


Science communication in the National Policy on Science, Technology, and Innovation in Health: analysis of the official speech


Comunicação científica na Política Nacional de Ciência, Tecnologia e Inovação em Saúde: análise do discurso oficial

Neide Emy Kurokawa e Silva^a

 <http://orcid.org/0000-0002-1314-8851>


E-mail: neks@iesc.ufrj.br

César Augusto Paro^a

 <http://orcid.org/0000-0002-8447-9586>

E-mail: cesaraugustoparo@iesc.ufrj.br

Miriam Ventura^a

 <http://orcid.org/0000-0001-8520-8844>

E-mail: miriam.ventura@iesc.ufrj.br

^aUniversidade Federal do Rio de Janeiro. Institute of Studies in Public Health. Department of Social and Human Sciences in Health. Rio de Janeiro, RJ, Brazil.

Abstract

From the inquiry about the possibilities of social participation and effective popular interaction in health research, this article aims to analyze how the National Policy on Science, Technology, and Innovation in Health approaches the communicative dimension. For that, the official document of this policy underwent a thematic analysis. The communication of science, technology, and innovation for population features mainly at the “scientific and technological advances diffusion” section, designated under different expressions that, although presenting distinct meanings and goals, are stated as synonymous in the document. Overall, the policy considers communication as the upright and unidirectional transfer of content to specific audiences - from a sender to a receiver. Such perspective contrasts with the horizontal and participative perspective of knowledge construction and technological appropriation preconized by studies on public engagement in science and scientific literacy. Considering our political, social, and cultural context, along with the merit of the Policy’s creation process, communication proposals must include an effective public participation in science, technology, and innovation in health, respecting the democratic and participative principles postulated by the National Health System.

Keywords: Science; Technology; Health; Community Participation; Communication.

Correspondence

César Paro

Praça Jorge Machado Moreira, 100. Cidade Universitária, RJ, Brasil.

CEP: 21941-598.

Resumo

A partir da indagação sobre as possibilidades de participação social e efetiva interação da população nas pesquisas científicas na saúde, buscou-se analisar como a Política Nacional de Ciência, Tecnologia e Inovação em Saúde aborda essa dimensão comunicativa. Deste modo, examinou-se o documento oficial desta política por meio da análise temática. A comunicação sobre ciência, tecnologia e inovação à população é tratada, principalmente, no item sobre a difusão dos avanços científicos e tecnológicos, sendo designada com diferentes termos, cujos significados e objetivos, embora distintos, são tratados como sinônimos. A ideia central de comunicação gira em torno de um conteúdo a ser transferido a determinados públicos, de forma unidirecional e verticalizada, de um “emissor” para um “receptor”. Tal perspectiva contrasta com a possibilidade de uma comunicação mais horizontalizada e participativa na produção de conhecimento e apropriação de tecnologias, como vislumbrado e desenvolvido por estudos e práticas sobre engajamento público na ciência ou letramento científico. Reconhecendo-se o mérito do processo que culminou nesta política e considerando o contexto político, social e cultural brasileiro é importante impulsionar propostas comunicativas de participação efetiva da sociedade nas questões de ciência, tecnologia e inovação na saúde, coerentemente com os princípios democráticos e participativos do Sistema Único de Saúde (SUS).

Palavras-chave: Ciência; Tecnologia; Saúde; Participação da Comunidade; Comunicação.

Introduction

Expanding the scope of the National Policy on Science, Technology, and Innovation (NPSTI), approved in 2001, the National Policy on Science, Technology, and Innovation in Health (NPSTIH) was launched in 2004, based on technical-scientific merit and social relevance. Although conceived as a result of the 1st National Conference on Science and Technology, in 1994, the NPSTIH was only implemented after the second edition of this conference, in 2003, under the leadership of the Ministry of Health. Its guidelines were published with the National Agenda of Priorities in Health Research (NAPHR), in 2004 (Goldbaum; Serruya, 2007).

This policy proposes a set of alternatives and political solutions for the scientific and technological development of the country, considering the interests of society, state, and market (Brasil, 2008).

According to Almeida-Andrade and Carvalho (2014), by including interests of such diverse actors, NPSTIH formulation involved several discussion forums beyond conferences, including a public consultation shared with 90 Brazilian health researchers – despite the modest response rate of 30%.

