Mediatization of science: reconfiguration of the paradigm of scientific communication and academic work in the digital era[1]

Midiatização da ciência: reconfiguração do paradigma da comunicação científica e do trabalho acadêmico na era digital

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ABSTRACT
The purpose of this paper is to discuss the mediatization of academic work and the reconfiguration of the paradigm of scientific communication in the digital age, based on five central spheres that organize the social dynamics of science. Since this discussion that has recently gained attention, an exploratory study model based on qualitative research was adopted, using interviews with 25 Brazilian researchers who use different social networks as a way of disseminating and sharing their work. This discussion intends to show the transformation of current scientific communication, seeking to understand how different areas of knowledge understand this change in the communication paradigm by the mediatization of science.
Keywords: Scholarly Communication, mediatization, sociability

RESUMO
A proposta deste artigo é discutir a midiatização do trabalho acadêmico e a reconfiguração do paradigma da comunicação científica na era digital a partir de cinco esferas que organizam as dinâmicas sociais da ciência. Trata-se de um estudo exploratório a partir de pesquisa qualitativa, baseado em entrevistas com 25 pesquisadores brasileiros bolsistas de produtividade que utilizam mídias sociais para divulgar e compartilhar seus trabalhos. Pretende-se, com essa discussão, evidenciar a transformação da comunicação científica atual, buscando entender como diferentes áreas do conhecimento compreendem esta mudança do paradigma comunicacional pela midiatização da ciência.
Palavras-chave: Comunicação científica, midiatização, sociabilidade

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SCIENTIFIC COMMUNICATION IS a multifaceted phenomenon that employs a variety of formats and communication means, involving different actors with different objectives. Traditionally, science communication fulfills a dual function in knowledge management: convey information to the academic community and funding entities, disseminating the results obtained in scientific research, and providing social return to society in general about the importance of what has been developed in the research centers. According to Wilson Bueno (2010), dissemination refers to the transfer of scientific or technological information carried out by scientists and aimed at specialists in a particular area of knowledge. For the author, disclosure fulfills a primary function of democratizing access to knowledge and establishing conditions for the so-called *scientific literacy* aimed at the *lay public*, in a discursive reproduction that implies a hierarchization of knowledge based on the deficit model widely debated in the last thirty years in the field of science communication (Barata; Caldas; Gascoigne, 2018).

Focusing on the distinction of the public for the differentiation between dissemination and scientific disclosure, the first functionality of scientific communication has as a structural dynamic a legitimation of the results obtained themselves, involving different circuits for such. Such circuits range from the publication of results in recognized journals in the academic publishing market to the dynamics of awards and recognition of researchers in the scientific community. The second functionality of scientific communication on the other hand serves a growing interest in society, which has the "concern to understand better – and also control – what is done in science and what results from it" (Albagli, 1996: 396).

Each of these spheres – dissemination and scientific disclosure – is, of course, targeted at different audiences, in their specific contexts. While dissemination is delimited by the scientific circle, disclosure refers to diffusion through different mass media and spaces of social media sharing by different social actors (Scherer; Motta-Roth, 2015). Scientific communication thus assumes that this occurs at a production level by agents that are legitimized by the scientific community, be they individuals or institutions (Marcinkowski; Kohring, 2014), as part of the spectrum of academic work.

In this sense, part of the academic work engendered by a set of institutional imperatives that determine the ethos of modern science (Merton, 1973) is crossed by the dependence of scientific communication. This work comes over the exchange value and commercialization of products and relationships, in which visibility, reputation, prestige and influence are matrices that fuel both consolidated and alternative scientific markets. In scientific communication

as a part of academic work, on the one hand, there is a need for the scientific community to report to state funding agents, presenting the result of investments in research based on indicators established in the national action plans for scientific development. On the other hand, there is a need that these results dialogue with society and meet social demands and needs by means of product development, service provision and other technological innovation tools that enable significant changes in daily life.

In this regard, some consecrated dynamics that pass through all areas of knowledge and define the premises of scientific communication can be found:

1. researchers seek to build a reputation along with their peers, based on criteria and indicators determined and agreed upon implicitly and explicitly by the field while competing for a legitimation space and influence in the national and/or international academic community through a wider visibility of their production;

2. in this search to achieve visibility both among peers and between development agents and society in general, a shift in the paradigm of scientific communication arises, with the emergence of different human and non-human actors (Latour, 2005) whose possibilities are based on performance metrics in order to measure the social impact of their research;

3. researchers feel that they must account for the investments of their research to financial agents, whether state-owned or not, or to society itself, which has contributed to scientific advance through the paying of taxes;

4. they justify the relevance and social impact of their research to these agents through production reports and communication with languages and formats that are adapted to the audience in order to dialogue with all non-academic society.

This change occurs mainly due to a reconfiguration of scientific communication as part of academic work by the popularization of communication technologies that provided a new level of engagement for scientific actors, mediating scientific visibility through social media. Attention and repercussion metrics in social media and other mass communication channels are gaining more and more space, emerging as one of the ways to measure the *social impact of mediatized science*. However, these discussions are based on an unidirectional model of scientific communication, without taking into account a paradigm of communication in which the order of production loses its traditionally

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established goals, in which there was a legitimized emitter with speech power that was directed towards the ideal receiver;

5. these spaces, as they are dynamic spheres that reflect political and social disputes, are occupied by different human and non-human actors who compete for the relevance of information, for the legitimation of knowledge, and the commercialization of knowledge.

Based on these five questions, this article aims to discuss the mediatization of academic work and the reconfiguration of the paradigm of scientific communication in the digital age, starting from five central spheres that organize the social dynamics of science, both in traditional academic environments and academic and non-academic social media. For that, a qualitative research is carried out from semi structured interviews with researchers at different stages of research and insertion in the traditional circles of academic recognition and in different areas of knowledge. This research intends to answer whether there is a difference in the understanding of researchers of several areas of knowledge with regard to the use of digital platforms for the scientific communication of their researches, as well as questions related to 1) visibility and quality indicators of scientific production; 2) performance metrics and measurement procedures in digital spaces; 3) accountability as a part of academic work; 4) the social impact of science and the relationship between society and academia; 5) disputes of power for the legitimation of knowledge that permeates the spaces of circulation of contemporary scientific communication. The hypothesis behind this research is that researchers from different levels and different areas have different understandings and relationships about scientific communication and the mediatization of science.

MEDIATIZATION OF ACADEMIC WORK AND SCIENTIFIC COMMUNICATION

The practical results of scientific research began to be disseminated from the possibilities provided by the Industrial Revolution, "causing the widening of social consciousness on the potential applications of scientific knowledge to material progress" (Albagli, 1996: 396). In this scenario, mass communication had always been an important means for the dissemination of research results. However, communication models were established by means of one-sidedness, wherein communication companies chose the agenda for disseminating the material produced by scientists. Such one-sided communication systems established a

deficient model for the popularization of science (Myers, 2003; Lévy-Leblond, 1992), in which scientists are regarded as the knowledge-dominating specialists, while the public is seen as lay (Lewenstein, 2003). In this system, the media had control over what was considered relevant enough to be aired, prioritizing what contributed to the political and commercial interests of the dominant classes, guiding Science and Technology into a model of media scheduling (Weaver; McCombs; Shaw, 2004) and a social framework based on scientific communication.

