Alternative Metrics and Open Science in Latin America: Challenges for democratization of knowledge

As Métricas Alternativas e Ciência Aberta na América Latina: desafios para a democratização do conhecimento

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> *"In the twentieth century, half the world sacrificed justice in the name of freedom and the other half sacrificed freedom in the name of justice, and in the 21st century we sacrificed both in the name of globalization"* (Eduardo Galeano)

Society is undergoing major transformations that directly affect the way we communicate science, transformations that go beyond the possibilities open through the digital technologies of the information age. These transformations began in the Scientific Revolution, a milestone for the democratization of knowledge, according to Paul David (David, 2008). For the author, the Scientific Revolution implied the change of a model based on the prolonged secrecy of the alchemists blessed with a divine power over the production of an enlightened knowledge for the necessity of the metallurgical area to publicly and quickly disseminate the practical results of the research to be applied to the market.

The entry of these new actors into the modern scientific ecosystem – the private sector, industries and the market – has been consolidated since the Industrial Revolution, "provoking the broadening of social consciousness about the potential applications of scientific knowledge to material progress" (Albagli, 1996, p.396). At this time, science is becoming increasingly dependent on the means of producing information and communication, such as the mass media, so that these results could be widely disseminated to stakeholders. As a result, it generated a need for a state-regulated ethical standardization, self-regulated by the scientific community, on the production of knowledge generated in this science-market-media triad.

This dependence of the scientific academy on communication was historically enough to initiate the institutional movement that made the sponsorship of formal scientific institutions a ubiquitous attribute of modern societies. This led the government to perform science communication in areas of knowledge that it considered strategic to attract investors' attention in certain programs and encourage the entry of new students (Weingart; Guenther, 2016).

Although the structures of capitalism have a close relationship with the historical organization of knowledge, it is precisely with the greater visibility of research provided by digital environments that the struggles for the monopoly of scientific competence have gone beyond the domain of traditional spheres related to science

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communication. In addition to mass media, the possibility of researchers using digital platforms to disseminate their research has led to the emergence of studies on the use of academic and non-academic social networks, for a higher visibility and an increased circulation of science.

Challenges and disputes about Open Science

Social media and other digital spaces have been increasingly used by researchers and institutions to share their research with society, changing the way we measure the social impact of academic production. This is the field of altmetrics, which emerged recently after the publication of the Altmetrics Manifesto, published by Jason Priem in 2010 (Priem *et al.*, 2010). The utopia of digital culture as a space for broad and de-hierarchical democratic participation, as advocated by Jenkins (2015), or the possibility of sustainable thinking devised by digital social networks (Levy, 2007), has resurrected the ideal of an open, horizontal, rapid and deinstitutionalized science. However, new opportunities and several challenges are emerging for peripheral countries, as the coverage and quality of data on alternative metrics is often not compatible with the dynamics of scientific communication developed in this region.

Faced with this emerging scenario about the circulation of science in digital environments and the particularities of Latin American scientific production and consumption dynamics, this special issue on Alternative Metrics and Open Science in Latin America is part of the journal *Transinformação*. Composed of 14 articles of extreme relevance to the metric studies of science, given the urgency of discussing alternative models of more open, plural and inclusive production of scientific knowledge, this issue is a milestone on the subject in Latin America.

The text by Fabiano Couto Corrêa da Silva and Lúcia da Silveira, "The Open Science Ecosystem", opens this magazine, where the authors discuss the benefits, challenges and issues for the adoption of the "movement of movements" (Albagli, 2019), starting from five dimensions: the scientific editorial system, open data, open reproducibility, open evaluation, and the Open Science Policies. For the authors, Open Science is the future and it should come through digital resources from the Internet, when producers of scientific information can again undertake the responsibility of publishing their own studies.

Understanding that Open Science represents a new approach to scientific work, in which not only research results are published, but the entire process of scientific production, Alejandro Caballero-Rivero, Nancy Sánchez Tarragó and Raimundo Nonato Macedo dos Santos discuss in this issue the Open Science practices of the Brazilian academic community. For the authors, this type of new and complex approach requires researchers to change their behavior in the process of constructing, conducting and publishing studies, sharing data and results or research methodologies. However, as these discussions are still very recent and information on new practices is scattered in various sources making it difficult to locate them, many researchers have problems in engaging the different Open Science modalities. Given this, the authors seek to explore some Open Science practices that are currently being used by the Brazilian academic community, specifically those related to Open Access and Open Data initiatives.

Doing science implies a process of disputes within the scientific field itself and Walter Couto and Sueli Mara Soares Pinto Ferreira discuss the "Legal and Illegal Paths to Open Access". Based on a study of the cartography of controversies, the authors present the discursive implications between two groups that, while defending open access to scientific articles, disagree about the means to achieve this end, especially when it involves an organizational proposal oriented to the rights of property of the information. For the authors, the unwanted sharing of scientific articles generates obvious controversies between the copyright infringing actors and the commercial publishers who hold the copyrights.

