB), Universidade
Federal de Minas Gerais (UFMG), Belo Horizonte, Brazil

Paulina Maia Barbosa

Departamento de Biologia Geral, Instituto de Ciências Biológicas (ICB), Universidade Federal de
Minas Gerais (UFMG), Belo Horizonte, Brazil

Adlane Vilas-Boas¹

Departamento de Biologia Geral, Instituto de Ciências Biológicas (ICB), Universidade Federal de
Minas Gerais (UFMG), Belo Horizonte, Brazil

Introduction

Communication and popularization of scientific knowledge play an important role in social inclusion as they aim to reach a broad public, not only those who are already literate or hold previous related knowledge. Science communication may also serve as a support for formal education, allowing for faster updates between research data and subjects taught at schools, for instance. Scientific and technological innovations promote changes in such a fast rate that it cannot be fully addressed during school time (Moreira, 2006; Candotti, 2002).

Brazil has witnessed an increase of science communication-related actions along the last two decades. These actions include the opening of science centers and museums, launch of specialized websites, newspaper sections, magazines and books, as well as the promotion of events. Many of them were financially supported by government agencies as part of implementation of public policies introduced in 2003. These also included the creation of a Thematic Committee for Science Communication in CNPq, an important federal funding agency, stimulating and academically valuing professors and researchers involved with these actions – especially through grants for science communication projects (Ferreira, 2014).

The initiative “Ciência no Ar” (Science in the Air) was started in 2011 at the Institute of Biological Sciences (ICB) of the Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, Brazil, in an attempt to organize and support several science popularization actions in course since 2005.

¹ Corresponding author, email: adlane@ufmg.br)

Initially, the radio was the first media utilized, then the Internet and, finally, a very unusual media for science communication: metropolitan buses. Science texts are displayed on bus seats after being broadcasted on the university radio station. They attempt to relate science and the day-to-day life of the public and reach different audiences with distinguished scientific knowledge, thus playing a role in social inclusion and in developing critical citizenship. “Ciência no Ar” encompasses several projects, including “Ciência para Todos” (Science for All), “Na Onda da Vida” (On the Wave of Life), and “Ritmos da Ciência” (Rhythms of Science), which are the main focus of this study.

Even though the importance of these projects has been recognized in academic and non-academic spheres (Silva et al. 2014; Vilas-Boas and Botelho, 2014), it became increasingly evident that it is necessary to introduce digital resources and virtual spaces of communication. Tools such as blogs and Facebook supposedly enable greater public outreach and allow the projects to surpass even international boundaries. However, how can this outreach be measured? Where should efforts be put on in order to increase outreach and public engagement? With that in mind, this study is an attempt to evaluate the public interaction and reach of scientific information conveyed by the program “Ciência no Ar” in different communication media.

Method

The websites for the science podcasts "Na Onda da Vida" and "Ritmos da Ciência" are hosted on the server of the Universidade Federal de Minas Gerais. The project has been developed at UFMG for 11 years, and despite its website launch in 2006, a platform for analysis of internet traffic was only implemented in 2011. Also in 2011, another website was developed on the same server to host information about the project "Ciência Para Todos" and the texts circulating in the city buses.

The websites of the projects were monitored using Google Analytics, a free system that tracks online traffic and can be installed on any site or blog. It stores data regarding user behavior and other information, allowing the site manager to have access to real-time content and track public activity on the platform. Using this tool, it is possible to gather data referring to the profile of users; visitors' geographic location and how they reached the site; user interest (how many times the site was visited and how long they remained connected); and which topics and pages were most popular amongst them.

In addition to Google Analytics, data from the projects' Facebook page was used to compare page popularity as the projects expanded. This information is provided by Facebook itself and includes number of total likes, total number of people reached by posts, and gender and age of users who like the page.

Here, we analyze stored data starting in 2011 to current time about the projects “Ciência Para Todos” and “Na Onda da Vida”. The findings obtained from this study, combining data from Facebook to those provided by Google Analytics, can help direct the future actions for the projects.