For Hjarvard (2012), the means of communication play an important role in the production and diffusion of knowledge and interpretations of science. With the growing importance of the media for the formation of public opinion and a growing reliance on science due to its scarce resources and, therefore, with the need to communicate research results to funding actors that measure public acceptance and impact of science production, science becomes more and more mediatized (Weingart, 1998). For instance, Brazilian development agencies such as CNPq and state foundations have requested researchers to send a video of five to ten minutes with the results of the study as part of the reports of accountability for the projects funded. These videos can be used as scientific dissemination materials.

But the process of mediatization is not only a set institutional practices, but a cultural change of present-day society, understood as a metaprocess in consonance with individualization and globalization (Krotz, 2007). Only then is it possible to observe a reconfiguration from the academic work to the digital academic work, in which subjects undertake themselves and their own image in digital spaces as part of academic activities. Such a change goes against an understanding of academic work as a honorable, disinterested, universal mission, almost as the priesthood of knowledge. Anchored in traditional teaching-learning models as a bank deposit, scholars passed on their knowledge to subjects in training, deprived of the light of knowledge, possessed only by the teacher. However, the change does not refer to a transformative education as opposed to a banking education, which Paulo Freire (2005) denounced, but to a transformation from work to labor (Fuchs; Sevignani, 2013; Allmer, 2018) with its other derivations of labor relations in the digital environment.

As university teaching and research becomes increasingly virtual and/or digital, with virtual learning environments and Massive Open Online Courses, there has been an impact on the flow of academic work (Poritz; Rees, 2017), in which there is a fusion between spaces of work and of personal and daily life, provided by the fairly new technologies of communication and information. It is increasingly common to use social media in academia, either for classroom

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support, for interaction with students, or to publicize the work of the teacher-researcher. These spaces are divided, with opinions on certain subjects that may or may not relate to the researcher's work, along with personal publications, family photos, leisure moments and the classic photographs of the food dish of the day.

In the mediatized academic work, the weight of academic activity is related to the pressure that researchers are subjected to scientific policies that use evaluation indicators accessible only to those who are inserted in the hegemonic scientific circle. These researchers use social media to build a reputation for disseminating scientific knowledge, being evaluated by the social impact of their science while dividing their personal spaces with professional work in digital environments.

The reconfiguration of this complex system around the academic work, based on the popularization of communication technologies and social media, provides a new level of engagement for these scientific actors, mediatizing scientific visibility through social media. In this sense, ways to evaluate scientific impact are not restricted only to the bibliometric systems, in which the citation between pairs legitimates the quality of research work. Repercussion and mentions in social media and appearances of mass media research are increasingly recurrent alternative ways of assessing the *social impact of science*. There is a certain discussion that has grown since the publication of the Altmetrics *Manifesto Altmetrics* (Priem et al., 2010), which presents a more comprehensive understanding of the impact of research products beyond the academic circle, with the aim to democratize access to scientific knowledge, especially through social media websites.

However, in a knowledge-based economy, a number of academic social media sites and platforms, for example, appear as a reflection of this movement of change in scientific communication: ResearchGate, Academia.edu and Mendeley are some of those spaces that have been used by researchers to disclose their scientific productions, and in which there is a whole logic of reputation building. Although the principles of modern science are embedded in these initiatives, these companies are based on business models, seeking sustainability in alternative means of scientific circulation, with personal data being converted into commodities. The user, by accessing their social media or surfing the Internet, is offering their social capital as labor (Fuchs; Sevignani, 2013), either to evaluate the repercussion and the online attention of the scientific production or for other exchange dynamics in digital environments, such as online reputation recognition and building. As an example, social digital platforms of academic work, such as ResearchGate and Academia.edu, are perceived as offering a series of technological *affordances* (Gibson, 2000) around the reputation of researchers: *scores* and AuthorRanks share some space for us to follow the access/visualizations of our profile in the media along with promises to have more detailed access,

identification of mentions and exclusive citations not collected by other search engines if we pay a relatively small amount to fulfill the curiosity of those who experience the exhibition and visibility of their work. In this scenario, new business models and alternative initiatives emerge and become partners of publishing companies, extracting data from online repertoire and awareness of scientific articles from these databases, offering other models focused on teaching and research institutions, as well as the individual researchers themselves.

In this ecosystem, social media has become one of the elements relevant to measure scientific impact through engagement measures. It is important to stress, however, a change in the very concept of engagement, especially in its scientific development. One of the earliest references to the concept appears in "The American Intellectuals and European Society", by Leonard Krieger (1952), an American historian who devoted his intellectual career to the discussion of historicism and the emergence of the modern European state. In the study aforementioned, published in *The Academy of Political Science* - founded in 1880 and indexed in the JSTOR database -, the author discusses the concept of political philosophy traditions, in which the subject's engagement relationship is related to a moral attitude regarding society, arguing for a double definition to the term:

> Actually, engagement means two things. First, it states the fact, implied in all contemporary thinking, that men are engaged in existence, willy-nilly, and that consequently contemplative, static thought is an illusion. But secondly, it means that men should be engaged to transcendence, that is, to the moral purpose which reaches out beyond man's immediat existence and in the light of which he undertakes the creative activity which gives meaning to his life. (Ibid.: 239-240)

In this text, Leonard Krieger attests that the term was incidentally coined by Gabriel Marcel (1998), mentioning his relationship with Sartre. Marcel, a French philosopher, playwright and composer related to the phenomenological-existential tradition, proposes two levels of praxis: a *fundamental engagement* and a *contingent engagement*. The first, relative to morality, is the foundation for the praxis of any subject, being supported by structural conditions, such as the subject's action against racism or against religious intolerance, whereas the latter is partisan, that is, in the name of a party and its ideological attachment. Sartre (1996), in turn, understands engagement as "a project initiated by the individual, which seeks to overcome what has become of him and of each result of this institution contributes to building some part of the totality of history" (Santos, 2005: 407). As can be observed in these two approaches, engagement has a relationship of commitment by the subjects and towards society. It is a

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moral stance related to the defense of a cause in search of social and historical changes. In this sense, the commitment of the thinker towards society and its own essence are fundamental to the understanding of engagement. It is not by chance that the possible translations "*getting engaged*", "*commitment*", and "*engagement*" have the same etymological roots as the medieval word "*engagier*", in which *en + gage* means "to act under compromise". This definition is central to understanding the transformation of the concept of engagement and its relation to the social impact of science.

If, at first, scientific engagement was understood as a social commitment, its connotation is reconfigured in the present day, in a society where mediatization is a process on the works (Verón, 2014), where production of knowledge is superficially evaluated by *engagement*, causing, for instance, a click-hunt with instigating titles and wordplay (Lockwood, 2016). This is one of the consequences of the process of mediatization of scientific knowledge that we live in, with the entanglement of media in daily life.

