Revista Lusófona de Estudos Culturais / Lusophone Journal of Cultural Studies, Vol. 9, No. 2, 2022, pp. 81–98
https://doi.org/10.21814/rlec.3973

Participation, Citizenship, and Science: The *Ask the Scientists* Experience at the School Agency of the Federal University of Paraná

Claudia Irene Quadros
Programa de Pós-graduação em Comunicação, Departamento de Comunicação, Setor de Artes, Comunicação e Design, Universidade Federal do Paraná, Curitiba, Brazil
Conceptualization, methodology, investigation, supervision, validation, writing – original draft, writing – review & editing

Regiane Regina Ribeiro
Programa de Pós-Graduação em Comunicação, Departamento de Comunicação, Setor de Artes, Comunicação e Design, Universidade Federal do Paraná, Curitiba, Brazil
Conceptualization, investigation, project administration, validation, writing – original draft

Chirlei Diana Kohls
Programa de Pós-Graduação em Comunicação, Departamento de Comunicação, Setor de Artes, Comunicação e Design, Universidade Federal do Paraná, Curitiba, Brazil
Data curation, formal analysis, writing – original draft, writing – review & editing

Patricia Goedert Melo
Programa de Pós-Graduação em Comunicação, Departamento de Comunicação, Setor de Artes, Comunicação e Design, Universidade Federal do Paraná, Curitiba, Brazil
Conceptualization, research, writing – original draft

Abstract

Public scientific communication in universities aims to encourage dialogue between scientists and society. By involving citizens in debates about its teaching, research, and extension actions, the university facilitates the exchange of knowledge with the community. In this paper, we discuss how this relationship is established through the project *Pergunte aos Cientistas* (Ask the Scientists), in which the population could clarify doubts about COVID-19 with researchers from different fields of knowledge. We, the authors of this article, are part of the Agência Escola (School Agency), an initiative for public communication and scientific dissemination of the Federal University of Paraná, the oldest educational institution in Brazil. Through descriptive analysis, we identify the public participating in this project and reflect on the relationships between society and scientists. To do so, we employ the concepts of open science (Recomendação da UNESCO Sobre Ciência Aberta, 2021), scientific dissemination (Caldas, 2010; Granado & Malheiro, 2015), and public communication of science (Bucchi, 2008; Manso, 2015). The studies on public formation (Dewey, 1946; Henriques, 2018) were essential to understanding how the participation of the publics in *Pergunte aos Cientistas* develops. The initiative has demonstrated the importance of citizens being active and aware of their surroundings. The exchange between scientists and society is beneficial for both parties: the former can map the population's doubts and needs, enabling the development of research based on social demands, while the latter discovers that it also has a space to show and expand its knowledge along with an academic community that has its doors open to society.

Keywords

science popularization, open science, public

Participação, Cidadania e Ciência: A Experiência do Pergunte aos Cientistas da Agência Escola Universidade Federal do Paraná

Resumo

A comunicação pública da ciência na universidade tem o propósito de incentivar o diálogo entre a sociedade e seus cientistas. Ao envolver o cidadão nos debates sobre suas ações de ensino, pesquisa e extensão, a universidade possibilita a troca de conhecimentos com a comunidade. Aqui discutimos como essa relação é estabelecida por meio do projeto *Pergunte aos Cientistas*, no qual a população pôde esclarecer dúvidas sobre a COVID-19 com pesquisadores de diferentes áreas do conhecimento. Nós, autoras deste artigo, fazemos parte da Agência Escola de Comunicação Pública e Divulgação Científica da Universidade Federal do Paraná, que se apresenta como a instituição de ensino mais antiga do Brasil. Por meio da análise descritiva, identificamos os públicos que participaram nessa ação e refletimos sobre a aproximação entre a sociedade e os cientistas. Para tanto, acionamos os conceitos de ciência aberta (Recomendação da UNESCO Sobre Ciência Aberta, 2021), divulgação científica (Caldas, 2010; Granado & Malheiro, 2015) e comunicação pública da ciência (Bucchi, 2008; Manso, 2015). Os estudos de formação de públicos (Dewey, 1946; Henriques, 2018) foram fundamentais para compreender como se dá a participação dos públicos no *Pergunte aos Cientistas*. A iniciativa tem demonstrado a importância de um cidadão ativo e ciente do seu entorno. Nesta troca de comunicação entre cientistas e a sociedade, ambos são beneficiados. Os cientistas conseguem mapear dúvidas e necessidades da população, possibilitando o desenvolvimento de pesquisas a partir das demandas sociais. Por sua vez, a sociedade descobre que também tem espaço para mostrar os seus saberes e adquirir mais conhecimento com uma universidade que abre as portas para a sua comunidade.

Palavras-chave

divulgação científica, ciência aberta, públicos

1. The Scenario Science Faces

The evolutionary process of science has been riddled with barriers and several mobilizations for its discredit (Rosa, 2012), which persist in the 21st century, given the scientific discoveries' power to question established powers. Therefore, the political, economic, social, and cultural context cannot be dissociated from scientific thought. In this sense, we seek to understand the communicational process of science in contemporaneity, observing decision-making made for and with the public.

Previous studies (Caldas, 2010; Costa et al., 2010) on scientific dissemination inspired us to reflect on this topic, bringing to light the current scenario of digital social network platforms, where false information can spread much faster than a virus. Citizens connected to the internet have a voice and can comment on the news and/or produce content. Appropriation of news content on digital social media shows that the production of meaning in groups, such as antivaccine pages on Facebook, is always associated with their cause. Put another way, these pages share, criticize, and even distort information to try to prove that vaccines cause harm (Almeida, 2019).