The authors also stress the underlying tensions regarding health managers’ interest for the promotion of science, technology, and innovation (STI) on the part of the Ministry of Health, and the fear of the scientific health community of limitations imposed to academic production. Despite the diversity of specific agendas, the common interest in defending scientific and technological promotion as a priority sector of the Brazilian Unified Health System (SUS), added to the favorable macropolicy conjuncture, allowed the formation of a national community of public policy on science, technology, and innovation in health.

This brief overview allows us to observe the participation of different actors in the NPSTIH formulation process, including those from different government sectors, social segments, and medical-industrial complex, as well as a broad participation of the scientific community.

If such complex mobilization managed to guarantee the proposition of a policy on STI in health, its implementation and maintenance as a priority theme in the government agenda requires the continuous participation of these actors and consequent resources allocation.

With the merger between the Ministries of Communications (MCOM) and Science, Technology, and Innovation (MOSTI) in 2016, resulting in the formation of the Ministry of Science, Technology, Innovations, and Communications (MOSTIC), the setback in social participation at issues concerning STI are manifest in other government sectors. Two secretariats were likewise integrated with such merger, namely the Science and Technology for Social Inclusion (SECIS) and the Research and Development Policies and Programs (SEPED). Responsible for programs aimed at appropriate technologies, seeking social development and knowledge dissemination, the SECIS secretariat included two departments: Popularization and Dissemination of Science and Technology and Regional Actions for Social Inclusion.

We understand that participation possibilities are more plausible and expected among actors more directly sensitized and involved with the jargon of science and technology, as scientists and managers. However, social performance, before its varied representation forms, would require investments for providing citizen participation (Arnstein, 1969; Bordenave, 1983).

Besides the ethical aspects around the protection of subjects in the processes of scientific, technological, and innovation production, we should also reflect upon the perspective of individual and collective actions within these processes. For such, we must overcome the hegemonic instrumental and deterministic view of the science-technology-innovation-society relationship, often treated in isolation, in favor of an understanding that assumes an intrinsic connection among them - as from the critical approaches of the Studies on Science, Technology, and Society (STS) (Feenberg, 2015; Neder, 2013).

Understanding scientific and technological development as a social process shaped by

cultural, political, economic, and epistemic dimensions, STS studies in the field of public policy defend “the social regulation of science and technology, stimulating the development of democratic mechanisms that promote more openness to scientific and technological policies.” (Palácios et al., 2003, p. 127, our translation).

Andrew Feenberg (2013) postulates the critical theory of technology, which prompts reflections based on the democratization of internal and hidden processes that govern sociotechnical codes, aiming to privilege, in new technical arrangements, values that are often considered marginal. In this scenario, values integrated with technologies are deemed as “socially incorporated” and cannot be exclusively represented by categories such as efficiency and control. Thus, the author proposes the centrality of technology democratization through public participation in decisions about project and development in STI.

In regard to the Brazilian health sector, the 1988 Constitution establishes the improvement of scientific and technological development and innovation within the SUS scope (Article 200, item V), while providing for community participation as part of the organizational guidelines of health actions and services (Article 198, item III). Thus, the chapter on SUS addressed several challenges in the science-technology-innovation-society relationship for guaranteeing the right to health.

This scenario of a system organized by a democratic logic provides a key element for the production of knowledge, technology, and innovation in the health sector: the interaction between these processes and the Brazilian population. Then, the relationship between society and science-technology-innovation in health implies a communicational dimension whose investments will determine the success of such an interaction.

These contexts lead us to reflect on how scientific research and technological development anticipate social knowledge and engagement within the national context, thus raising the questions: what are the meanings of social communication and participation in the field of science and technology? How does the NPSTI

approach the communicative dimension in the scope of health research?

Considering that sector-specific policies may indicate how research on health incorporate the communication sphere, this study investigated how the NPSTI official document addresses such communicative dimension.

Before addressing this research path, we will briefly discuss the main concepts that deal with social participation or communication in the relationship science-technology-society, as studies on this theme adopt different terminologies that express different meanings.

Communication, science, and technology

The literature on communication in the fields of science and technology provides a vast array of concepts and terminologies, showing variations in the meanings attributed for a single term.