Taking into account that different areas of knowledge are based on their own parameters, legitimized and recognized by the peers that constitute the social grouping of their respective area, to understand these contemporary dynamics about the communication of science and the mediatization of academic work, it is necessary to investigate how researchers themselves understand these questions, seeking to identify the themes evidenced by their discourses, which emerge from the sharing of their visions about the scientific world and its relation with the communication of their work.

METHODOLOGY

Seeking to understand the insights and perspectives of researchers from different areas of knowledge based on their views on their own dynamic social realities, this study is anchored in the contribution of qualitative research as "a situated activity that locates the observer in the world. It consists of a set of interpretative, material practices that make the world visible" (Denzin; Lincoln, 1994: 3). With the objective of analyzing the understandings about academic work and its relation with scientific communication from the perspective of researchers at different states in their career and different areas of knowledge, this research has a methodology based on content analysis (Bardin, 2006) of the speeches of the subjects interviewed, operationalizing the categorization of central themes using automatic and manual coding by means of the software application NVivo 11.

To do so, two methodological steps were adopted:

1. Definition of the corpus of analysis: seeking to encompass a sample consisting of a set of researchers from different knowledge areas and at different levels of their careers, in order to verify their perspective and understanding on the transformations of academic work and its relation with current scientific communication, 100 profiles of researchers were sought based on geographical distribution in different areas of knowledge, in equal distribution of gender (50/50).

a. Having as criteria that the researcher had a profile in academic digital social networks and was active in these platforms; initially, a search was conducted in ResearchGate and Academia.edu, checking the career levels of the researchers found while verifying their curriculum in the platform Lattes.

b. A balanced geographical distribution was defined in this initial sample, with 20 researchers from each of the five regions of the country. The presence of universities in digital academic social networks was first sought and, starting from the institutions, the departments and active members in the digital academic platforms (ResearchGate and Academia.edu) were explored[2].

c. The balanced division of different career levels was also established, with the researchers being distributed into four categories: PhD student (25); PhD with a formation of up to ten years without being a scholarship holder (25); CNPq scholarship holder level 2 (25); and CNPq scholarship holder level 1 (25) – two categories that mark the recognition and consecration of these researchers in their respective areas of knowledge.

2. Following the steps suggested by Meho (2005) in conducting e-mail interviews, after the 100 possible interviewees were defined, an e-mail or a message on digital academic social networks was sent, between 15th and February 18, 2018, inviting researchers to participate in this research by answering ten structured questions. After this contact, 25 participants agreed to participate. It is noteworthy that, because this is a qualitative research, some discursions occurred through exchange of messages[3], in order to explore some important and relevant points for the discussion. The e-mail interview is understood as a possible alternative for qualitative studies when face-to-face or by-telephone options have been exhausted (Hunt; McHale, 2007)[4].

[2] The universities sought were: Centro-Oeste – Universidade Federal de Goiás (UFG), Universidade de Brasília (UnB) e Universidade Federal de Mato Grosso (UFMT); Nordeste – Universidade Federal da Bahia (UFBA), Universidade Federal de Alagoas (Ufal), Universidade Federal de Campina Grande (UFCG), Universidade Federal do Ceará (UFC), Universidade Federal de Pernambuco (UFPE) e Universidade Federal do Rio Grande do Norte (UFRN); Norte – Universidade Federal do Amazonas (Ufam), Universidade Federal do Pará (UFPA) e Universidade Federal de Tocantins (UFT); Sudeste – Universidade Federal do Rio de Janeiro (UFRJ), Universidade Federal de Minas Gerais (UFMG), Universidade de São Paulo (USP), Universidade de Alfenas (Unifal), Universidade do Estado do Rio de Janeiro (UERJ) e Universidade Federal de Uberlândia (UFU); Sul – Universidade Federal do Rio Grande do Sul (UFRGS), Universidade Federal de Santa Catarina (UFSC), Universidade Federal do Paraná (UFPR), Universidade Estadual de Londrina (UEL). It is worth noting that no criterion was established for choosing these institutions, with only those who had large numbers of members in their online communities being sought.

[3] Average of six per participant.

[4] Although some studies (Curasi, 2001; Murray; Sixmith, 1998; and Olivero; Lunt, 2004) point to the recognition of the e-mail interview and its advantages and disadvantages in comparative studies against the face-to-face procedure, some difficulties were found as a result of unanswered questions or messages deriving from the responses of the primary structure of the script, whose ten questions are to be answered succinctly.

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Profile of the interviewees

Among the 25 interviewees, 5 are scholarship holders of levels 1, 8 of level 2, 7 PhDs and 5 PhD students, divided in the areas of Agrarian Sciences (3), Biological Sciences (2), Health Sciences (1), Exact and Earth Sciences (1), Applied Social Sciences (5), Engineering (5), Humanities (5) and Linguistics, Letters and Arts (3). Despite the equal distribution in the initial corpus between regions, the Southeast region (8) was predominant over the others.

Qualification	Gender	Major	Region
PhD	Male	Agrarian Sciences	Central-West
PQ2	Male	Biological Sciences	Southeast
PQ1	Male	Exact and Earth Sciences	Southeast
PhD student	Male	Engineering	Northeast
PhD	Female	Applied Social Sciences	North
PQ1	Female	Humanities	South
PQ2	Female	Linguistics, Letters and Arts	Southeast
PQ1	Female	Applied Social Sciences	Southeast
PhD student	Female	Applied Social Sciences	Southeast
PhD	Female	Humanities	South
PhD student	Female	Agrarian Sciences	Central-West
PQ2	Male	Engineering	Northeast
PhD	Female	Engineering	South
PQ2	Male	Engineering	Northeast
PQ2	Female	Applied Social Sciences	Southeast
PQ2	Male	Linguistics, Letters and Arts	South
PQ1	Female	Health Sciences	Southeast
PQ2	Female	Linguistics, Letters and Arts	Southeast
PhD	Female	Agrarian Sciences	Central-West
PQ1	Female	Humanities	Southeast
PhD student	Male	Biological Sciences	North
PhD	Female	Engineering	Northeast
PQ2	Female	Humanities	Southeast
PhD student	Male	Applied Social Sciences	Northeast
PhD	Female	Humanities	South

TABLE 1 – Interviewees' profile
Source: author's own elaboration

Although many studies point to an inequality in the presence of women in consecration spaces of different areas of knowledge (Leta, 2003; Santos et al., 2010; Barata; Goldbaum, 2003), the sample here is balanced among the Level 1 and Level 2 productivity scholarship holders.

Encoding

The interviews were included in the qualitative analysis program Nvivo 11.0, which falls within the category CAQDAS (Computer Assisted Qualitative Data Analysis Software), facilitating the organization of information in levels and sub levels, as well as the creation of categories in nodes that enables the content analysis of qualitative research (Miles; Huberman; Saldana, 2013). Considering its ability to perform all the checks and structuring required for the detailed analysis of the data, this software was chosen for conducting operationalization into analyses of automatic and open categories. In addition to the ten automatic categories and the three profiles that comprised the semi-structured script, 21 nodes were identified, manually classified between 50 and 5 occurrences, up to 0.8% weighted percentage.