If, on the one hand, the denial of science can be more intense during a certain period because of the societal context, on the other hand, it increases the interest of scientists to publicize the results found to debate them with their peers and society. By making this decision, scientists try to discuss their findings with different audiences. They know that this approach to the pluralism of ideas can lead them to face many challenges, but these challenges are important for advancing science and developing citizenship. We understand that in science, as Cássio Hissa (2013) highlighted, "the ways of doing are not only articulated to the way of thinking but, above all, to the ways of being - and of being in the world - of the one who researches" (p. 128). Researching also means sharing and engaging in dialogue so that scientific thinking can nourish itself, as Rosa (2012) points out, from universal wisdom.

In this article, starting from our question (how can the public communication of science contribute to the scientific dissemination of a university closer to society?), we discuss concepts of open science, citizen science, and scientific dissemination. Then, we reflect on the public communication of science. Studies on public formation are also explored to examine this project.

From a concrete action, our goal is to analyze how public communication can contribute to the democratization of science by understanding the formation of the publics. The content of the project *Pergunte aos Cientistas* (Ask the Scientists), which is part of the scientific dissemination actions at the Agência Escola (School Agency) of the Federal University of Paraná (UFPR), was analyzed through a process of descriptive analysis to verify how this relationship between scientists and the population that participates, questions and criticizes occurs. According to Gil (2008), descriptive analysis allows the "use of standardized data collection techniques" (p. 28). Using this method, we could point out the characteristics of the participating audiences, such as gender, age, level of education, and city. Beyond identification, we sought to study how the participation of different groups (scientists, journalists, and society) takes place. That made it possible to understand this researched universe's anxieties, difficulties, and concerns. In total, there were 153 questions the public asked, and the scientists answered in 2020. The scholarship recipients and one of the journalists from the Agência Escola were the mediators in this process that brought the groups closer. From this survey, which gathered information about the public's profile, we crossed the data with the experiences lived during the project and analyzed it in the light of studies on public communication of science and the formation of the publics.

2. Open Science and Scientific Dissemination

Contemporary discussions about knowledge production are directly associated with the scientific community's concern with free access to information. With the expansion of digital social networks, this concern is gaining strength to expand access to data and information from academic research and, consequently, disseminate them to peers and the general public. In this context, the *FOSTER* project (*Facilitate Open Science Training*

for European Research) — a consortium formed by researchers from several European institutions — defines open science as transparent and collaborative (Bezjak et al., 2018). This model is challenged by the reflections brought by the sociologist of science Karin Knorr-Cetina (1999). Science should involve social life not only through its products but also through its structures and procedures (Knorr-Cetina, 1999, pp. 377–378).

The *Manual de Formação em Ciência Aberta* (Open Science Training Manual; Bezjak et al., 2018), initiated in the year 2018 at the German National Library of Science and Technology in Hannover, highlights that the "advocacy and promotion of Open Science in all its areas seeks to ensure that people, particularly the most vulnerable, are able to be heard on issues that are important to them" (Chapter 2.11). The authors also state that open science seeks to give the public a voice and considers their views when making any decision about their lives.

Among the dimensions of the process of doing science openly presented by the *FOSTER* project, some advantages are directly associated with science dissemination and science popularization, namely: (a) increased visibility and recognition of researchers and institutions; (b) promotion of scientific, social responsibility and social appropriation of knowledge; (c) transparency and knowledge of the scientific process; and (d) democratization of access to scientific knowledge (Bezjak et al., 2018).

The United Nations Educational, Scientific and Cultural Organization (Unesco) has published, in 2022, a series of recommendations for the development of open science with the purpose of "providing an international framework for open science policy and practice" (Recomendação da UNESCO Sobre Ciência Aberta, 2021, p. 6), considering several issues, such as regional differences and the challenges of all open science actors in different countries. In that document, open science is presented as an inclusive construct with several practices and movements to increase scientific collaborations and information sharing to benefit society and science itself. Regarding the involvement of social actors, there is a recommendation to encourage voluntary participation in building scientific knowledge through citizen science developed with appropriate methods to ensure benefits to all.

In this article, the proposed relationship between open science and communication is associated with its social dimension, where the process is centered on the citizen as an active informational subject. Hence the need to look at this phenomenon from the perspective of public communication.

We try to add our efforts to those of researchers who investigate this theme, such as Costa et al. (2010) and Manso (2015), and to defend open science. In an attempt to clarify the movements that occur in open science, Fecher and Friesike (2014, p. 20) have listed five schools of thought: (a) democratic, (b) pragmatic, (c) infrastructural, (d) public, and (e) metric. In the first, the democratic school, citizens, scientists, and politicians participate. In the second, the pragmatic school, scientists work together for more efficient results. In the third, the infrastructure school, scientists benefit from developing technological platforms that share knowledge. In the fourth, the public school, both scientists and citizens are involved. The fifth, the metrics school, is related to policies for

developing metrics that measure scientific impact. They all involve differentiated publics and require specific communication strategies, besides deserving in-depth studies of these relationships.

In this study, we selected the schools of thought that have citizen participation: (a) public school and (b) democratic school. In the public school, both citizens and scientists participate in the research process, resulting in clearer scientific communication that broadens its scope and facilitates dialogue. In the democratic school, access to knowledge is a fundamental human right, for it is through knowledge that human, social, cultural, and cognitive evolution occurs. This social inclusion in science and technology has also been encouraged for a long time in Brazil. Ildeu de Castro Moreira (2006), who was president of the Brazilian Society for the Advancement of Science, defends the need for every Brazilian to "acquire basic science knowledge" (p. 11). For the scientist, only in this way can citizens understand their surroundings and gain more opportunities to work and actively participate in the process and understanding of research. Thus, it is necessary to study the relationships established between citizens and scientists in an attempt to bring these publics closer together.