In the national literature, this occurs with terms such as science dissemination, diffusion, communication, literacy, alphabetization, vulgarization, and popularization. Scientific engagement is yet another terminological variation, although less common in Brazil.

Regarding the term “scientific communication and diffusion,” the Health Science Descriptors (DeCS)¹ distinguishes communication from diffusion according to the audiences being addressed:

Communication, publication, and diffusion of results of scientific research in articles, books, and other bibliographic documents that can be either paid or free, printed or online, and generally peer-reviewed. Scientific communication may target scientists and academics or the general public, in which case it is termed “scientific diffusion.” (our translation)

Thus, besides the scientific communication targeting other scientists and science itself, the scientific diffusion, targeting non-scientists,

implies basically three aspects: teaching science in the school environment to encourage the training of new scientists; decoding scientific findings for the general public through news published in different media; and communicating professionals, technicians, and managers potentially consumers of the findings, such as those related to drugs.

The terms may also be differentiated in relation to the moment that communication occurs, such as the diffusion of the research or its technological product, or even the study design and agenda.

Besides the vehicles, audiences, and moments involved in the diffusion/interaction of scientific communication, one may also discern the models indicating meanings and practices underlying this communication.

We understand model as a set of features regarding the ethical, political, and epistemological horizons guiding the communication. By understanding that communication to a lay public entails the transmission of information, for example, we invoke a certain conception of this public: that it lacks a technical knowledge inherent to science and scientists, thus requiring the provision of such information. The moment when the public is included in the process also says a lot about the horizons guiding communication, be it in regard to the notion of what is socially relevant or only to the disclosure of research results.

Such perspective is widely explored in the literature that distinguishes *alphabetization* from *scientific literacy*, rooted in the traditions of North American studies on scientific literacy. Despite the mistakes related to its translation and appropriation, in Brazil, the concepts of alphabetization and literacy differ in meaning. Whereas the concept of alphabetization refers to the technical capacity of teaching/learning reading and writing, literacy refers to the ability of reading and writing in providing practices that operate transformations in social conditions, that is, enable the “rewriting” of reality (Cunha, 2014).

¹ Available at: <<http://decs.bvsalud.org>>. Accessed on: May 30, 2019.

As for the Spanish context, the expression *alfabetización científica* designates “the teaching whose aim is to promote skills and competences among students, enabling them to participate in day-to-day processes” (Sasseron; Carvalho, 2011, p. 60, our translation).

Still within the notion of scientific literacy, Germano and Kulesza (2007, p. 13, our translation) discuss the difference between practical, civic, and cultural scientific literacy:

Practical scientific literacy is that which contributes to overcoming concrete problems, enabling individuals to immediately solve basic difficulties that affect their life. Civic scientific literacy would be that which makes citizens more vigilant to science and its problems, so that themselves and their representatives may make better informed decisions. The cultural scientific literacy would be at another level of cognitive and intellectual elaboration, sought by the small fraction of the population that wishes to learn about Science as a human achievement and in a deeper manner.

Different objectives and audiences are proposed for the same expression, reinforcing the plurality of meanings attached to a single word or term, possibly conveying multiple meanings and practices.

A less known jargon in Brazil, *Public engagement in Science*² arises from the public communication of science and is used in analyses of relations between citizens and science and technology, also entailing different meaning.

Public engagement in science, like scientific literacy, transcends the mere dissemination of

knowledge as a transmission of information to the public. Rather, the term implies an effective appropriation and integration with other knowledge to be used in decision-making:

It involves the commitment between society and science through dialogue, in particular through an open discussion among equals that enables lay people to become the protagonists in scientific decisions with social impact. (...) Being a fundamental part of a strong and consolidated democracy, this more egalitarian position of public involvement establishes a two-way street: public knowledge of science and the scientific community knowledge about the public (Oliveira; Carvalho, 2015, p. 156, our translation).

By indicating the numerous designations for communication in the field of science and technology (ST) and the gradient between involved foci, communication models, and audiences, this brief panorama covers more vertical approaches based on the notion that the lay public lacks sufficient knowledge, thus requiring information on scientific discoveries for being able to consume new technologies; as well as more horizontal approaches, whereby citizens’ participation is not limited to information about the study outcomes, but rather provides for their protagonism, including in determining social priorities.