Results

The “Na Onda da Vida” website/blog has nearly 220 thousand page views in its history (Fig. 1A, left). Despite the differences in the content, year of creation and frequency of postings, the audience from both websites are similar in relation to localization. Being written in Portuguese, it

was not a surprise that the majority of users accessed from Brazil, with few records from other countries (Fig. 1B). In Brazil, access originated primarily from Belo Horizonte and São Paulo (making up a maximum of 30% of total access for each of the projects). However, there were users registered in the cities of Rio de Janeiro, Brasília, Recife, Salvador, Curitiba, Campinas and Fortaleza (Fig. 1C). The majority of users are first-time visitors on the website (79% for “Ciência Para Todos” and 83% for “Na Onda da Vida”) and remain on the website for an average of 1 minute and 41 seconds to 3 minutes and 40 seconds respectively. Bounce rates (which measure percent of single page view) for “Na Onda da Vida” and “Ciência Para Todos” varied between 36% and 46%, respectively (Fig. 1A). Mainly, access to the site was done on Windows (79% to 81%) followed by Android operating systems (9% to 10%) (Fig. 1D).

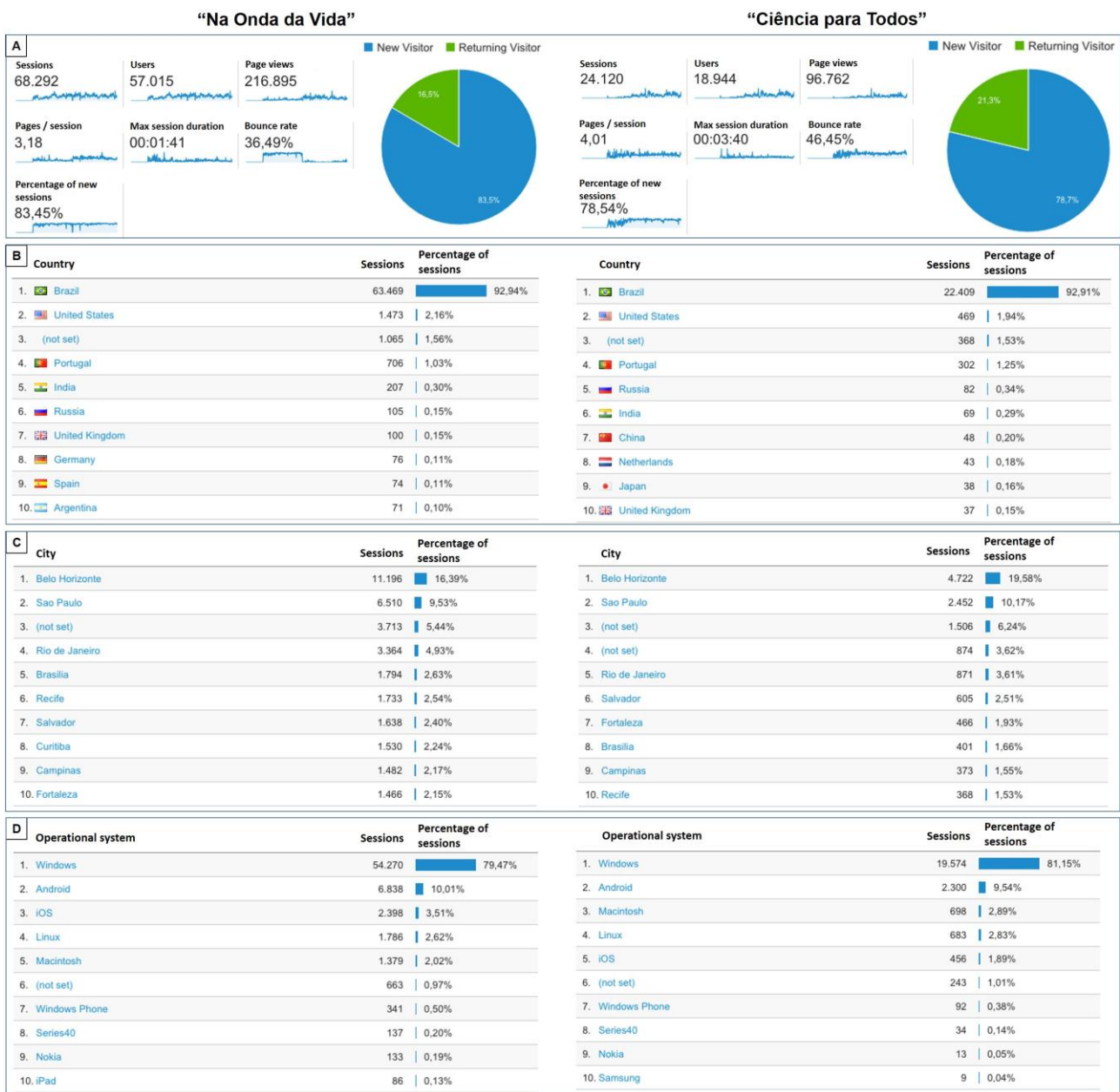


Fig. 1: Data generated by Google Analytics from the websites of the projects “Na Onda da Vida” (On the Wave of Life; left side) e “Ciência para Todos” (Science for All; right side) from 2011 to 2016.