As the authors argue, Open Science practices are not an easy way out and there are different perspectives to understand it. The results of this research dialogue with what Anne Clinio, in a text published in this issue entitled

"Open Science in Latin America: Two perspectives in dispute", points to the polysemic character of the term. For the researcher, it is possible to identify two interpretative currents about Open Science: one focuses on themes such as the guarantee of rights, cognitive justice and social justice, a view shared by some authors in this issue, linking this way of making science to values such as transparency, ethics and collaboration. The other perspective identified by Anne Clinio points to a utilitarian discourse of science by mentioning greater effectiveness, productivity and competitiveness.

The author points out that these interpretative currents have been elaborated and promoted by governments, educational and research institutions, and Latin American financial backers in favor of Open Science. As an example of these promotions involving different government and scientific agents, we can mention the 4th National Open Government Action Plan, described by Patrícia Rocha Bello Bertin, Juliana Meireles Fortaleza, Adriana Cristina da Silva and Massayuki Franco Okawachi, in a text about "The partnership Open Government as a platform for the advancement of Open Science in Brazil". With a methodology applied to the construction of commitments developed in a strong dialogue with the various actors of the Brazilian scientific process, they show the instrumentality of the Open Government Partnership for the construction of a collaborative strategy in support of Open Science in Brazil.

In line with the 2030 Agenda for Sustainable Development Goals, information access is recognized as a fundamental human right and Latin America has had recent but well-established initiatives around access to information, such as the Colombian Law 57 and Mexico's Federal Law on Transparency and Access to Public Information. This is a subject discussed by Patrícia Nascimento Silva and Marta Macedo Kerr Pinheiro in a text about "Alternative metrics for open government data in Latin America". The authors present DGABr, a platform focused on providing metrics for measuring Open Government Data that can be used across Latin America.

Open data is one of the domains of Open Science and the logic between both spheres is convergent, around values beyond social justice, democracy and participation. They also converge on values such as transparency for greater traceability, verifiability and reproducibility. Such values point to what Anne Clinio defends as "a gradual displacement of the value of knowledge as the common good in the service of citizenship for a commodity to be marketed for the benefit of few individuals and large corporations" (Clinio, 2019, p.9). This new model of academic capitalism, which had its inception after the Industrial Revolution, is marked by an increasingly destabilizing and less regulatory profile. That is, if at first the State assumed the leading role as a regulatory body and responsible for the public communication of science, today its performance is increasingly unrelated to the advances of neoliberal investment policies in Science, Technology, Innovation (STI) and Higher Education (HE). Such state tangentiality for STI investment tends to reflect neoliberal strategies in developed countries in the 1980s, resulting in significant cuts in public research funding, such as the ones we have been following in Brazil since 2015 and other Latin American countries such as Chile.

Technological advances have enabled us to develop a more open science, a key in which Latin America has played a key role in pioneering open access initiatives. As pointed out by Alperin *et al.* (2015), Latin America is one of the most progressive regions in the world in terms of open access and the adoption of sustainable models for research dissemination. Even before being an agenda for the rest of the world, such as cOAlition S, Open Access has been developed in the region since the 1990s, as was the development of the Scientific Electronic Library Online (SciELO), launched in 1997 and supported by the *Fundação de Amparo à Pesquisa do Estado de São Paulo* (FAPESP, Foundation for Research Support of the State of *São Paulo*) and by BIREME, in addition to documents such as the "*Declaration of San José hacia la Virtual Library en Salud*", 1998, for example. From models that were based on a predominantly state system and recognizing science as a public asset, Open Access was an alternative response to inequality over scientific circulation. Open Access has come to be understood as an investment strategy of Latin American countries to increase the visibility of their productions in a system marked by a scientific editorial oligopoly (Larivière; Haustein; Mongeon, 2015) dominated by a set of European and North American countries.

At first, the publication of scientific journals in Latin America has been predominantly an initiative of the academic community itself, with eventual state support. However, in view of the process of destatization of higher education in which the region has been living in recent years – such as Chile, Brazil, Colombia, Mexico, among others (Duham; Sampaio, 2000), with the expansion of oligopolies encouraged by neoliberal policies imposed by world financial agencies after the Washington Consensus (Chaves; Amaral, 2015) –, scientific journals have been forced to rethink their modes of scientific production, seeking to develop models of sustainability which are less dependent on state support. In this sense, Article Process Charging (APC) has been understood as a growing Open Access business model (Björk, 2017) in some Latin American countries, including Brazil. This is a subject that André Luiz Appel and Sarita Albagli discuss in their text "The Adoption of Article Processing Charges as a Business Model by Brazilian Open Access Journals" where they seek to provide input to audit open access editorial policies that are being proposed for scientific magazines.