Antonio Granado and José Malheiros (2015) present several definitions of concepts about scientific culture. Here we highlight four: science outreach, science communication, public understanding of science, and public engagement in science and technology. These concepts are important for discussing the public communication of science. For the authors, "the *dissemination* [emphasis added], vulgarization or popularization of science consists of the *diffusion* [emphasis added] of knowledge of science (...) and, in particular, of the fruits of research produced at present, throughout the population" (Granado & Malheiros, 2015, p. 15). As they point out, one of the purposes of the activities carried out under this designation is to bring science closer to society. Science communication seeks to communicate scientific knowledge, such as research results, to diverse audiences. Public understanding of science can be associated with how the publics appropriate science through outreach. Granado and Malheiros (2015, p. 17) criticize the information deficit model because the scientist is seen as the keeper of knowledge, and it is considered that the public has difficulty understanding science, so one-way communication is forced. *Public engagement in science and technology* emerged in the United Kingdom in 2000 to combat the trust crisis that science was facing at the time. In this concept, the emphasis of communication is "in a relationship between equal citizens, whose knowledge and will have equal dignity, whose opinions must all be respected, and in a true dialogue between experts and lay people" (Granado & Malheiros, 2015, p. 17). The authors point out that this model "considers the need to involve the whole of society in discussions in decisions that affect its life" (Granado & Malheiros, 2015, p. 17). Democratically, citizens are mobilized to build knowledge with scientists.

3. Public Communication of Science and Democratic Participation

Public communication of science has been widely advocated in Brazil because it encourages democratic debate between scientists and society. In this sense, communicating is, in fact, sharing knowledge for the development of science and the population's welfare. And for this, communication cannot be unidirectional. However, as Brandão (2007) points out, the concept of public communication differs depending on the country, the author, and the context. The author notes at least five ways of defining public communication: (a) public communication identified as organizational communication, (b) public communication identified as scientific communication, (c) public communication identified with the state and/or government communication, (d) public communication identified with political communication, and (e) public communication identified as communication strategies of organized civil society.

Bucchi (2008) argues that the history of public communication of science is relatively new when compared to the long tradition of communicating science to the public. For a long time, argues the author, science communication had a patronizing tone when the media shared a news story they thought was of public interest. He also criticizes the deficit model, explaining that disbelief in science cannot be reduced to an information gap between experts and the public. However, he does not dismiss it in the process of science communication, which has many stages that are not mutually exclusive. For Bucchi (2008), lay knowledge should be valued in a continuous public science communication model. The exchange between scientists and the population affects both. Although their knowledge differs, neither can be considered more important than the other. The author further warns that public communication of science "cannot be seen only in the context of expert/citizen interactions, but also in the broader context of science in society" (Bucchi, 2008, p. 68).

As already mentioned, the concept of public communication of science is directly associated with the process of scientific openness and dialogues from the perspective of an active citizen who assumes the centrality of this process and benefits from it. Another important aspect is to adopt the premise that science, like language, is public (Knorr-Cetina, 1999). Thus, communicating to one's peers is only one aspect of the circulation of knowledge, and communicating to a lay audience is not only a process of dissemination but also of popularization of scientific knowledge. In this perspective, it becomes relevant to challenge a hierarchical trend in which scientists are considered to be those who possess knowledge, and the public, those who lack it. The idea is to enhance processes in which the public interacts with knowledge and re-signifies it according to its cultural, social, and personal aspects. Thus, dialogical relations are established where lay experience, common sense, and everyday life can be equivalent to specialized scientific knowledge, providing public participation. A society needs independent individuals to be independent, and this process takes place, to some extent, in the ability to understand how science works and how it is directly inserted into one's daily life. According to Bauman (2000/2001), the power of the subjects to influence the conditions of their own existence, to give meaning to the "common good", makes social institutions adapt to this meaning, that is, a process of collective construction of citizenship.

Another author who presents a critical perspective on the process of communicating science is Castelfranchi (2008). For the author, a model that values expert knowledge tends to maintain the dominance of experts over non-specialists, ignoring the cognitive and participatory capacity of a type of public that, most of the time, is unaware of science and technology due to the inefficiency of the educational process.

Manso (2015) defines the public communication of science as the space of opportunities for dialogues that brings "to the center of the debates the figure of the so-called citizen (not specialized in science), stimulating the plurality of knowledge and cultures" (p. 2). The positioning of the citizen assuming scientific protagonism, as Manso (2015) highlights, "is something challenging, including in the epistemological sense, of what this citizen with scientific-social (and political) capacity and responsibility will be in contemporary times" (p. 2). These points converge with the concern of Heloiza Matos (2011) in extending scientific knowledge to communicative exchanges: "public communication should be thought of as a political process of interaction in which expression, interpretation, and dialogue prevail" (p. 45). Jaramillo López (2011) understands it as a process that counts on the participation of collective subjects (civil society actors) that, even while expressing themselves individually, seek the construction of what is public in a democratic way.

We base this article on the authors mentioned above to argue that public communication of science presupposes participation, that is, a democratic model, egalitarian among the actors, with emphasis on dialogue, and that recognizes the multiple types of knowledge and the multiple types of reception. In this sense, we understand the need to know our audiences in greater depth. Burns et al. (2003) defend the importance of considering the publics according to their needs, interests, attitudes, and knowledge levels. To this end, they divide the public involved in science communication as scientists, mediators, decision-makers, the general public, the attentive public, and the interested public. In this paper, we focus on the following publics: scientists, mediators (journalists and scholars), attentive public (part of the population that seeks information about science and technology), and interested public (composed of people who are interested but not necessarily well informed about science and technology). The typology of Burns et al. (2003) shows many implications of these established relationships in science communication.

