JCOM

TWENTY YEARS OF SCIENCE COMMUNICATION: LOOKING BACK, LOOKING FORWARD

Research in science communication in Latin America: mind the gap

Luisa Massarani and Thaiane Oliveira

Abstract

In this commentary, we discuss the challenges associated with carrying out research in science communication in Latin America. We start with the "invisibility" of Latin American studies in the three most prominent international journals in the field (although there has been a growing number of studies in the region). Then, we look to the recent popularisation of science through social media, the political issues facing the region and the massive spread of disinformation and fake news, which has been widely accentuated by the pandemic. We argue that there is an urgent need but also opportunities for innovation and collaborative research in science communication. Finally, we call attention to how the present situation might lead to bigger gaps among researchers from the developing world, including Latin America, and the so-called developed world.

Keywords Science communication in the developing world

DOI https://doi.org/10.22323/2.21070308

Submitted: 27th May 2022
Accepted: 18th June 2022
Published: 7th November 2022

Invisibility

A world map of science communication research presented by Guenther and Joubert [2017] — after a systematic, bibliographic analysis of a full sample of research papers that were published in the three most prominent journals in the field from 1979 to 2016 — shows that Latin America occupies a shy place. Only five Latin American countries are highlighted in this map: Brazil, Mexico, Argentina, Chile and Venezuela.

Brazil performed best on the list of developing countries and was actually 10th in the world ranking for number of papers published, after the U.S., U.K., Canada, Netherlands, Australia, Germany, Spain, Italy and Japan. However, the total number of papers published by Brazilian authors represents only 1.6% of the total number of all papers published.

In looking at the distribution of papers among the three journals analysed: two articles (in almost four decades!) were published by Latin American authors in *Science Communication*, nine articles were published in *Public Understanding of Science,* and 48 articles published in *JCOM*.

Growing locally

Although Latin American research in science communication has been almost invisible in the three most prominent journals in the field, a study conducted by our group shows that there is a growing body of published research in the region [Massarani et al., 2017]. We identified 609 papers about science communication research published by 1,199 authors in 80 English, Portuguese and Spanish-language peer-reviewed journals.

The oldest paper we identified in our study was published in 1985 — from the author of the first PhD dissertation in science communication in Brazil, written by Wilson Bueno, a national reference in the field. Since 1997, the number of articles has increased each year, demonstrating that a growing number of Latin American researchers have dedicated themselves to the field. Unfortunately, we also observed that many researchers work in isolation, with few collaborators.

In terms of the methodologies these researchers adopted, we observed that these approaches made sense for the time when these papers were published; content analyses and discourse analyses ranked were popular approaches, with little use of research software.

The world has been changing at a rapid pace, and with the popularisation of social media, the political issues facing the region and the massive disinformation and spread of fake news — a context widely accentuated by the pandemic — there is an urgent need for innovation in science communication research' innovation is needed in Latin America and around the globe.

The new context

Social media platforms give scientists more tools for communicating the results of their research and for engaging with issues related to science. There are opportunities for scientists to engage with different audiences, and for science communicators and citizens to engage with science.

However, social media platforms also facilitate the circulation of information that contradicts scientific evidence, giving visibility to conspiracy theory movements and disinformation. The ability for non-academic actors to battle in public over claims of expertise on topics related to science [Lang & Hallman, 2005] has become a recurring concern; it has led to significant public and political debate about "post-truth", "alternative facts" and "fake news" [Lubchenco, 2017; Vosoughi, Roy & Aral, 2018; Vignoli, Rabello & de Almeida, 2021].

Science-related scepticism and anti-science movements have grown in several countries and are a major worldwide concern [Hornsey, Harris & Fielding, 2018; Smith & Graham, 2019; Sánchez & de las Mercedes Fernández Valdés, 2020; de Souza Filho & de Aguiar Lage, 2021]. The circulation of science-related mis- and disinformation affects public health and increases the probability of outbreaks of diseases [World Health Organization, 2019, 2021].

Anti-vaccination campaigns, for example, gained significant visibility on digital social networks over the last few years [Smith & Graham, 2019; Nobre & da Silva Guerra, 2020; Johnson et al., 2020]. In many cases, the movements behind these campaigns existed on the fringes of society and were treated as stigmatised knowledge [Barkun, 2015]. But at present, they are at the centre of public debate driven by political leaders, opinion makers and digital influencers.

The COVID-19 pandemic has indeed exacerbated the situation described above, and this is particularly true in Latin America, where more than 1.57 million deaths from COVID-19 were recorded (28.2% of deaths worldwide) [Congress Research Service, 2022].

The lack of an effective health infrastructure and the social and economic context are important factors contributing to the high number of deaths, but we must also consider poor policy decisions. One prominent example from the region was the recommendation to use drugs for treating COVID-19, such as ivermectin, hydroxychloroquine and chloroquine, with no scientific evidence to support their efficacy. Some Latin American governments have promoted these drugs and spent considerable amounts of money on supporting their sale [Scolari, 2020; Rainer, Harumi & Ónice, 2020; Herrera-Peco et al., 2021]. Another example has been the promotion of anti-vaccine movements by the President of Brazil, Jair Bolsonaro, which have also been associated with disinformation [de Lima Fontes, de Lavor Delgado, de Assis, Lima & Lima, 2020; Oliveira, Quinan & Toth, 2020; Bezerra, Magno & Maia, 2021; Monari, 2021].