For the data analysis, a detailed check of each line of the response was also carried out in order to identify conceptual labels from the coding of the information in the sources of this study, being then inserted in the five categories of analysis proposed, based on the theoretical discussion for support. These are: 1) indicators of visibility and quality of scientific production; 2) accountability through scientific dissemination as a part of academic work; 3) the social impact of science and the relationship between society and academia; 4) the mediatization of science and its measurement procedures in digital spaces; and 5) power disputes for the legitimation of knowledge that permeates the spaces of circulation of contemporary scientific communication.

RESULTS OBTAINED

Based on the automatic categories generated by the semistructured questions in the interview script, we will discuss the results obtained from the five spheres of the social dynamics of the circulation of science: 1) indicators of visibility and quality of scientific production; 2) accountability through the disclosure of research results as part of academic work; 3) the social impact of science and the relationship between society and academia; 4) the mediatization of science and its measurement procedures in digital spaces, and 5) disputes of power for the legitimation of knowledge that permeate the spaces of circulation of contemporary scientific communication.

1. *Indicators of visibility and quality of scientific production*

Even though the profile search took place in social media, four of the researchers stated that they did not share material on academic or non-academic digital social networking websites, and that there was no correspondence with a specific qualification[5].

[5] The four researchers who answered that they do not use social media to divulge their works are from the Southeast region, two being from the field of Applied Social Sciences and one of Biological Sciences.
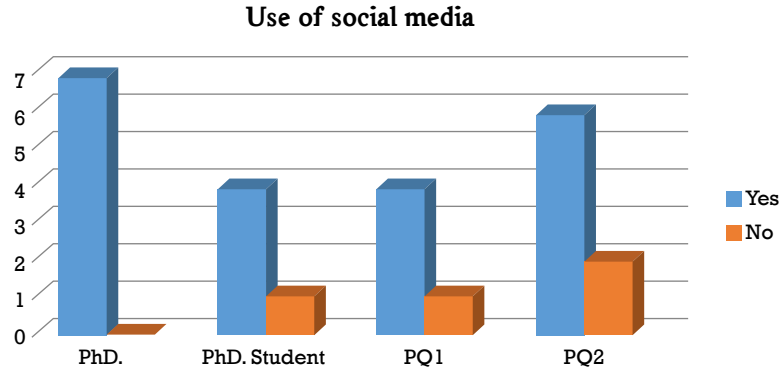
Use of social media

FIGURE 1 – Graph on social media use by career level

With regard to use, it was observed that some utilize social media as repositories to facilitate access to these materials, with ResearchGate predominating in different areas of knowledge. It should be noted that this was an open question since it was a qualitative study. The graph was therefore generated using the voluntary mentions of the participants about the networks that they commonly use.
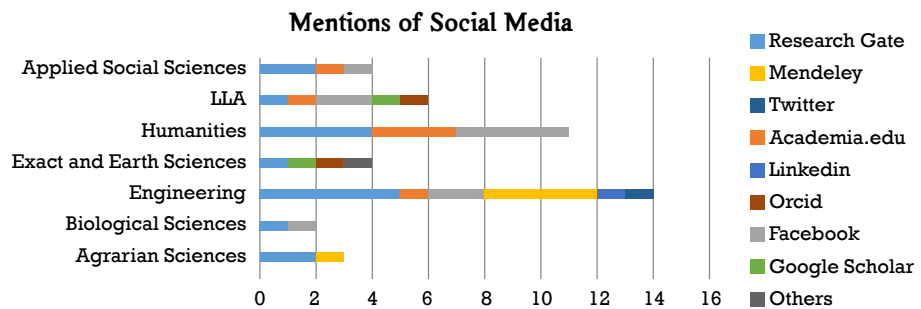
Mentions of Social Media

FIGURE 2 – Graph about mentions of social media by area of knowledge

According to the graph above (Figure 2), ResearchGate is the most used platform by researchers in different areas. The researchers also pointed out that they often use the platform not only to disseminate their research to a broad audience, but to dialogue with their peers and keep track of what peers in their field have produced. The use of these digital spaces as a way of increasing visibility and construction among their peers, as one of the central spheres that are established in the social dynamics of the circulation of scientific production, was present in the interviewees' speech: "In non-academic networks, I occasionally do little 'merchandising' when I publish a book" (Interviewee 11, PhD, Humanities).

This imperative of visibility, as Paula Sibilia (2003) points out, is due to the intersection between the public and private spheres, since in order to be present in everyday circles it is also necessary to be visible in spaces of digital flow. It is in this sense that visibility is a relational value resulting from the presence of the actor in the social network (Recuero, 2011), provided they are connected.

As a consequence of the imperative of visibility in the connectivity logic in digital social networks, researchers seek to build a reputation with their peers while at the same time competing for the space of legitimation and influence in the academic community through greater visibility of their production: "I often look at their publications and disclosures, particularly at ResearchGate" (Interviewee 21, Ph.D., Applied Social Sciences); "From time to time I search what my colleagues are publishing. Unadvertently I end up comparing myself, since the platform itself warns me about it" (Interviewee 24, PhD, Engineering).

2. *Performance metrics and measurement procedures in digital spaces*

In this negotiation between the mechanisms of visibility provided by these digital spaces and the tools that stimulate surveillance and competition through digital elements of the platforms themselves, researchers seek to establish measures of comparison and recognition with their "peer competitors" (Bourdieu, 1983). Rankings, number of citations, awards for access, downloads and ranges are mechanisms of the imperative of visibility and competitiveness that also permeates the scientific field, using a logic in which researchers are encouraged to put themselves as exhibited goods in metrics showcases offered by digital academic platforms such as ResearchGate and Academia.edu. Thus, algorithmic academic identities are reconfigured by the intensification of the competitive nature inherent to the scientific community itself, which is founded on a recognition system. And from these digital exposures of academic work, self-promotion is triggered by the development of self-quantification techniques of academic performance, as a gamification of scientific knowledge (Hammarfelt; Rijcke; Rushforth, 2016). In this context, the platform, as a non-human actor (Latour, 2005), becomes a central element in the process of mediatization of science and gamification of academic digital performance: "In ResearchGate you end up seeing performance and publications because they appear for you" (Interviewee 12, Pq2, Engineering); "And the pressure increases, especially when there are 'scores' like in ResearchGate, where there is a note for what you are producing or have produced (I still don't quite understand how this works)" (Interviewee 11, Ph.D., Agrarian Sciences).

As in a game, countless *affordances*[6] *are available* (Deterding, et al., 2011) on an academic platform and, increasingly, other elements are being added, continuously

[6] *Affordance* is the quality of an object that allows the individual to identify its functionality without the need for prior explanation.

stimulating the user to explore the entire digital environment, providing new interactive possibilities and sociability with the academic community of the whole world and the possibility of satisfying curiosity about who is accessing their profile in case of adherence to the business model based on distinction and exclusivity (as is the case of *premium* signups, for example). However, despite the *affordances* available on these platforms as possibilities available for action (Gibson, 1982), the subject is not always able to perceive them or perceive their value for use. It is in this sense that, in the interviews, the use of these digital spaces was pointed out as more akin to repositories, with their interactional, social and locational mechanisms being barely used. For instance, when asked about article searches in these digital spaces, the interviewees said they prioritized specific platforms from their fields, such as Pubmed. Among the most cited search sites are: Google Acadêmico (7), Portal de Periódicos da Capes (5), Elsevier (Scopus [4] and Science Direct [3])[7], Web of Science (4) and Scielo (2), presenting social media as a source of secondary or alternative search (4) (Figure 3).