This article does not exhaust all the possibilities of these relationships but seeks to demonstrate how an action mediated by communicators has impacted scientific dissemination by bringing scientists and society closer together.

4. The Agência Escola of Public Communication of the Federal University of Paraná

From the perspective of public communication of science, the UFPR started, in 2018, a technical-scientific project aimed at scientific dissemination. The initiative is called "Agência Escola de Comunicação Pública e Divulgação Científica UFPR" (School

Agency of Public Communication and Scientific Dissemination UFPR) and aims to foster the visibility of the production of science developed and stimulated, in/by the university. The project comprises 21 undergraduate scholarship holders, six graduate scholarship holders, eight scholarship professors (one of them being the coordinator), and 13 professionals hired under the Brazilian labor laws standard.

The operation of the Agência Escola is based on three axes: training, experimentation, and technological innovation. Their integration structures the involvement of undergraduate scholarship students from the courses of visual arts, graphic design, music, advertising and propaganda, journalism, public relations, institutional communication, and information management, and from post-graduate (Master's and PhD level) communication and design. Besides experiencing the productive routines of different fronts in the field of communication and working in an interdisciplinary dynamic, the students broaden their vision of what science is and its importance in people's daily lives, as well as the several specificities of knowledge production. They also develop critical capacity in an environment favorable to expressing creativity and innovation, serving as a space for experimentation and creating new languages and formats.

The set of communication actions of the Agência Escola aims mainly to expand the access of scientific knowledge to society, leaving the university's walls and strengthening the dialogue between scientists, the population, and the press. One of these actions is *Pergunte aos Cientistas*, which aims to bring citizens closer to researchers and the science produced at the UFPR, motivating citizens to send questions about topics related to their daily lives that can be clarified by scientific knowledge.

Launched in March 2020 against the backdrop of the pandemic caused by COVID-19 and false news circulating on digital social networks, *Pergunte aos Cientistas* bridges the gap between the public, scientists, and journalists. The action, which collaborates to democratize access to knowledge production and show the impact of science on people's lives, is put into practice by following these steps: (a) the community sends questions to the means of communication of the Agência Escola (digital social networks and email); (b) the questions are gathered and forwarded to a group of UFPR scientists, (c) who answer all the questions and (d) forward the answers to the journalism team of the Agência Escola; (e) the answers are then organized and provide the basis for a report written in accessible language, (f) published on the website of the Agência Escola and on the university's news portal (in addition to being suggested to the press for reporting); (g) the report is circulated on the Agência Escola and UFPR's digital social networks; and is (h) forwarded directly to all the people who sent their questions.

The multidisciplinary team from the Agência Escola mediates between the publics (society, scientists, and journalists from the press), seeking to present the scientific answers through its journalistic actions in accessible language. The packaging of the content into a news format also seeks the capillarization of the subject to reach other people in society who may be interested in the theme, with questions from the community itself answered by scientists who study the subject. This process seeks, thus, the democratization of scientific knowledge and the participation of citizens in scientific dissemination, a proposal that articulates and dialogues with the concepts and authors discussed in this article.

4.1. Audience Participation in *Pergunte aos Cientistas*

To answer the question of our article, it is also pertinent to approach the discussion about the formation and affectation of the publics from John Dewey's (1946) theoretical basis and its dynamics with the Agência Escola. For this, the analysis is organized to understand how the publics are affected, trained, and move in the "Agência Escola de Comunicação Pública e Divulgação Científica UFPR" *Pergunte aos Cientistas* initiative.

In this context, *Pergunte aos Cientistas* offers different potentialities seen through the lens of public communication of science. Among them is the reach of the action, with the participation of people from several cities in the five Brazilian regions (North, Northeast, Midwest, Southeast, and South). The repercussion in the press amplifies this reach to an even greater number of individuals, as shown in Table 1.

Information	Data
Questions received	153
Questions answered	153
Participants	136
Age	18 to 80 years old, most between 21 and 60
Countries	Brazil, Portugal, the United Kingdom and Paraguay
Cities	53
Brazilian states	12
Brazilian regions	North, Northeast, Midwest, Southeast and South
Profissions	54
Reports produced and published on the Agência Escola website and Portal Federal University of Paraná	10
Total report views	292,055
Press releases	25 news items on three TV stations, three radio stations and 11 websites/newspapers
Scientists who answered questions	23
Subjects of the questions	Several aspects of prevention and contamination from COVID-19, such as the use of masks, hand sanitizer, the practice of physical activities, cleaning of packages and food, going to the market, tests and vaccines and risk groups, among others

Table 1 *Public data from the project* Pergunte aos Cientistas

In this reasoning, Dewey (1946) defends the view that the human being is not a passive spectator but an active participant through the very activity of communication. Moreover, as we highlighted earlier, this perspective is shared in open science.

This movement can be perceived from *Pergunte aos Cientistas*. The population faces countless difficulties, insecurities, and problems caused by the pandemic. Affected by the same event, they try to act to clarify their doubts so that they can feel safer and/or know how to face this circumstance.

In the initiative, people of different age groups, professions, and geographic locations, as shown in Table 1, move and actively participate by sending questions to receive answers that can guide decisions and attitudes in everyday life. These questions may interest other people with similar doubts, which can be observed by the number of views of the reports produced: almost 300,000, as well as press coverage with different scopes. In informal conversations during the mediation with the journalism team of the Agência Escola and press interviews, the scientists who answered questions from society commented that some of the questions led to new investigations and may become the subject of new studies.

