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PARTICIPATORY SCIENCE COMMUNICATION FOR TRANSFORMATION

Valuing visitors' knowledge: the experience of Association Traces at the crossroads between science communication, participatory activities and social inclusion

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Abstract

In this "practice insight" we present a series of experiences run by Association Traces, injecting participatory approaches into science engagement activities by valuing the knowledge of the public rather than focusing on their ignorance.
Starting from the observation that a sort of hybridization is occurring between cultural activities and public engagement with science on one side, and co-creation and participatory activities on the other, we provide some insight on the features of each approach. Examples are then used to highlight the potential value of this hybridization: as a way of making participatory activity more recognizable and accessible to a wide audience; to ensure that scientists have a professional interest in engaging in the communication activity; to raise a sense of ownership and empowerment in the audience, etc. These examples will eventually show that participation may lead to science communication practices that are socially-inclusive and/or productive for research, and ideally both.

Keywords

Participation and science governance; Public engagement with science and technology; Social inclusion

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Introduction

At PCST 2020+1 we presented a paper exploring the points of contact and the points of divergence between science engagement activities, and emergent co-creation and participation practices.[1] These reflections were based on the observation of increasing interest from the science engagement community for the world of participation and co-creation (in particular through the inclusion of participatory spaces within science centers, or in the activities of public

[1] Merzagora, M., 'Between science engagement and co-creation: the pros and cons of a natural marriage', PCST 2020+1 presentation #836.

engagement associations), and vice-versa (mainly motivated by the need of ensuring that participatory activities are visible, recognizable, and accessible to the wider public).

In fact, more and more science centers are integrating fab-lab spaces and living lab approaches in their offer; science engagement activities are including citizen science and participatory research components; hybrid cultural spaces are multiplying, working in the grey zone between knowledge production and knowledge sharing; discussion games are often used to explore or even influence policy making around controversial socio-technical issues; design thinking and co-creation are becoming an expertise valued to develop science communication actions [Deserti, Real and Schmittinger, 2022].

This convergence/hybridization is a wonderful opportunity of renewal for science communication practices. Association Traces is trying to harness it by experimenting various types of hybridization of co-creation, participation, social inclusion and traditional science communication activities. These range from extremely light approaches injecting participation elements into traditional formats, down to full scale co-creation and living lab formats truly combining the interests of research and the interests of the various engaged audiences.

We present below a brief overview of some of these experiences. Rather than focusing on one single example, we chose to span several examples. For each one, we highlight the added value of promoting participation and of taking into consideration visitor knowledge in science communication activities. Specific references describing each example in full detail are included in the paragraphs below. We would like to defend these hybridizations as a key component in making science communication relevant for a wider range of audience on the one hand, and on the other hand in renewing the role of science communication within the process of scientific knowledge production. In other words, we conclude that more participation within science communication, if well done, will result in a healthier and more just society, and lead at the same time to better science (i.e., original, robust, relevant, ethical). Although they all wish to do so, none of our examples fully satisfy both these ambitions: they will be presented here as ongoing experiences providing partial contributions, indicating that a more mature interpretation of participatory science communication is needed in order to fully progress toward this double goal.

In the concluding section, we present some general reflections on specific features of participatory activities and science communication highlighted by the examples, and we focus on how, in order for the hybridization of the two approaches to occur, it is important to design activities that welcome different level of engagement, that is, welcoming the participation of fully committed citizen willing to invest time and energy, as well as the lighter participation of curious, "passing-by" visitors.

Traces is a Paris based association focusing on science and society issues. Its mission is "to transform scientific culture into a tool for social justice and citizen participation". Traces activities consist, on the one hand, in offering opportunities to wider segments of society to meet and use knowledge as an instrument of change, and on the other hand in offering opportunities to the scientific community to discover and take advantage of the richness of the diverse knowledge available in society.

Participation, inclusion, and relevance for research

Participation should not be considered as a goal in itself. In the activities presented in the following sections, participation is instrumental for two key objectives that we wish to achieve. First, a socially-inclusive knowledge society, able to offer opportunities to all the segments of society to use knowledge (and scientific knowledge in particular) as a power-tool for change [Merzagora, Mignan and Rodari, 2015]. Second, a role for science communication and public engagement as a productive opportunity for scientific research, that is, offering opportunities to scientific research to progress in more original and socially relevant directions [Merzagora, 2016; Merzagora, 2017].