[7] Since they are products of the same company (Elsevier), we opted to place them in the same category.
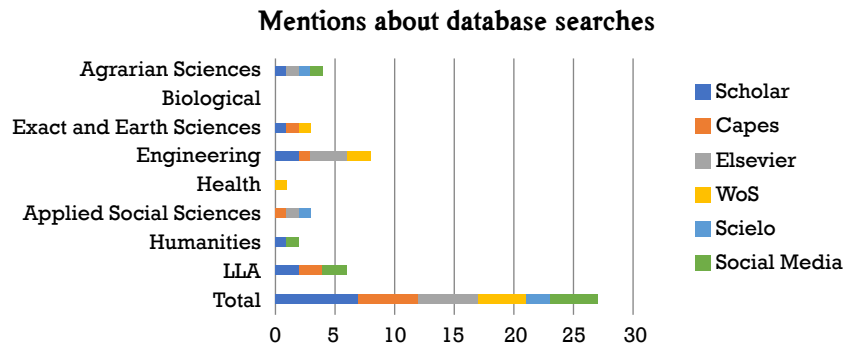

Mentions about database searches

FIGURE 3 – Graph generated from the mentions
about job searches by area of knowledge

Only 11 researchers reported using digital social networking platforms for interaction with some frequency, and 3 of them pointed out that they seldom interact socially in these spaces, even though the platform offers mechanisms for performance metrics, not only of their own, but also of their peers: "When I access ResearchGate, this performance information and the indexes of members of my contacts network appear on the login home page" (Interviewee 14, Pq2, Engineering).

However, in spite of self-promotion and the quantification of academic performance in these digital spaces, the essential factor in the motivation to fuel profiles in academic digital social networks is not only recognition among peers, but also the commitment to disseminate the results of studies and to

prove the value of the public money invested in their research. Thus, the quality of academic work overcomes the technical possibilities of self-quantification.

3.   *Accountability through disclosure as a part of academic work*

Academic work, as discussed earlier, has been associated for many years with a moral attitude and engagement (*engagier*) of intellectuals towards society. Academic activities, in all of their conceptions of the *teaching, research and extension* triad, and including the *administrative* addendum, were historically understood by their vocational character rather than formal work (Allmer, 2018). As the activities that concern academic work are increasingly digitalized and mediatization becomes part of professional activity, several authors (Allmer, 2017; Fuchs, 2017; Poritz; Rees 2017) have observed a transformation of the conditions of academic work. This statement is in line with the findings of this research, in which 18 of the 25 interviewees considered scientific disclosure as a part of the academic work, being "*important for the advancement of science*" (Interviewee 12, Pq2, Engineering). However, the dimension of social commitment does not distance itself from academic work, since half (n=12) of the interviewees pointed out the importance of the relationship between academia and society:

> Yes, I believe that the work we do – which is often overlooked and poorly understood/ socially valued – should be disclosed. It's something like extension activities that we promote at the university. I think that, especially those who, like me, studied and work at a public university, have an obligation to share their research as a way of returning our work to society, which is the one who sustains this kind of work. (Interviewee 10, PhD, Humanities)

Accountability to society - and to the development agencies that distribute the money originated from taxes – was also evident in the interviewees' speeches, the topic being pointed out by five researchers from different areas, for which performance, visibility and ease of access are central issues in the retribution to financing agents.

Joss Winn (2015) points out that this transformation is subject to measurements of performativity that are "embedded"[8] into the academic world by monitoring the production of information as part of the advance of a neoliberal agenda. For Winn (2015: 3), "de-regulation is a process of re-regulation, de-control is a new form of control, a less visible state regulates through the self-regulation of new subjectivities", in which academic subjects perform intensive work upon themselves. Contradicting this statement, it is necessary to look at

[8] Term used by the author.

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the mandatory scientific policies in Brazil, which are extremely important for the success of some initiatives, from open access to institutional repositories, which highlight the country as a benchmark in scientific production (Science Metrix, 2018). This is a subject pointed out by several researchers, especially at more advanced levels of their career:

> My impression is that these repositories and academic networks will be increasingly important for scientific disclosure and are already being requested as evaluation criteria nowadays (Interviewee 3, Pq1, Exact and Earth Sciences).

> This [disclosure] is our commitment as the faculty of IFES, our salary includes teaching, research and extension activities. Therefore, we have an obligation with the State to disseminate the results of our research, whether in print or digital format. (Interviewee 6, Pq1, Humanities)

In addition, attention is paid to matters that involve mandatory policies and ways of measuring impact from social media, especially in researchers that are scholarship holders - a factor that points to a certain feeling of pressure on the use of social media to increase the impact and range of productions (Figure 4), although this is not a sentiment shared by the majority.
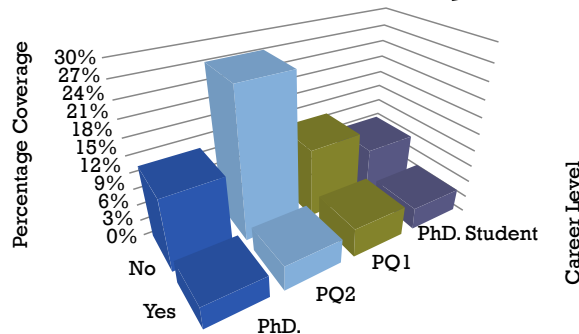

FIGURE 4 – Pressure per career level (graph generated using NVivo 11.0)

> Today, there is even pressure from development agencies to have a presence on social networks and for researchers to make an effort to disseminate their results in popular media. I think it is salutary pressure, but I am afraid that it will become a form of evaluation without proper criteria and revisions. (Interviewee 3, Pq1, Exact and Earth Sciences)

However, it was still pointed out that the pressure comes from the scientific field (Interviewee 13, PhD, Engineering), beyond the universal norms of Merton. For researchers in formation, the pressure arises as a consequence of the competition stimulated by the platforms themselves:

> The pressure increases especially when there are "scores", such as occurs in ResearchGate, where there is a grade for what you are producing or have produced. It may even be a form of encouragement, but it may not have such impact on people, especially students who want to get into academic life. And many sites do this, so what was supposed to become a form of information exchange, sometimes turns into competition. (Interviewee 11, PhD, Agrarian Sciences)

Academic digital social platforms reproduce the rationale of competition upon which the scientific field (Bourdieu, 1983) was instituted. Due to the computerization of research and the digitization of academic communication, research evaluation has become increasingly related to *big data* activities (Moed, 2018): large volumes of citation, complex mathematical formulas for science evaluation, usage data, and Alternate metrics such as *altmetrics* and *webometrics* have been increasingly called upon by various institutions, including development agencies themselves, in order to assist in decision-making on where to invest money in science, technology, and innovation. However, with the failure of valuation systems exclusively based on metrics and impact formulas, new ways of evaluating science have been considered, not due to their census value, but by the social impact (and in all meanings this term can represent, such as political, communication, economic, etc.) through methodologies that allow for a more complex analysis of the qualitative value that can be established between academia and society.