We reviewed several authors to understand the formation of the publics at the Agência Escola. Fábio França (2008) presents the concept of the public from the perspective of Dewey and Blumer, as shown in Table 2.

Dewey	Blumer
A group of people faces a similar issue	A group of people who are involved in a matter
They acknowledge the problem	They are divided on the matter
They organize to act on the problem	They discuss the problem

Table 2 *Definitions of public formation*

Source. Adapted from Fábio França, 2008

There are similarities between the authors, and both contribute greatly to understanding the formation of the publics. For Dewey (1946), ideas are important when they serve as a tool for solving real problems. The scientist also defended the relationship between theory and practice and encouraged sharing ideas for developing knowledge, as previously mentioned. In this sense, open science also seeks the collaboration of all involved publics to solve a problem. The biggest obstacle, however, is to unite these publics in an egalitarian way. Hebert Blumer (as cited in V. V. França, 2018), from symbolic interactionism, observed that people act in the world based on the meaning things have for them and that these meanings come from social interaction. For him, in these interactions, the meanings produced are acted upon by the individual himself.

The questions forwarded by people to *Pergunte aos Cientistas*, associated with the answers given by researchers, are consumed as information of public interest. That

shows that the affectation process is not individual but a collective construction. That can be seen in the total number of views of the 10 stories produced in 2020 and published on the Agência Escola UFPR and Portal UFPR websites, which reached 292,055 views that year. The three most read articles include in their titles topics of public interest for prevention care during the pandemic: "Cientistas Orientam Sobre Efeitos Colaterais e Uso Correto de Álcool em Respostas Para Dúvidas da Sociedade" (Scientists' Guide on Side Effects and Correct Use of Hand Sanitizer in Answers to Doubts of Society), in which the cover image is hand sanitizer being applied on hands, with 87,431 views; "'É Verdade que Todos Vão Pegar Coronavírus?': Cientistas da UFPR Respondem Novas Perguntas da Sociedade" (Is It True That Everyone Will Catch The Coronavirus? UFPR Scientists Answer New Questions from Society), with 76,122 views; and "Ida ao Mercado, Caminhada e Imunidade: Cientistas da UFPR Respondem Novas Perguntas da Sociedade Sobre Coronavírus" (Going to the Market, Hiking and Immunity: UFPR Scientists Answer New Questions From Society About Coronavirus), with 38,112 views. Although the reach is large — which proves the public's interest — we are interested in future studies that can deepen the production of this public's meanings and encourage the participation of society in various actions of the Agência Escola.

Henriques (2018) points out that one of the possible ways to explain the process of affecting the publics is by the problematization of a situation because it depends on the perception and recognition of indirect consequences that require attention, the promotion of a sense of impact and the creation of a generalized view of the consequences. When the consequences of a problem reach beyond the individual directly involved, we enter the public dimension, "making people and groups have to deal with them, denouncing the problem and calling for action" (Henriques, 2018, p. 163). In *Pergunte aos Cientistas*, we notice this movement of calling people to action from, for instance, a question about vaccines sent by a young woman who wanted to convince her mother to vaccinate against COVID-19. Soon after the scientists' answer to her question was released, the young woman got in touch to say that her mother had ended up taking the vaccine.

The serious damage faced by society generates a symbolic bond between people who look to science, the public university, and scientists for support in clarifying their doubts. "Publics are first — and foremost — a form of sociability. That is, they define a specific pattern of interdependent social relations, through which individuals establish a certain kind of connections" (Esteves, 2018, p. 143). Henriques (2018) also states that publics are forms of sociability formed in networks of social relations and information flows. For the author, the "conditions of cohesion are not only physical but also (and mainly) symbolic" (Henriques, 2018, p. 162).

That occurs because the impact is collective, for it extends beyond the set of individuals. However, "the collective unit that goes by the name of public does not override or erase the individual subjects that constitute it; quite the contrary, it depends on them and even needs to stimulate their affirmation" (Esteves, 2018, p. 150).

Moreover, the same person can be part of different publics simultaneously or at different times, alternating according to the changes in their perceptions of what affects them.

> While certain groups may create a somewhat more stabilized identification, it does not mean, from the point of view of the action, that they will always have the same members and the same bond between and among them with certain opinions and positions. (Henriques, 2018, p. 166)

In open science, for example, we can observe that scientists play several roles in this dialogue with society, for they also need to listen to their peers and citizens for the development of their research — in interviews for RPC TV, affiliate of Rede Globo in Paraná, one of the UFPR researchers who answers the population's questions stated that society's own questions can generate research questions. For citizens to participate in open science, however, it is necessary to show that their involvement is important for developing society's knowledge.

Henriques' (2018) conceptualization is perceived in the variety of public profiles sending their questions to the project. It is observed by the participants' age range, from 18 to 80 years old, with a similar concentration, 20 to 30 people, in the age ranges from 21 to 30, 31 to 40, 41 to 50, and 51 to 60. In addition, the different profiles can be seen in the areas of activity of the participant population, listed in 54 professions from the data submitted with the questions. The occupations that appeared most often were students, teachers and retired individuals. However, the variety is evident in the 54 cited overall: domestic worker, civilian fireman, health agent, driver, administrative assistant, mechanics technician, insurance broker, salesperson, doctor, nurse, military, lawyer, biochemist, psychologist, systems analyst, entrepreneur, environmental engineer, among others.

The people who send their questions to *Pergunte aos Cientistas* also appear as a group in the published reports with their names and questions related to other similar or diverse questions within the theme of the pandemic asked by people from different geographical locations.