Accountability and transparency for Alternative Metrics

Along with the economic crisis – and instability and political insurgency – in Latin America, we can see transparency, evaluation and accountability principles emerge (Afonso, 2016), as one of the ways to help managers make decisions about the distribution of resources, especially at times when budget cuts are becoming the reality of Latin American countries, especially in the Science, Technology, Innovation and Education fields. In this sense, periodic evaluations become necessary to assess the performance of different spheres of higher education, including scientific journals. However, as pointed out by Rogério Mugnaini, Rafael Jeferson Pezzuto Damacenom, Luciano Antonio Digiampietri and Jesús Pascual Mena-Chalco, in an article in this special issue, entitled "The Panorama of Brazil's scientific production beyond indexation: an exploratory analysis of communication in journals", the Latin American sources for the evaluation of scientific production. Must strive to know the specifics of their science circulation dynamics. Therefore, they should not be limited to the traditional commercial bases from which access is closed. According to the authors, bibliometric studies need to delineate a broader context of national scientific production, seeking to disseminate scientific policy from matrices that do not ignore the particularities of the modes of production of scientific knowledge, of their own countries.

Such evaluative effort, based on more complete methodologies, is also carried out by Fábio Gouveia, in an article on "Altmetric Studies in Brazil", based on the analysis of *Plataforma Lattes* (CNPq, Lattes Platform) curricula. These are related methodological movements in which, from one perspective, concern the very dynamics of dissemination in the global scientific market, which seek to break with the legitimation and the promise of greater visibility to the indexed productions in these commercial bases. If Latin American scientific production is not fully covered in these legitimized spaces of hegemonic science, the researchers in the region will seek other ways to promote and give visibility to their work to build reputation in a local or global setting.

Although alternative metrics may balance differences in scientific circulation in countries such as Latin America, what Germana Barata points out in this special issue is that the analyzes of the representativeness of countries, languages and areas of knowledge in altmetrics reveal that the indicators need to be improved in order to value scientific articles published in developing countries, in languages other than English, with open access and national or regional relevance. This seminal article for this issue and for the studies of alternative metrics, which reveals the limitations of altimetry for science practiced in Latin America, considering the social network behavior of academics and society in general.

This has been a discussion brought by several researchers from Latin America, who point to an urgent need to find alternative indicators of research production that are able to capture a larger portion of the production of the developing regions. Therefore, it is necessary to take into consideration not only scientific production, but a whole set of actors around the university as a center of knowledge production. They are non-governmental organizations, actors from society who are outside the traditional academic world, for example, and that demand

other implications to think about the social impact of science, based on new metrics that allow us to analyze the visibility and impact of production in a way that it is complementary to the traditional indicators. This is a discussion brought by Alejandro Uribe-Tirado, Jaider Ochoa-Gutiérrez, Kelis Ruiz-Nuñez and Marcela Fajardo-Bermúdez in a text proposing a methodology applicable to Latin American universities on visibility and social impact.

Other texts close this issue, showing cases of how alternative metrics can be used, complementing traditional metric studies. In the "Urban governance in Latin America: bibliometrics applied to the context of smart cities", Andréa Oliveira Queiroz, Julia Tereza Abrão Vieira Lourenço Wilmers, Ricardo Augusto Souza Fernandes and Wanda Aparecida Machado Hoffmann, present a bibliometric study and the co-occurrence of research words about Smart Cities. Still, the dissemination by digital social media as spaces for interaction and dissemination of information among scientists, provided the expansion of the possibilities of evaluating a scientific artifact beyond the number of citations. In this sense, Rubens da Costa Silva Filho and Samile Andréa de Souza Vanz present a case study on the visibility of open access articles in the Brazilian nursing area. Nanci Oddone and Cláudio França seek to investigate the alternative indicators of qualitative approach from Twitter to follow the posts of four aggregators and platforms of academic books in digital format, namely: SciELO Books, Open Access Publishing in European Networks (OAPEN), Directory Open Access Books (DOAB), and OpenEdition Books. The authors point out that the followers' manifestations on social networks can provide relevant evidence for scientific publishing to identify emerging themes and to evaluate academic book dissemination strategies.

Challenges for democratization of knowledge

What we can observe in the studies presented in this special issue is that technologies allow us to not only increase the visibility of science related to traditional science assessment spaces, but also serve as a space for democratizing scientific knowledge. It is not just translations, transpositions of scientific languages to non-academic subjects, reproducing communicational models that understand the receiving end from a "perspective of lack", a deficit perspective. That is, from a linear communicational model, in which the subject from outside the academic world is not scientifically literate and, therefore, needs to have access to knowledge in a language that allows them to understand. This enlightened and deficient view has strengthened the walls between the academic community and society. However, if for centuries we have built walls to differentiate ourselves as subjects endowed with wisdom and knowledge, the present moment is asking us precisely to build bridges, which recognize that academic knowledge depends on and complements citizen knowledge. Bridges that allow us to form networks with society, requiring a public, open, participatory, democratic and transparent debate.