Regarding subject matter, from the about 220,000 page views at “Na Onda da Vida” website/blog, the most accessed pages refer to three specific programs about menopause (12.7%), scorpions (9.6%) and cachaça - sugar cane liquor (7.8%). These have several comments and interaction with the project team and users. A more modest audience accessed the “Ciência Para Todos” website/blog, with nearly 100,000 page views (Fig. 1A, right).

The use of Facebook can be described as timid by the project team with a limited number of likes and shares, especially if one considers the number of worldwide users (Fig. 2, upper left). Throughout the projects’ timelines, there are peaks of access, which could be associated with events put on to promote the projects, such as task-force for distributing a new batch of texts in the buses. These events are announced on social media, mass emails, and sometimes even covered on television by local stations. Thus, we hypothesized that an influx of online traffic might result on the project websites; however, no correlation was observed.

Anyhow, a major leap in total number of likes occurred from June 2015 until present - in just this period, the number of likes since the page started in 2011 was tripled (Fig. 2, upper right). A fact that may have contributed to this increase is the establishment of regular activity, which attracted more viewers. Consequently, the number of people reached by posts and user engagement (such as commenting or sharing a post) saw a rise as well (Fig. 2, upper and lower left). Interestingly, women make up 60% of total viewers; however, for both genders, around 50% are people between the ages of 18 and 44 years (Fig. 2, lower right).