The discussion between public and private is also pertinent in the interaction with organizations. "These interactions both take place in a dimension of private transactions and in a public dimension, and it is in this second dimension that these people and groups take for organizations a less or more defined collective form" (Henriques, 2018, p. 161). From this angle, this article's object of analysis can be observed from the idea of the dual formation of publics. Henriques (2018) explains that this logic highlights the communicative dynamics between these two actors (organization and public) and that, through it, the modes of relationship and the creation of conditions of existence of various groupings as publics are built.

The dynamic of the dual path of formation understands that the public not only takes shape for organizations but is also formed by them. That is, the "public simultaneously *constitutes itself and is constituted* [emphasis added] — which is to say that it is formed in the interaction itself, in its own movement" (Henriques, 2018, p. 165). We perceived the double path of formation with participants who started to follow and actively interact with Agência Escola's communication channels (digital social networks and email). This is the case of the educational advisor Eliane Américo, 38, from the city of

Valparaíso, in the state of Goiás, who also sent questions to more than one of the reports produced involving different themes, such as the use of masks, sanitization of fruits and vegetables, and care for risk groups.

Dewey (1946), at the beginning of the last century, understood the importance of communication and its constant movement for the formation of the public, which, for him, are not mere spectators but reflective subjects that produce and share meanings. In this perspective, the publics are formed through communicational dynamics.

Moreover, Dewey (1946) relates the reflexive potential of communication and the publics to the role of education. In this relationship, we also visualize the competence of connection with the project *Pergunte aos Cientistas* analyzed in this article. The author points out that education can liberate new potentialities, "capable of all kinds of permutations and combinations, which would then modify phenomena, while this modification would, in turn, affect human nature and its educational transformation in a continuous and endless procession" (Dewey, 1946, p. 199).

In this sense, education in the analyzed object lies in the actions of the public, such as seeking scientific information, sharing it among their groups and adapting their behaviors to face the pandemic based on the answers received with scientific knowledge, like using masks and hand sanitizer, social distancing and isolation, hygiene of products and food, and going to the market with preventive care. For example, the union leader Giancarlo Tozo, 43, from Cascavel, Paraná, asked about the safe way to distribute food to the people most affected by the pandemic.

In Dewey's words, "we have the physical tools of communication as never before. (...) Without such communication, the public will remain shadowy and formless, searching spasmodically for itself, but grasping and holding its shadow rather than its substance" (Dewey, 1927/2012, as cited in Calhoun, 2017, p. 39). The author adds that "signs and symbols, language, are the means of communication by which a fraternally shared experience is initiated and maintained" within publics (Dewey, 1991/2012, as cited in Esteves, 2018, p. 148). The fraternally shared experience through communication conceptualized by the authors is also observed in *Pergunte aos Cientistas* from the process of receiving the questions and producing the content to the dissemination to the press. The Rede Massa SBT, for example, publicized the action in its channels by interviewing one of the UFPR scientists who answered the questions, opening the media's own space for the community to send their questions about the pandemic.

The discussion outlined here demonstrates that a public, faced with a situation that affects it, sets itself in motion to act collectively, generating visibility and the possibility of generalization of interest. "It is the condition of manifesting and acting in public that will somehow enable this public, although already existing as a potency, to actually present itself as a public and begin to produce, thereby, its effects" (Henriques, 2018, p. 170).

We understand that transparently showing the operation of communicational processes is important in encouraging public participation. The public, as Henriques (2018) highlights, "always tends to show itself as representative of some opinion or some will that extrapolates it" (pp. 166–167). Moreover, the author continues, the public desires

"the greatest possible expansion of this representation, otherwise it loses its very raison d'être" (Henriques, 2018, pp. 166–167).

5. Considerations

In this article, we sought to show how public communication can contribute to the process of democratization of science through a concrete action of the Agência Escola of the UFPR, which consists of students, teachers and other professionals from different areas. Attracting citizens to discuss science has been challenging for the project team and its partners.

The public's participation in *Pergunte aos Cientistas* is still limited when we reflect on the potential of open science and public communication of science. However, the action contributes to knowing the needs of the public of the Agência Escola, as well as their location, experienced contexts, attitudes and interests, as Burns et al. (2003) recommended. The questions sent to the scientists were catalogued, aiming to know the Agência Escola's publics. Although we have not analyzed the content of the questions nor the answers of the scientists in this paper, the themes addressed signal the interests of a population that sought not only solutions to their problems but also questioned public health decisions. The public's participation also made it possible to plan other editions of *Pergunte aos Cientistas* with other themes beyond COVID-19, such as mental health, natural disasters, politics and democracy. In this sense, by opening up space to listen to the needs of Agência Escola's public, we also seek to contribute, through public communication of science, to awaken the public's interest in dealing with themes of their daily lives in science dissemination.

The approach to the publics of the Agência Escola also involved scientists and communication mediators (advisors, journalists and scholarship holders). For these groups, this activity also brought a new experience that resulted in more knowledge about the community and the public communication of science. We do not rule out direct contact between scientists and the population, but the dynamic adopted in *Pergunte aos Cientistas*, which has the mediation of communicators, allowed the involvement of researchers with a very extensive work routine. The communication between scientists, mediators and the public also allowed the direct exchange of knowledge. The scientists offered more subsidies to the mediators when answering questions from the public. Moreover, they also had a better understanding of the role of communicators in science dissemination and the importance of public communication of science to meet the population's needs. The mediation of communicators also made it possible to package the content in an accessible language in different formats and media, in which diverse audiences circulate and move to actively participate through the activity of communication, as discussed in this paper from Dewey's (1946) point of view.