In this context of decision maker communication, science communication has been an important tool for fighting the pandemic [López-Borrull & Ollé, 2019; Sánchez Tarragó, 2020]. Science communication research has been key to understanding how information circulates online and in the public sphere, and for tackling scientific disinformation and other information disorders related to science.

Science is essential for providing evidence-informed guidance for decision-makers and debate in the public sphere. It remains at the centre of disputes, particularly when new influential actors in digital environments emerge, introducing content contrary to science evidence. Science communicators must also be aware of the challenges that arise from excess of information provided in this reverse communication model, which no longer centres on gatekeepers. Information is distributed by different actors in social networks and in contexts of epistemological crisis where conspiracy theories spread with speed through several channels.

The challenges

According to Wallach [2016, p. 7], "we are on the cusp of a new era in computational social science". This new computational age in the social sciences has brought challenges for researchers in science communication. The first challenge, which leads to others, is the huge amount of information available.

Some studies, only looking at Twitter, for instance, show the challenge in terms of dealing with large volumes of data. A research study to identify the circulation of information about hydroxychloroquine within a Brazilian alt-right group collected almost one million tweets in three months [Oliveira, Evangelista, Alves & Quinan, 2021]. Sharma, Seo, Meng, Rambhatla and Liu [2020] collected more than 54

million tweets about COVID-19 in only three months. In a multilingual research project on COVID-19 discussions on Twitter, Chen, Lerman and Ferrara [2020] collected 123 million tweets in only seven days.

Working with large volumes of data requires investments in technological infrastructure, which is capable of storing and processing the data. Although working with a large volume of data is a challenge that applies broadly, this is a challenge in particular in Latin America and the developing world, where buying basic equipment, or even a pencil. can be difficult in terms of both funds and bureaucracy. Storing large volumes of data is expensive and hiring cloud services or servers that store robust data are billed in dollars. This kind of infrastructure has become increasingly distant from the academic reality of Latin American researchers.

Another common challenge for science communication in data analysis around the world is data extraction. After criticism about the role of algorithms in the dissemination of disinformation, and reports of personal data leaks such as the case of Cambridge Analytica [Isaak & Hanna, 2018], platforms were forced to change their data extraction policies. These data policies often locked academic researchers out of studying data generated on social platforms, while preserving corporate and business access to social media users' data [Walker, Mercea & Bastos, 2019].

Data extraction requires access to the Application Programming Interface (APIs). APIs are accessible only through code programming. The domain of code languages, such as JSON, R or Python, is not common for science communication researchers. Beyond the domain of code language programming, to extract data from Facebook and Instagram it is necessary to have access to the API via CrowdTangle tools. Twitter has an API for Academic Research. Despite no costs associated with using CrowdTangle and the Twitter API, these are only available to the platform companies' partners: to be a partner and have access to the API, it is necessary to sign agreements with the platforms and depend on its infrastructure for data extraction — again, not always possible for Latin American researchers.

In addition to the knowledge needed for data processing, real-time analysis requires mastery of data mining to explore data, looking for consistent patterns, such as language structures, association rules, or temporal sequences. Software is required to deal with this data, and even in cases where free software is available, training for use is not always usual in Latin America.

Understanding how science communication circulates in digital environments requires multidisciplinary research teams: computer scientists for data mining, extraction and processing data, and more traditional methodologists, including discourse analysts, content analysts and semioticians, to analyse the data and provide relevant and useful interpretations in a big data context. To make sense of digital data provided in digital environments requires experts in the fields of science communication, computing, communication, statistics, and anthropology, among others. This is a challenge that needs to be faced, not only in Latin America, for the survival of science in the face of such complex phenomena as the growth of scepticism, science disinformation, science-related conspiracy theories, and the discrediting of scientific institutions in the face of advances in denialism in the world.

Final considerations

The platformisation of communication, the political issues facing Latin America, and the massive spread of mis- and disinformation, which has been widely accentuated by the pandemic, has challenged researchers in science communication to rethink their objects of research and develop innovative methodologies. It has also created opportunities for innovation and interdisciplinary collaborative research.

However, it also presents new obstacles including a lack of infrastructure, expertise and training for researchers in the developing world, including Latin America. Without support for further innovation, the present context may lead to a bigger divide between these researchers and those from the so-called developed world.

Acknowledgments

This article was written in the scope of the Brazilian Institute of Public Communication of Science and Technology, with the support of the National Council for Scientific and Technological Development (CNPq) and the Carlos Chagas Filho Foundation for Research Support of the State of Rio de Janeiro (Faperj). Massarani and Oliveira thanks to CNPq for the Productivity Fellowship respectively 1B and 2 and to Faperj to respectively Our State Scientist and Our State Young Scientist.

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How to cite

Massarani, L. and Oliveira, T. (2022). 'Research in science communication in Latin America: mind the gap'. *JCOM* 21 (07), C08. https://doi.org/10.22323/2.21070308.

ISSN 1824-2049. Published by SISSA Medialab. jcom.sissa.it