With that, we may synthesize the main characteristics inherent to communication models in science, having in mind that the meaning attributed to terms may vary according to the authors approaching them. (Chart 1).

2 Term institutionalized at the 2007 Public Engagement Conference in Lisbon, organized by the European Union.

Chart 1 – Designations and main characteristics of communication in science

DESIGNATION	FOCUS	COMMUNICATION MODEL	AUDIENCE
Scientific Communication	Scientific knowledge and population (scientists and non-scientists); transfer of scientific knowledge;	Horizontal; scientists to scientists	Peers
Scientific dissemination	Informational; transmission of scientific knowledge	Verticalized; scientists (who attains knowledge) to population (who lacks knowledge)	Technology consumers and users of scientific information
Scientific diffusion	Informational; transmission of scientific knowledge	Verticalized; scientists (who attains knowledge) to population (who lacks knowledge)	Technology consumers and users of scientific information
Scientific alphabetization	Pedagogical; informational; improvement of science education; fomentation of research culture	Verticalized; scientists (who attains knowledge) to students and/or population (who lacks knowledge)	Students; population
Scientific vulgarization	Informational; translation of specialized language into ordinary language	Verticalized; scientists (who attains knowledge) to population (who lacks knowledge)	Technology consumers and users of scientific information
Science popularization	Informational; pedagogical; translation of specialized language into ordinary language	Verticalized (may have sharing nuances)	Technology consumers and users of scientific information
Scientific literacy	STI democratization; pedagogical; political; possibility of critical understanding of the STI by the lay public	Horizontal; joint formulation of the scientific agenda	Citizens
Public engagement	STI democratization; pedagogical; political; possibility of critical understanding of the STI by the lay public	Horizontal; joint formulation of the scientific agenda	Citizens

Research path

Considering that documents may help understanding social realities in institutional contexts (Flick, 2009), this qualitative exploratory research conducted a documental analysis to investigate how the National Policy on Science, Technology, and Innovation in Health (NPSTIH) approaches scientific communication.

The policy was originally published in 2005, after being approved at the 2004 National Conference on Science, Technology and Innovation in Health and at the 147th Ordinary Meeting of the National Health Council. However, for the purpose of this study, we will investigate the second and current edition of the NPSTIH (Brazil, 2008).

Documental analysis was performed based on the binomial content/production context, considering

that the document comprises a “communicative device” resulting from a specific historical, social, and political process rather than an “information container” (Flick, 2009).

Thematic analysis was performed in the light of Bardin’s (2016) propositions. Document reading was guided by NPSTIH formulation context and by the survey of the terminology used to deal with the theme. Information pertinent to communication processes were selected and explored through coding, by cutting out and compiling data into units of meanings (themes and subthemes), enabling their description and interpretation.

In this interpretative stage, the findings were analyzed according to the theoretical-conceptual references of critics of Collective Health and STS Studies.

Results and discussion

The “population” in the NPSTIH

NPSTIH affiliation is delimited right at the beginning of the document, stating the principles of the National Health Policy (NHP) within the scope of the SUS and the NPSTI as its guides.

In respect to the NHP, the NPSTIH highlights the consonance with the constitutional principles of universality, integrality, and equity, upholding an ethical and political commitment to “the production and appropriation of knowledge and technologies that contribute to reducing social inequalities in health, in line with social control” (Brasil, 2008, p. 5, our translation). As for the NPSTI, NPSTIH includes the principles of technical-scientific merit and social relevance, postulating the adjustment of technical and scientific knowledge production according to the economic, social, cultural, and political needs of the country, aiming at a sustainable national development.

The document references social relevance as one of the driving axes of the policy, along with sanitary and economic relevance. In the document, the main ideas associated with the term “social, sanitary, and economic relevance” concern the advancement of knowledge, suggesting competitiveness and development, and the usefulness of the knowledge produced, aiming at solving priority health problems (Brasil, 2008).

Despite the possible tensions between the principles of social and economic relevance, provided for by the NPSTI, and that of equity, which aims to reduce social inequalities in health, as provided by the SUS, the NPSTIH document discusses the coexistence of an economic and developmental tonic, characteristic of a science and technology policy, and the commitment to democratic and participatory constitutional precepts.