By returning to the problem question of our research (how can the public communication of science contribute to the scientific dissemination of a University closer to society?), we understand that the mediation of Agência Escola's team not only contributes

to the democratization of access to scientific knowledge but also has a fundamental role in promoting the public communication of science. The team brings scientists, society, and the press closer together. In the exchanges with the public, we highlight three messages sent to the team. They say they felt as if they were talking to scientists: "it felt like I was in a doctor's appointment when I read the answer"; "the important thing is to help clarify doubts with the right people"; "I really admire your work (scientists and journalists), you are essential to bringing information to the population. Gratitude".

To promote a closer and more direct dialogue with society, the Agência Escola of the UFPR is experimenting with a hybrid format of *Pergunte aos Cientistas*. Besides all the already established content packaging and format of the action, in the August 2022 edition, which had the theme "Política e Democracia" (Politics and Democracy), the Agência Escola's team visited the Julia Amaral Di Lenna Municipal School, in Curitiba, Paraná, in Brazil, to collect questions from teenage students on the subject. Subsequently, political scientists who answered the questions will go to the school with Agência Escola's team to talk to the students. Thus, this process strengthens a more direct and circular dialogue and interaction between scientists and society.

The dynamic of *Pergunte aos Cientistas* was also planned considering the actions of digital social network platforms. Studies on public participation in social media platforms (Macedo & Quadros, 2021; Quadros, 2005) show us the need to establish rules to promote a fruitful debate in the digital environment. *Pergunte aos Cientistas*, although it brings in its name the centrality of scientists, arises to open space for the public with the mediation of a communication team prepared and being trained to disseminate science.

The experience of other actions of the Agência Escola, which seek to debate topics of interest to citizens, has shown that it is still necessary to establish editorial policies for public participation, such as the dynamic created in *Pergunte aos Cientistas*. For example, in the second edition of "Divulga Ciência AE" (Disseminate Science AE; an event promoted by Agência Escola) on its YouTube channel, scientists debated the use of drugs in the treatment of COVID-19. The debate attracted more than 1,500 viewers, and its repercussions were discussed on Agência Escola's digital social networks and the UFPR's official profile, which also publicizes these actions. The scientists receive all kinds of messages, such as critical, complimentary and offensive ones.

In the COVID-19 pandemic, we have evidenced more effective citizen participation at Agência Escola of the UFPR. *Pergunte aos Cientistas* was planned to bring knowledge to the public, trying to listen to their concerns. This Agência Escola initiative, added to others, has brought the public closer to the university. We know that maintaining this interaction with the public requires an effort beyond the scope of a communication team. However, we realize that the number of scientists who feel the need to adopt open science in their research and interact with the public is increasing. About the rules of this interaction, we argue that they must be built by the public involved so that the processes of this approach actually promote the participation of all.

Public communication of science, which involves the participation of different social actors, requires in-depth knowledge of its audiences. Knowing their interests, needs,

and contexts makes it possible to contribute to scientific dissemination closer to society and, thus, to encourage the debate that benefits all publics and science itself.

Translation: Pedro Wiezel

Acknowledgements

We thank Funpar — The Federal University of Paraná Foundation for financially supporting the Agência Escola.

References

Almeida, A. M. (2019). *Movimento antivacinas na internet: Da apropriação e recirculação do jornalismo de saúde ao empoderamento em grupos no Facebook* [Master's thesis, Universidade Federal do Paraná]. AcervoDigital da UFPR. https://hdl.handle.net/1884/64287

Bauman, Z. (2001). *Modernidade líquida* (P. Dentzien, Trans.). Jorge Zahar. (Original work published 2000)

Bezjak, S., Clyburne-Sherin, A., Conzett, P., Fernandes, P., Görögh, E., Helbig, K., Kramer, B., Labastida, I., Niemeyer, K., Psomopoulos, F., Ross-Hellauer, T., Schneider, R., Tennant, J., Verbakel, E. (2018). *Manual de formação em ciência aberta* (A. Miguéis, B. Nolasco, C. Marques, C. Lopes, C. Alves, C. Reis, C. Boavida, C. Lopes, D. Silva, F. Borba, G. Praça, G. Gabriel, I. Andrade, L. Gonçalves, M. Montenegro, M. Antunes, M. Amante, M. Vargues, M. Duarte, ... Sanches, T, Trans.). Foster. https://doi.org/10.5281/zenodo.1212496

Brandão, E. P. (2007) Conceito de comunicação pública. In J. Duarte (Ed.), *Comunicação pública: Estado, mercado, sociedade e interesse público* (pp. 2–33). Atlas.

Bucchi, M. (2008). Of deficits, deviations and dialogues: Theories of public communication of Science. In M. Bucchi & B. Trench (Eds.), *Handbook of public communication of science and technology* (pp. 57–76). Routledge.

Burns, T., O'Connor, J., & Stocklmayer, S. (2003). Science communication: A contemporary definition. *Public Understanding of Science*, *12*, 183–202. https://doi.org/10.1177%2F09636625030122004

Caldas, G. (2010). Divulgação científica e relações de poder. *Informação & Informação*, *15*(1esp), 31–42. https://doi.org/10.5433/1981-8920.2010v15n1espp31

Calhoun, C. (2017). Facets of the public sphere: Dewey, Arendt, Habermas. In F. Engelstad, H. Larsen, J. Rogstad, & K. Steen-Johnsen (Eds.), *Institutional change in the public sphere* (pp. 23–45). De Gruyter.

Castelfranchi, Y. (2008). Para além da tradução: O jornalismo científico crítico na teoria e na prática. In L. Massarani & C. Polino (Eds.), *Los desafíos y la evaluación del periodismo científico en Iberoamérica: Jornadas Iberoamericanas sobre la Ciencia en los Medios Masivos* (pp. 10–20). AECI; CYTED; OEA; RICYT; SciDevNet.