4. *Social impact of science and the relationship between society and academia*

Until the 1990s, scientific disclosure developed according to a deficit model, established as originating from a unidirectional understanding of communication in which an emitter has the power to transmit a unique knowledge light to an ideal receiver, upon which access to this knowledge it's not possible. Terms such as *lay public*, for example, are constantly being used as a reinforcement of this separation between academia and society, ignoring the recognition of these subjects as knowledge producers. Although terms such as *engagement* and *dialogue* are now "are part of the discourse of science communicators, along with the simple provision of providing facts

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and information" (Barata; Caldas; Gascoigne, 2017: 90), the idea of an elitist distinction that separates scientist and ordinary citizen is constantly reinforced by the interviewees, who show great concern as to the audience for which the communication is intended:

> Although much of the results are usually difficult to interpret by the general community, I think that dissemination of the knowledge produced is part of research assignments. Including making science closer to the public and society. (Interviewee 14, Pq2, Engineering)

As we have seen, even though the dimension of engagement and social commitment is evident in the interviewees' speech, there is the reproduction of an understanding that science is dominated by an elite of scientists considered experts while the public is seen as lay (Lewenstein, 2003), and in order to reach "the population in general, it is necessary to transform the scientific language, generally quite hermetic, into another context" (Interview 15, Pq2, Engineering), translating it to the general public.

Concern with the target audience for the material, as an ideal recipient, was evident in the interviewees' speech in different areas of knowledge. This concern allows for possibilities for researchers to create their own strategies for differentiating the use of academic and non-academic digital social networks, when copyright allows for that (three mentions): "In Linkedin I only include simpler studies with direct applicability for rural producers" (Interviewee 1, PhD, Agrarian Sciences); "In Facebook, I usually share information of public utility, such as monitoring or selection public notices for masters' degree and doctorate" (Interviewee 6, Pq2, Humanities); "Academic work only in academic networks, because I think it is not interesting to my contacts in other networks" (Interviewee 10, PhD student, Applied Social Sciences). A certain concern with the target audience and the targeting of "qualified readers" is thus perceivable (Pq2 researcher, Linguistics, Letters and Arts), pointing towards a generalized fear that "general disclosure can cause reading with false interpretations or with misunderstandings" (Interviewee 2, Pq2 researcher, Biological Sciences).

5. *Disputes of power for the legitimation of scientific knowledge*
As was possible to see, the latent preoccupation with changes in scientific communication and the direction that evaluation policies are likely to take is evident, especially in networks of political and ideological disputes arising in social media.

"As for open social networks, their importance should also grow, but I can't understand how to tell the wood from the trees in these environments. *Fake news* is easy peasy against *fake science*!!" (Interviewee 3, Pq1, Exact and Earth Sciences). When asked about what *fake science* would be, the interviewee pointed to a series of disputes occurring both within and outside the scientific field, such as "cheating" with regard to citation-based assessment indicators and disputes over the legitimacy of scientific knowledge in social media:

> I believe that every social space will have a power struggle. Science is only a way of seeing the world. When you want to transport scientific knowledge into the context of an open social network, it obviously ceases to be science only and enters a political context. Even in a strictly scientific context, there is no absolute truth, but legitimation criteria that are accepted in this context. In the more open social networks, similar legitimation criteria do not always exist. The Wikipedia experience could perhaps be used to validate the functioning of scientific repositories and even legitimize scientific information made available on the internet. Maybe even better than the number of *likes*!!! (Interviewee 3, Pq1, Exact and Earth Sciences)

The interviewee alludes to the moment we live in, the crisis of science and the advancement of repercussion metrics in social media, such as *altmetrics*, which have been adopted by scientific publishers and indexers.

These disputes have been observed by some researchers, especially at more advanced levels in their careers, such as Interviewee 3 (Pq1, Exact and Earth Sciences), which points to the emergence of *fake science* and power struggles in social media spaces:

> In social networks, there are a number of examples of fake science. An example is this bizarre discussion about vaccine. A lot of religious and obtuse people report a proven false study done in Britain, I believe it is from the last century, linking vaccines to health problems and immediately this is repeated all the time in the internet as if it had some real background. (Interviewee 3, Pq1, Exact and Earth Sciences)

Even if the clash between science and religion is older than modern science itself, we have seen a growth of unbelief in institutions in which knowledge is understood as an instance of power and the transformation of individual experiences as the source of all truth. Liesbet van Zoonen (2012) points out that, despite the declining confidence in government institutions, belief in democracy remains stable, although confidence in the mass media is low. In this scenario, the press, public institutions and science have been the targets of criticism in

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several countries, related to the status of truth as established in modern age. Topics such as the flat earth model, the anti-science movement and campaigns against vaccination emerge in spaces of mediatization of information and communication, bringing to light the very form in which these institutions of power were authoritatively consolidated and their practices for the maintenance of power.

This is an observation that refers to a previous study that sought to identify the actors who are discussing science on Youtube (cf. Oliveira; Evangelista; Toth, 2017). The study showed the role of the platform itself as a non-human actor (Latour, 2005) that is important for the accumulation of social capital in the internet, identifying that, in addition to the subjects mentioned above, the citizens that are legitimized by science as aforementioned are divided in the following *clusters*: *science as entertainment*, through youtubers to help popularize science by trivia; *science as merchandise*, consisting of educational institutions that seek to gain new customers for their preparatory courses directed to high school students who wish to enter the university, and *science as doctrine*, constituted by religious people who seek to delegitimize scientific knowledge based on dogmatic principles, showing that science is as much a doctrine as religion. Such sets of actors identified in this research corroborate the growth of what Liesbet van Zoonen (2012) calls I-pistemology, that is, a change in the truth status of authoritarian institutions towards an understanding based on personal experiences, an epistemology turned towards itself. This phenomenon, which is not recent, as the author points out, is in line with the growth of conservative positions and the advancement of the evangelical party in the National Congress, as well as a neoliberal agenda of public policies, affecting important human rights guidelines, built for decades of struggle and being based on scientific advancement.

This conception confirms the perception of Interviewee 3 (Pq1, Exact and Earth Sciences): "*Social networks are full of experts. With regard to this it only loses to Globo*". Based on this speech, it can be understood that observing the changes on scientific communication through social media means discussing it while the sphere of the fourth power, which is not based on the precepts of traditional mass media, let alone a naive, moderator and vigilant State, or a fifth power, which gives voice to citizens (Guareschi, 2007). It is a sphere that is inseparable from other social spheres, whose algorithmic power plays an important role in the ordering and governance of society (Beer, 2017), making what the algorithm defines as relevant visible, recognizing the importance of human and non-human actors in the process of legitimizing science in a mediatized society.

FINAL REMARKS

If, prior to social media, scientific dissemination followed the interests of mass media, today the production on the subject surpasses the models defined by these channels due to a diversity of actors, and no longer due to the dominance of broadcasters. It is a shift in the paradigm of scientific communication itself, in which "reverse agenda-setting" (Kim; Lee, 2006) and the *release of the emitter pole*, present in the reconfiguration of communication in the current scenario, also occur in the scientific sphere, allowing subjects with different knowledge to contribute to the dissemination of scientific knowledge.