The document is assertive in describing the role of actors from research institutions and the Ministry of Health in its formulation. However, the performance of society as a whole is not evident - at times mentioned as *representatives of social movements*, at other as *social control*, - in a way that its presence is only recorded in conferences

preceding the policy formulation (Andrade; Camargo, 2014; Goldbaum; Serruya, 2007).

Before such a complex process involving actors with such diverse interests, knowledge, powers, and argumentative capacities, the participation of the population in the debate may be compromised, for the theme is unrelated to their daily life.

In this scenario, the question about the quality of popular participation in NPSTIH formulation is inserted within a broader question about its association with the STI.

Scientific communication in the NPSTIH

Throughout the course of the NPSTIH text, scientific dissemination is justified based on the shortcomings of introducing accessible and clear forms of communication for the lay public and for health professionals, resulting in the low use of scientific knowledge and posing barriers to social participation.

The focal point between STI and society regarding communication within politics comprises the notion of knowledge dissemination and related terms.

These terms are mostly used in (a) the chapter referring to the current situation of science and technology in Brazil, in the item on human resource formation; and (b) the chapter on NPSTIH strategies, in the item on Dissemination of Scientific and Technological Advances.

From a textual analysis, we identified that the most common words related to communication in the document were “diffusion,” with nine occurrences, and “dissemination,” with seven occurrences, followed by “communication,” used five times, “disclosure,” used four times, and “popularization,” used twice.

We also verified a series of semantic slips in words or terms related to scientific communication, being treated as synonyms. However, as a rule, scientific diffusion referred to the communication aimed at non-scientists, as stated in the DeCs.

The etymology of the words diffusion, dissemination, disclosure, and popularization is rooted in Latin, meaning “spreading” (Houaiss;

Villar, 2001). Conversely, “communication” can convey two different meanings, as postulated by Germano and Kulesza (2007, p. 15):

Sourced from a Latin word: *communis*, which means “by common”, communication can convey two meanings. The first, transitive, “[to] communicate”, equivalent to informing and transmitting; and the second, of communicating, in horizontal dialogue with the other. In the transitive sense, communication would be intimately close to diffusion, implying that communicate is to transmit to the vulgar (*di-vulgare*) something proper to or constructed by a specialized actor or social sector (our translation).

The central idea around the notion of communication expressed in the document is aligned with the transitive sense of informing; that is, that of a content (knowledge) to be transferred to certain audiences through a one-way communication, from a “transmitter” to a “receiver.”

Such model corresponds to that traditionally employed in communicative practice within the health field. It assumes the existence of a “transmitter” who holds the scientific knowledge (health professionals) and transmits it to a “receiver” without scientific knowledge (users). In this process, receivers’ lay knowledge are either disregarded or deemed as obstacles to understand the only valid knowledge - that derived from science (Becker, 2008; Teixeira, 1997). Thus, such communication designates a relationship between subjects and objects, in line with the concept of “banking education” postulated by Paulo Freire (2016). Besides epistemological aspects, this concept denounces the underlying values, ideologies, inequalities, and powers, resulting in a vertical transmission comparable to the top-down model of scientific communication (Bensaude Vincent, 2014).

The sentences below, extracted from the document, allow us to infer that this type of relationship is predominant in the way the NPSTIH treats communication between STI and the public of non-scientists.

[...] favor the diffusion of scientific information **to society** (Brasil, 2008, p. 33, emphasis added; our translation).

[...] support and advances initiatives that favor **scientific diffusion** for researchers, entrepreneurs, managers, health professionals, students of various levels, stages, and modalities of Brazilian education, with emphasis on health courses, and for civil society (Brasil, 2008, p. 31, emphasis added; our translation).

[...] accessible and clear forms of communication for **the lay public and for health professionals** (Brasil, 2008, p. 10, emphasis added; our translation).

In the excerpts above, the preposition “for” reinforces the strong transmissional sense of the words “diffusion” and “dissemination,” fairly present throughout the document. Consistently, one of the NPSTIH strategies is addressed by the term dissemination of scientific and technological advances.

The Policy identifies the diffusion “receiver” as the lay public; health professionals; researchers; entrepreneurs; managers; health, education, federal, state, municipal, and council workers; organized civil society; and students of various levels, stages, and modalities of Brazilian education with emphasis on health courses.