Costa, A., Sousa, C., & Mazocco, F. (2010). Modelos de comunicação pública da ciência: Agenda para um debate teórico-prático. *Conexão*, *9*(18), 149–158. https://abcpublica.org.br/biblioteca/modelos-de-comunicacao-publica-da-ciencia-agenda-para-um-debate-teorico-pratico/

Dewey, J. (1946). *The public and its problem*. Gateway Books.

Esteves, J. P. (2018). Públicos e comunicação: Breves apontamentos sobre novos capítulos de uma aprendizagem recíproca. In V. França & P. Simões (Eds.), *O modelo praxiológico e os desafios da pesquisa em comunicação* (pp. 141–159). Sulina.

Fecher, B., & Friesike, S. (2014). *Open science: One term, five schools of thought*. Springer Cham Heidelberg.

França, F. (2008). *Públicos: Como identificá-los em uma nova visão estratégica*. Yendis Editora.

França, V. V. (2018). Discutindo o modelo praxiológico da comunicação: controvérsias e desafios da análise comunicacional. In V. França & P. Simões (Eds.), *O modelo praxiológico e os desafios da pesquisa em comunicação* (pp. 89–117). Sulina.

Gil, A.C. (2008). *Métodos e técnicas de pesquisa social*. Editora Atlas.

Granado, A., & Malheiros, J. V. (2015). *A cultura científica em Portugal: Ferramentas para perceber o mundo e aprender a mudá-lo*. Fundação Francisco Manuel dos Santos.

Henriques, M. S. (2018). Promoção do interesse e projeção da experiência: A formação dos públicos na interação com as organizações. In V. V. França & P. Simões (Eds.), *O modelo praxiológico e os desafios da pesquisa em comunicação* (pp. 161–174). Sulina.

Hissa, C. (2013). *Entrenotas: Compreensões de pesquisa*. Editora UFMG.

Knorr-Cetina, K. (1999). A comunicação na ciência. In F. Gil (Ed.), *A ciência tal qual se faz* (pp. 375–399). João Sá da Costa.

López, J. C. J. (2011). Advocay: Uma estratégia de comunicação pública. In M. M. K. Kunsch (Ed.), *Comunicação pública, sociedade e cidadania* (pp. 61–80). Difusão Editora.

Macedo, K. C. A., & Quadros, C. I. (2021). As interações entre os leitores do site The Guardian: A participação no long-form journalism. *Revista Temática*, *17*(7), 1–17. https://doi.org/10.22478/ufpb.1807-8931.2021v17n7.59970

Manso, B. L. de C. (2015, October 26–30). *A comunicação pública da ciência à luz da ciência aberta: Repensando o cidadão como sujeito informacional* [Conference presentation]. VI Encontro Nacional de Pesquisa em Ciência da Informação, João Pessoa, Brazil. http://www.ufpb.br/evento/index.php/enancib2015/enancib2015/paper/view/3093/1122

Matos, H. (2011). A comunicação pública na perspectiva da teoria do reconhecimento. In M. M. K. Kunsch (Ed.), *Comunicação pública, sociedade e cidadania* (pp. 39–59). Difusão Editora.

Moreira, I. (2006). A inclusão social e a popularização da ciência e tecnologia no Brasil. *Inclusão Social*, *1*(2), 11–16. https://revista.ibict.br/inclusao/article/view/1512

Quadros, C. I. (2005). A participação do público no webjornalismo. *E-Compós*, *4*, 1–17. https://doi.org/10.30962/ec.56

Recomendação da UNESCO sobre ciência aberta, november, 2021, https://unesdoc.unesco.org/ark:/48223/pf0000379949_por

Rosa, C. A. P. (2012). *História da ciência: Da antiguidade ao renascimento científico*. FUNAG.

Biographical Notes

Claudia Irene de Quadros is a permanent professor in the Postgraduate Program in Communication at the Federal University of Paraná (Curitiba, Brazil). She holds a PhD in communication from the University of La Laguna (La Laguna, Spain) and did post-doctoral studies in digital communication at Pompeu Fabra University (Barcelona, Spain).

ORCID: https://orcid.org/0000-0003-1322-8971

Email: clauquadros@gmail.com

Address: UFPR – Departamento de Comunicação, Rua Bom Jesus, 650, Cabral, Curitiba, Brasil, 80035-010

Regiane Ribeiro is a permanent professor of the Postgraduate Program in Communication at the Federal University of Paraná (Curitiba, Brazil), with a PhD in communication and semiotics from the Pontifical Catholic University of São Paulo (São Paulo, Brazil).

ORCID: https://orcid.org/0000-0003-1110-2902

Email: regianeribeiro5@gmail.com

Address: UFPR – Departamento de Comunicação, Rua Bom Jesus, 650, Cabral, Curitiba, Brasil, 80035-010

Chirlei Diana Kohls holds a master's degree and is a PhD student in communication from the Federal University of Paraná (Curitiba, Brazil).

ORCID: https://orcid.org/0000-0002-8785-8776

Email: chirleidiana@gmail.com

Address: UFPR – Departamento de Comunicação, Rua Bom Jesus, 650, Cabral, Curitiba, Brasil, 80035-010

Patricia Goedert Melo holds a master's degree and is a PhD student in communication from the Federal University of Paraná (Curitiba, Brazil).

ORCID: https://orcid.org/0000-0002-8708-0589

Email: patigmelo@hotmail.com

Address: UFPR – Departamento de Comunicação, Rua Bom Jesus, 650, Cabral, Curitiba, Brasil, 80035-010

Submitted: 14/03/2022 | Accepted: 15/06/2022