Based on interviews with 25 researchers from different career levels and different areas of knowledge, through this qualitative study, we were able to discuss some well-defined dynamics that are in the process of consecration or under transformation, permeating academic work, especially based on a shift in the paradigm of scientific communication. Although with a reduced corpus and the limitations previously exposed as to the method employed, allowing for the possibility of later investigations, we observed that researchers seek to build a reputation with their peers based on established criteria that are agreed implicitly and explicitly by the area, while at the same time they compete for the space of legitimation and influence in the academic community, trying to achieve more visibility to their production. The matter of visibility was a central issue in many speeches, beyond the grasp of the questions asked, being articulated with a social commitment to facilitate access in reaffirming that quality is more important than visibility in establishing a reputation.

We also perceive that, regarding social commitment, researchers perceive disclosure as a way of accounting for the investments to financing agents or to society itself, which contributed to scientific advancement through the paying of taxes. This dissemination can occur by means of production reports and communication with languages and formats that are adapted to the audience in order to dialogue with all non-academic society, which in turn is understood as *alien* to the scientific community.

In a search for greater visibility, both among peers and between development agents and society in general, we see a shift in paradigm emerge from scientific communication, with the emergence of different actors. This change occurs mainly due to a reconfiguration of scientific communication as part of academic work by the popularization of communication technologies that provided a new level of engagement for scientific actors, mediating scientific visibility through social media. These spaces, as they are dynamic spheres that reflect political and social disputes, are occupied by different human and non-human actors who

compete for the relevance of information, for the legitimation of knowledge and its commercialization.

In this way, when we speak of mediatization, we are not only talking about a pervasiveness of the media in the interests of society (Meyer, 2002), as science is, or a colonization of a social domain over another, but of sharing these spaces as forms of a non-deliberative political exercise, present in the discourse, in the language itself and in the visibility and relevance of materiality itself, in a space of conflict and negotiation of meanings between a directed audience, their social dynamics, and cultural texts (Martino, 2011). Therefore, in order to discuss issues related to scientific communication and the social impact of science on social media, it is necessary to be attentive towards disputes about the legitimation of science in digital spaces, in which discourses that appropriate it for political or economic interests proliferate. In a mediatized society or one that is in the process of mediatization, wherein institutions, practices and conflicts start having a direct relationship with the media (Verón, 2014), thinking scientific communication transcends unidirectional models in which researchers or educational institutions are the only ones legitimized enough to talk about science. It is necessary to understand them as a dynamic space that generates structures and dynamics of their own in which the dispute about knowledge gains dimensions that are reflected in other social spheres. **M**

REFERENCES

ALBAGLI, S. Divulgação científica: informação científica para cidadania. *Ciência da Informação*, Brasília, DF, v. 25, n. 3, p. 396-404, 1996.

ALLMER, T. Academic labour, digital media and capitalism. *Critical Sociology*, Thousand Oaks, v. 16, n. 1, p. 44-48, 2017. DOI: https://doi.org/10.1177/0896920517735669

_____. Theorising and analysing academic labour. *tripleC*, London, v. 16, n. 1, p. 49-77, 2018. DOI: https://doi.org/10.31269/triplec.v16i1.868

BARATA, G.; CALDAS, G.; GASCOIGNE, T. Brazilian science communication research: national and international contributions. *Anais da Academia Brasileira de Ciências*, Rio de Janeiro, v. 90, n. 2, supl. 1, p. 2523-2542, ago. 2018. DOI: http://dx.doi.org/10.1590/0001-3765201720160822

BARATA, R. B.; GOLDBAUM, M. Perfil dos pesquisadores com bolsa de produtividade em pesquisa do CNPq da área de saúde coletiva. *Cadernos de Saúde Pública*, Rio de Janeiro, v. 19, n. 6, p. 1863-1876, 2003.

BARDIN, L. *Análise de conteúdo*. Lisboa: Edições 70, 2006.

BEER, D. The social power of algorithms. *Journal Information, Communication & Society*, Abingdon, v. 20, n. 1, p. 1-13, 2017. DOI: https://doi.org/10.1080/1369118X.2016.1216147

BOURDIEU, P. O campo científico. In: ORTIZ, R. (Org.). *Pierre Bourdieu*: sociologia. São Paulo: Ática, 1983. p. 156-183.

BUENO, W. C. Comunicação científica e divulgação científica: aproximações e rupturas conceituais. *Informação & Informação*, Londrina, v. 15, n. 1, p. 1-12, dez. 2010. DOI: http://dx.doi.org/10.5433/1981-8920.2010v15n1espp1

CURASI, C. F. A critical exploration of face-to-face interviewing vs. computer-mediated interviewing. *International Journal of Market Research*, Thousand Oaks, v. 43, n. 4, 2001. DOI: https://doi.org/10.1177/147078530104300402

DENZIN, N. K.; LINCOLN, Y. S. *Handbook of qualitative research*. Thousand Oaks: Sage, 1994.

DETERDING, S. et al. Gamification: using game-design elements in non-gaming contexts. In: CHI CONFERENCE ON HUMAN FACTORS IN COMPUTING SYSTEMS, 11., 2011, Vancouver. *Proceedings*… New York: Association for Computing Machinery, 2011. p. 2425-2428.

FREIRE, P. *Pedagogía del oprimido*. Buenos Aires: Siglo XXI, 2005.

FUCHS, C. *Social media:* a critical introduction. Thousand Oaks: Sage, 2017.

FUCHS, C.; SEVIGNANI, S. What is digital labour? What is digital work? What's their difference? And why do these questions matter for understanding social media? *tripleC*, London, v. 11, n. 2, p. 237-293, 2013. DOI: https://doi.org/10.31269/triplec.v11i2.461

GIBSON, E. J. The concept of affordances in development: the renascence of functionalism. In: COLLINS, W. A. (Org.). *The concept of development*: the Minnesota Symposia on Child Psychology. New Jersey: Lawrence Erlbaum Hillsdale, Mahwah, 1982. p. 55-81.

_____. Where is the information for affordances? *Ecological Psychology*, v. 12, n. 1, p. 53-56, 2000.

GUARESCHI, P. A. Mídia e democracia: o quarto versus o quinto poder. *Debates*, Porto Alegre, v. 1, n. 1, p. 6, 2007. DOI: https://doi.org/10.22456/1982-5269.2505

HAMMARFELT, B. M. S. et al. Quantified academic selves: the gamification of science through social networking services. *Information Research*, Borås, v. 21, n. 2, 2016. Available from: <https://bit.ly/2D803VF>. Access on: Oct. 4, 2018.