The term science popularization is limited to its role as a strategy for science dissemination, through the creation of nuclei and forums and the participation of the health sector in the Science and Technology Week in Brazil - on which we found no references in the literature.

Despite the semantic proximity between popularization and vulgarization, Germano and Kulesza (2007) discuss the differences between the terms:

[...] **popularizing** is much more than vulgarizing or diffusing science. It is placing it within the field of popular participation and under the scrutiny of dialogue with social movements. It is putting it at the service of the minorized in a cultural action that, expressed in the reflexive dimension

of communication and in the dialogue between different, guides the actions of these groups while respecting the daily life and the symbolic universe of the other. Thus, different from its English conception, we believe that the term *science popularization* has gained strength in Latin America due to the various popular struggles that mark the history of the region. In a scenario that saw the rise of the birth of a Liberation Theology, a Pedagogy of the Oppressed, and a Popular Education, it is natural for the term to have a remarkable presence (p. 20, emphasis added; our translation).

Corroborating the references cited and these considerations, the meanings attributed for the term popularization in Latin America and Brazil could have been more consistently explored by the NPSTIH.

Among the purposes of diffusion initiatives, we may distinguish a set of terms and words associated to two main poles of meaning: one focused on promoting citizenship in the interface with the STI and another focused on the notion of STI as a mere consumption object.

- Promotion of citizenship: Equity, social participation, and socialization of scientific and technological production.
- STI consumption: Use of the knowledge produced; broad social appropriation of the benefits of science, technology, and innovation in health; dissemination of technical progress; and support for innovation and dissemination of technical and scientific knowledge in an accessible way to society.

The counterpoint between citizen participation and consumption of knowledge and technology would correspond to the distinction between scientific literacy, public engagement in science, and science popularization on the one hand, and literacy and scientific dissemination and diffusion on the other.

Spaces and media listed in the NPSTIH text reinforce the emphasis on the idea of dissemination, being mostly limited to access to libraries, magazines, internet, museums, science

centers, and science and culture integration centers. The mention to promoting debate forums was grounded on diffusing research results related to health risks.

When addressing the creation of the National Health Innovation System, the document elicited the possibility of participation from the general public (even if only from a certain segment) in a stage prior to the scientific and technological production, not limited to receiving information/knowledge:

Health councils and other instances of social control and management of STI/H [Science, Technology and Innovation in Health], in the three spheres of government, **should encourage and promote discussions about technological needs in this field**, aiming at improving health services and ensuring access to new technologies (Brasil, 2008, p. 23, our translation).

Despite the limits inherent to a policy, the critical tone towards the communication model that marks the NPSTIH emerges from the expectation of a greater openness to spaces of formation and discussion in the document, with a closer approximation between STI and the population.

Final considerations

Besides recognizing the merit and the democratic process that culminated in the NPSTIH, which reflects the possibilities of the Brazilian reality, one must also compare this document with more ambitious proposals that take communication in its broadest sense - that of effective social participation in the issues around STI and health. In using communication in a narrower sense, it is as if we are “wasting” the legal support of our Constitution with regard to subjects’ protagonism, be them scientists, technicians, or the general population.

The dialogical perspective defended from a reflexive conception of communication is not exempted from conflicts, for it comprises an interaction involving different actors, different interests.

Amongst the profusion of terms that seek to express ambition for a more democratic and participatory interaction between STI and the

population, that of scientific literacy and public engagement in science seem to be aligned with the proposal.

When discussing literacy, not to confront it with scientific alphabetization is inevitable. Whereas alphabetization would be restricted to the act of teaching reading and writing, the concept of literacy would go beyond that, incorporating the cultivation and exercise of social practices grounded on writing (Soares, 1988); that is, literacy would refer to the social use of scientific knowledge.

Similarly, public engagement in science refers to an interaction and integration between specialist and non-specialist audiences in the discussion of scientific and technological themes, based on reciprocal learning and problem-solving in this field.

Before a STI policy that emphasizes the dissemination of research results to legitimize them or scientificize the population, what investments in citizens formation can actually interact and engage with the STI? What are the openings for effective dialogue among different actors and between scientific and popular knowledge? What is our ability and will to assume the transmissional and vertical notion of communication as being “strange?”

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Authors' contribution

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