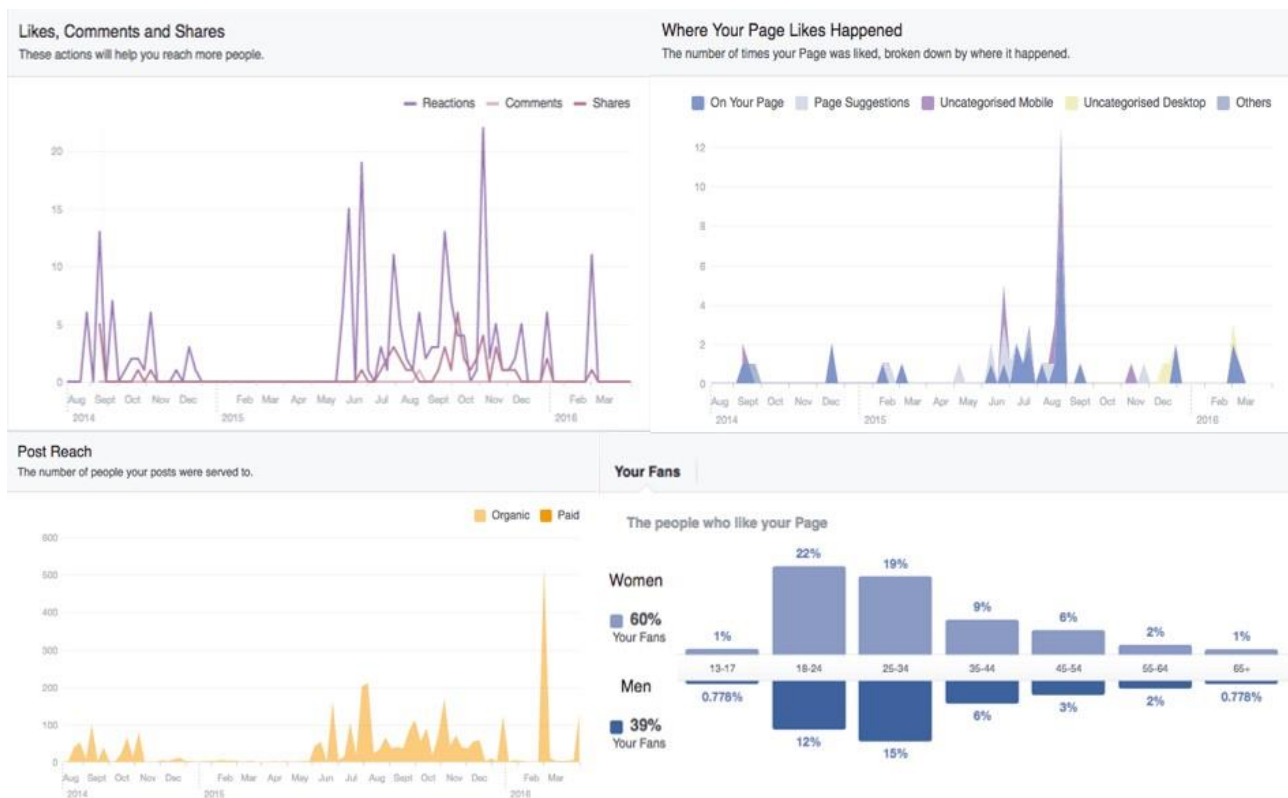


Fig. 2: Data generated by Facebook from 2014 to 2016.

Discussion

Evaluating public engagement is not an easy task. The nature of the projects discussed here is not limited to physical spaces making measuring even harder. The “Ciência Para Todos” texts are found only on certain bus lines in the metropolitan region of Belo Horizonte and, although interviews with bus users give some information about acceptance of the project, we do not have true numbers of readers. Though statistics from the city bus company indicates that there are 18 million potential readers each year, they are all restricted to specific regions and there is no concrete data on how many bus passengers actually read the texts. The same is true for the podcasts aired on the university radio, “Na Onda da Vida” and “Ritmos da Ciência”, since, while the radio station is transmitted to all of Belo Horizonte and surrounding regions, it may only reach farther regions and cross state borders with the help of the Internet. This is why having a digital space is essential to increase the projects’ outreach.

While the majority of access still comes from Belo Horizonte, records of users from many other cities, states, and even countries around the world support the idea of popularization of science, which is the backbone of “Ciência no Ar”. Information is not limited to a certain region and anyone with access to the Internet, a tool which has grown in popularity just from the beginning of the projects, can learn more about the research done at the Universidade Federal de Minas Gerais (UFMG). In Brazil, the percentage of the population aged 10 years and older that accessed the internet through a personal computer increased 5% in just one year, going from 49,4% in 2013 to 54,4% in 2014 (IBGE, 2014).

The internet also allows “Ciência no Ar” to obtain and incorporate information from other science institutions into the program to further appeal to the international public. It is interesting to point out that the projects’ association with the University website might also be a contributor to their online popularity in Belo Horizonte.

The fact that the majority of access comes from computers run on Windows points to an interesting social-economic reality of the project audience. While other, more modern digital tools can give users almost immediate access to content (such as, using a smartphone to look up information displayed on one of the bus texts or heard on the radio), this does not happen. Almost all users will access the site from a desktop computer. This can be a reflection of many factors, including that internet service is not available to the population in general and many people do not use cell phone services to access the web except on Wi-Fi. Additionally, people are often discouraged to make use of smartphones and other technology in buses (Gonçalves and Vilas-Boas, 2014) - there might be risk of robbery or assault, although we have no data to confirm this information.

These are examples of challenges faced by communicating science and technology, which stem not only from inside hurdles of developing and creating projects, but also from the social-economic reality of a developing country. Therefore, for successful growth of initiatives, many different tools and resources, both traditional and modern, must be used to create spaces of learning and communication that are as inclusive as possible for all audiences.