HJARVARD, S. Midiatização: teorizando a mídia como agente de mudança social e cultural. *Matrizes*, São Paulo, v. 5, n. 2, p. 53-91, 2012. DOI: https://doi.org/10.11606/issn.1982-8160.v5i2p53-91

HUNT, N.; MCHALE, S. A practical guide to the e-mail interview. *Qualitative Health Research*, Thousand Oaks, v. 17, n. 10, p. 1415-1421, 2007. DOI: https://doi.org/10.1177/1049732307308761

KIM, S.-T.; LEE, Y.-H. New functions of Internet mediated agenda-setting: agenda-rippling and reversed agenda-setting. *Korean Journal of Journalism & Communication Studies*, Seul, v. 50, n. 3, p. 175-205, 2006.

KRIEGER, L. The intellectuals and European society. *Political Science Quarterly*, New York, v. 67, n. 2, p. 225-247, 1952.

KROTZ, F. The meta-process of mediatization as a conceptual frame. *Global Media and Communication*, Thousand Oaks, v. 3, n. 3, p. 256-260, 2007. DOI: https://doi.org/10.1177/17427665070030030103

LATOUR, B. *Reassembling the social:* an introduction to actor-network-theory. Oxford: Oxford University Press, 2005.

LETA, J. As mulheres na ciência brasileira: crescimento, contrastes e um perfil de sucesso. *Estudos Avançados*, São Paulo, v. 17, n. 49, p. 271-284, 2003. DOI: http://dx.doi.org/10.1590/S0103-40142003000300016

LÉVY-LEBLOND, J.-M. Elementary quantum models with position-dependent mass. *European Journal of Physics*, Bristol, v. 13, n. 5, p. 215, 1992.

LEWENSTEIN, B. V. Models of public communication of science and technology. *Public Understanding of Science*, Thousand Oaks, v. 16, p. 1-11, 2003.

LOCKWOOD, G. Academic clickbait: articles with positively-framed titles, interesting phrasing, and no wordplay get more attention online. *The Winnower*, New York, v. 3, 2016. DOI: https://dx.doi.org/10.15200/winn.146723.36330

MARCEL. G. *Entretiens:* Paul Ricœur, Gabriel Marcel. Paris: Présence de Gabriel Marcel, 1998.

MARCINKOWSKI, F.; KOHRING, M. The changing rationale of science communication: a challenge to scientific autonomy. *Journal of Science Communication*, Trieste, v. 13, n. 3, p. 1-8, 2014. DOI: https://doi.org/10.22323/2.13030304

MARTINO, L. M. S. Três hipóteses sobre as relações entre mídia, entretenimento e política. *Revista Brasileira de Ciência Política*, Brasília, DF, n. 6, p. 137-150, 2011. DOI: http://dx.doi.org/10.1590/S0103-33522011000200006

MEHO, L. I. E-mail interviewing in qualitative research: a methodological discussion. *Journal of the Association for Information Science and Technology*, Hoboken, v. 57, n. 10, p. 1284-1295, 2006. DOI: https://doi.org/10.1002/asi.20416

MERTON, R. K. *The sociology of science:* theoretical and empirical investigations. Chicago: University of Chicago Press, 1973.

MEYER, T. *Media democracy*. London: Polity, 2002.

MILES, M. B.; HUBERMAN, A. M.; SALDANA, J. *Qualitative data analysis*. London: Sage, 2013.

MOED, H. F. Alternative approaches to the quantitative assessment of academic research. *El Profesional de la Información*, v. 27, n. 2, p. 237-239, 2018. DOI: https://doi.org/10.3145/epi.2018.mar.02

MURRAY, C. D., SIXSMITH, J. E-mail: a qualitative research medium for interviewing? *International Journal of Social Research Methodology*, Abingdon, v. 1, n. 2, 103-121, 1998. DOI: https://doi.org/10.1080/13645 579.1998.10846867

MYERS, G. Discourse studies of scientific popularization: questioning the boundaries. *Discourse Studies*, Thousand Oaks, v. 5, n. 2, p. 265-279, 2003. DOI: https://doi.org/10.1177/1461445603005002006

OLIVEIRA, T.; EVANGELISTA, S.; TOTH, J. A ciência no Youtube: redes de autoridade e diferente linguagens da comunicação científica na era digital. In: CONGRESSO TELEVISÕES, 1., 2007, Niterói. *Anais…* Niterói: Universidade Federal Fluminense, 2017.

OLIVERO, N.; LUNT, P. Privacy versus willingness to disclose in e-commerce exchanges: the effect of risk awareness on the relative role of trust and control. *Journal of Economic Psychology*, Amsterdam, v. 25, n. 2, 2004. DOI: https://doi.org/10.1016/S0167-4870(02)00172-1

PORITZ, J. A.; REES, J. *Education is not an app:* the future of university teaching in the internet age. London: Routledge, 2017.

PRIEM, J. et al. *Altmetrics:* a manifesto. Out. 2010. Available from: <http:// altmetrics.org/manifesto>. Access on: Nov. 7, 2018.

RECUERO, R. *Redes sociais na internet*. Porto Alegre: Sulina, 2011.

SANTOS, N. C. F.; CANDIDO, L. F. de O.; KUPPENS, C. L. Produtividade em pesquisa do CNPq: análise do perfil dos pesquisadores da química. *Quimica Nova*, São Paulo, v. 33, n. 2, p. 489-95, 2010. DOI: http://dx.doi.org/10.1590/ S0100-40422010000200044

SANTOS, R. de J. L dos. Modelos de engajamento. *Estudos Avançados*, São Paulo, v. 19, n. 54, p. 391-427, 2005. DOI: http://dx.doi.org/10.1590/ S0103-40142005000200021

SARTRE, J. P. *L'existentialisme est un humanisme*. Paris: Gallimard, 1996.

SCHERER, A. S.; MOTTA-ROTH, D. Engajamento e redução do espaço dialógico no gênero notícia de popularização científica. *Letras*, Santa Maria, n. 50, p. 261-302, 2015. DOI: http://dx.doi.org/10.5902/2176148520213

SCIENCE METRIX. *Analytical support for bibliometrics indicators*: open access availability of scientific publications. Montreal: Science-Metrix, 2018. Available from: <https://bit.ly/2nTbece>.

D

SIBILIA, P. Os diários íntimos na internet e a crise da interioridade psicológica. In: ENCONTRO DA COMPÓS, 12., 2003, Recife. *Anais...* Recife: Compós/Universidade Federal de Pernambuco, 2003.

VAN ZOONEN, L. I-Pistemology: changing truth claims in popular and political culture. *European Journal of Communication*, v. 27, n. 1, p. 56-67, 2012. DOI: https://doi.org/10.1177/0267323112438808

VERÓN, E. Teoria da midiatização: uma perspectiva semioantropológica e algumas de suas consequências. *Matrizes*, São Paulo, v. 8, n. 1, 2014. DOI: http://dx.doi.org/10.11606/issn.1982-8160.v8i1p13-19

WEAVER, D.; MCCOMBS, M.; SHAW, D. L. Agenda-setting research: issues, attributes, and influences. In: KAID, L. L. *Handbook of political communication research*. New York: Routledge, 2004.

WEINGART, P. Science and the media. *Research Policy*, Amsterdam, v. 27, n. 8, p. 869-879, 1998. DOI: http://dx.doi.org/10.1016/S0048-7333(98)00096-1

WINN, J. Writing about academic labour. *Workplace*, Vancouver, n. 25, p. 1-15, 2015.