It's not just about using social networks to communicate with society. We need to go beyond them, recognizing the relevance, but also the challenges of being intermediated by centralized networks, by personalization algorithms that limit us to consuming only what interests us, establishing relationships with the people who approach us, ideologically, promoting the "shrinkage" of our own social network. And we know how much this difficulty in dialogue beyond our bubbles is harmful to democracy itself. We see the result of this in the partisan political sphere in Latin America, among other countries. In the current turbulent scenario of Western democracies, the distrust of institutions has turned into an attack on the basic premises of illuminism, eroding shared understandings of reality and discourse. "Knowledge" has become legitimized by emotionality and personal experiences (Van Zoonen, 2012).

We are also witnessing an epistemic crisis that threatens to undermine the political agenda and the political agency. This crisis is related not only with the enormous amounts and speed of information and the processes by which we build knowledge, but also with the disputes over truth itself as an analytical and determinant category. It is precisely because of the epistemic crisis over unstable values such as the truth that we see the emergence of transparency, evaluation and accountability, principles of accountability, as one of the authoritarian paths built on

the discourse of recovery of the trust which has been lost in democratic institutions, including in the university. It is in this context that the wave of metrification and datification pervade all social spheres. Science communication is now measured, reported and evaluated based on indicators, metrics and rankings. And in this accountability system, visibility and prestige are symbolic values that are easily assimilated by analytical categories, insufficient to account for university relevance, such as notions of impact and engagement that are used as imperatives of science assessment. Such concepts linked to attention or performance indicators as quantifiable and measurable values, depoliticize the very understanding of what these words can mean: the commitment of academics to society.

Major movements around open knowledge have gone from being a niche cause in some developed countries to becoming almost ubiquitous on the political agendas of governments in various parts of the world. Thus, the enchanting discourse about the openness of science becomes a marketing strategy for large corporations, including the scientific oligopoly itself, to sound like a "friendly openness". Like other cunning movements of capitalism (Fraser, 2009) in appropriating social agendas, Open Science has also been used as a discursive strategy for companies to present themselves as progressive, innovative and supportive of a transparent, open, interoperable and accessible to all layers of society, however, making it a new, profitable segment.

Open Science, Open Education, Open Innovation, and Open Government Data are some of the labels that emerge from "open society" ideas and play an important role in driving accountability, enabling new forms of civic participation and action through developmental and progressive discourse. This contemporary trend of accountability and transparency requires the opening of data while encouraging the growth of independent, private and non-governmental organizations focused on the distribution of information about governments, political systems, financial systems, etc. However, who regulates the performance of these agents, who are commodifying information and knowledge, if the State has been a less active as a regulatory agent?

Despite the implications around the very definition of Open Science, we are sure that this is one of the paths to the democratization of scientific knowledge, to the necessary transparency, as long as it is comprehensively understood (Albornoz; Chan, 2018). But to do so, we need to think about what metrics we want for Latin America. What values do we want to incorporate in scientific assessments? As Simon Bolivar said, "an ignorant people is a blind instrument of their own destruction". Therefore, we need to be aware of disputes over the very evaluation mechanisms we have adopted for ourselves. We must be aware of the contexts and disputes surrounding the appropriation of what we mean by Open Science, so that it is not merely a profitable model with a neoliberal, conservative and curtailing agenda. Aware of the importance of investments in science, technology and innovation for national sovereignty, all institutions that preserve democratic regimes, such as the university, are under attack, aiming to place some countries in a level of semi-peripheric subservience to a potential buyer of international technology and a subsidiary of a higher education system run by international economic groups. It is in this sense that we see international reports of tax adjustment plans for the privatization of higher education in Latin America, as well as the increasingly quantifiable, calculable, classifiable commodification of Latin American science, in the name of transparency and accessibility. Systematic attacks are being undertaken to de-legitimize quality and public higher education in Latin America, jeopardizing important notions such as sovereignty, freedom and democracy.

Faced with all the discussions brought in this issue, Simón Bolívar again inspires when he says that "nations march to their greatness while advancing their own education". But how can we move forward if our education has been targeted by the financial market and investments in education subtracted year after year? How to talk about democratizing knowledge if democracy itself in Latin America is at risk? How to talk about freedom and transparency for an Open Science, if the very academic freedom is being curtailed in Latin American countries? More than technological challenges, our greatest impasse for the implementation of an open, transparent and egalitarian Open Science is political resistance to the destabilization of the democratic order and the privatization of knowledge. And we can only resist with a united, open and accessible Latin America based on values such as social justice and equality.

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