The absence of correlation in the Facebook platform between events for distributing new texts in the buses and online activity clearly reveals there is still a disconnection between the products offered by the projects through “old-fashioned media” (the buses and radio) and the virtual interaction platforms they make available. This might happen due to the different challenges of connectivity faced by the public, as previously discussed, which prevent a timely sensitive feedback in online spaces. Alternatively, this absence could raise doubts about the effectiveness of

advertisement of these events on other media (newspapers, television news), since the links to the projects' online platforms are not easily memorized when read or heard away from points of immediate access to Internet connection (a computer or smartphone).

On the other hand, this miscorrelation seems to be balanced out by the use of digital media for advertisement purposes, since providing updated information and receiving feedback are both faster and easier in these platforms. Remarkable evidence of this trend was seen on the projects' Facebook page, where a progressive increase in activity was observed as more information was posted. Constant upkeep and calls for public participation on the page appear to be the key aspects for making a tangible expansion in outreach and engagement.

Conclusions

Digital tools give projects like "Ciência no Ar" a means to expand beyond physical spaces. Also, they facilitate the processes of gathering and analyzing data regarding public interest and activity. With this data, it is possible to better present information about science, furthering the goal of encouraging more people to participate in the discussion on science locally, and even globally. There is some evidence that the project audiences are incredibly diverse, so careful consideration must take place when it comes to maintaining the balance between more "old-fashioned" methods and media and the modern possibilities of the digital age.

References

- Candotti, E. Ciência na educação popular. In *Ciência e Público – caminhos da divulgação científica no Brasil*. Org. Massarani, Luisa; Moreira, Ildeu de Castro; Brito, Fatima. Rio de Janeiro: Casa da Ciência – Centro Cultural de Ciência e Tecnologia da Universidade Federal do Rio de Janeiro. Forum de Ciência e Cultura, 2002. 232p.
- Ferreira, J. Popularização da ciência e as políticas públicas no Brasil (2003 – 2012). Tese. Instituto de Biofísica Carlos Chagas Filho, Programa de Pós-Graduação em Ciências Biológicas - Biofísica. Universidade Federal do Rio de Janeiro. Rio de Janeiro, 2014. 185p.
- Gonçalves, E. A. & Vilas-Boas, Adlane. Ciência para todos: conhecendo o leitor de ciência nos ônibus de Belo Horizonte. In: *II Colóquio Internacional Tendências Contemporâneas da Comunicação Científica*, 2014, Florianópolis. Anais do II Colóquio Internacional Tendências Contemporâneas da Comunicação Científica, 2014.
- IBGE 2014. Pesquisa Nacional por Amostra de Domicílios – Pnad – 2014, divulgada em 13 de novembro, pelo Instituto Brasileiro de Geografia e Estatística IBGE, <http://www.ibge.gov.br> acesso em 20.11.2015).
- Moreira, I.C. (2006). A inclusão social e a popularização da ciência e tecnologia no Brasil. *Inclusão Social*, vol.1, No 2, 11-16.
- Silva, E. C., Maia, B. A., Resende, T., & Vilas-Boas, A. 2014. Brazilian Pop Music as an inspiration for radio programs of science and technology. In: *13th International Public Communication of Science and Technology Conference*, 2014, Salvador. Proceedings of PCST 2014. Rio de Janeiro: FIOCRUZ - COC, 2014. v. 1.
- Vilas-Boas, A. & Botelho, J. S. Science and literature travelling together in metropolitan buses. In: *13th International Public Communication of Science and Technology Conference*, 2014, Salvador. Proceedings of PCST 2014. Rio de Janeiro: FIOCRUZ - COC, 2014. v. 1.

Acknowledgements

The authors would like to thank Fundação de Amparo à Pesquisa de Minas Gerais (FAPEMIG), PROEXT/MEC, PBEXT/UFMG and CNPq for the financial support to the projects along the years and FAPEMIG for the travel grants to A. Vilas-Boas to participate in PCST 2016.