In both these objectives, and regardless of the great variety of participatory approaches, one key concept remains, in our view, at the core: public engagement and science communication should always value the knowledge of the public more than their ignorance. In fact, participatory science communication challenges a traditional, widespread, yet absurd posture: inviting the public only for what they do not know, and inviting scientists only for what they know [Merzagora, 2016]. In this sense, *participatory science communication* is key to progress toward *socially-inclusive science communication* [Massarani and Merzagora, 2014; Merzagora, Mignan and Rodari, 2015; Aguirre, 2016]: in fact, it is impossible to propose socially-inclusive public engagement activities without ensuring a full recognition of the relevance of the knowledge of each participant. And *participatory science communication* is also key to a *scientifically productive science communication*, by ensuring that in public engagement activities scientists also always have something to learn and the public has always something to offer too. We consider that *participatory* science communication is relevant when it leads to *socially-inclusive* and *scientifically-productive* science communication.

In the following, we will shortly review some examples in which we tested various ways to value the knowledge of the public in science engagement activities.

Injecting participation into traditional formats

During traditional activities, such as presentations involving scientists talking about their research in front of an audience, some extremely simple techniques allow to ensure contributions by the public. As a general rule, we ensure that in the first phases of the encounter, the scientist should never be the first one to talk. The audience should talk first, and scientists should be allowed to actively listen. We experimented many "tricks" to allow this: a most simple one is to ask the audience to associate keywords to the title of the presentation before listening to it, draw a word-cloud, and ask the scientist to start his or her talk by reacting to it, making particularly explicit the elements of surprise (there are always some). A most fun one, designed by our partners in the European Researchers Night French consortium, features a "chinese whispers" game among visitors, starting from a scientific sentence, letting the message "deteriorate" along the chain of transmission from one person to the other, and then asking the scientists to build their presentation based on the final restitution (for once, the game itself is guilty of the deterioration, not the media!). We proposed similar approaches by having the scientists and the public comment on improvised theatre shows about the topic of the presentation, etc.

While these examples cannot be defined as "participatory", they do strongly influence the posture of both the audience and the scientists toward a participatory

posture. The key elements are the order of the speakers, and the fact that the contribution of the audience is bound to perturbate and influence the presentation. In fact, preparing the scientist to give a talk in which they will be asked to actively listen and say nothing for the first 20% of the time, is already strongly influencing their mindset. Similarly, asking the public to propose open ended reflections before the presentation, thus acknowledging that they have a lot of valuable contributions to give, changes their listening attitude. These "tricks" enable to reveal differences and peculiarities among an otherwise undifferentiated audience: by proposing keywords, deformations, cultural references, images, etc., each participant reveals something of his or her viewpoints, expertise, knowledge, which then becomes valued and can be part of the communication event.

A clear advantage of such simple actions is that the proposition remains clearly recognizable and accessible by the common, less experienced audiences, an audience that most probably would not invest the time and the energy needed to participate in a living lab or a scenario workshop in its first contact point.

GEP: a large-scale participatory experiment within a science communication event

The *Grande Experience Participative (GEP,* 'large participatory experiment') is an initiative that had been running every 2 years since 2015 within the European Researchers Night (ERN) in France, where a research group develops a large-scale experiment involving the participation of 10.000+ citizens on a single night in 12 to 14 French cities.

The initiative starts with a classical call for proposals, asking research groups to submit proposals for an experiment that takes advantage of the participation of several thousand citizens on a single night during ERN. A jury composed of researchers and science communication experts selects one single proposal according to both scientific and public engagement criteria: the research should lead to valuable scientific results, and at the same time be able to engage the audience during the participatory phases. The selected experiment receives funding (that for once goes from a communication activity to a scientific project, rather than the opposite) and the support of local ERN organizers in order to design and facilitate citizen participation in the experimental protocol. All the phases of selection and funding, design of the experiment, execution of the experiment, data analysis down to the publication of results, lasting between 10 and 20 months, are documented through a blog, so the public can have an overview of the entire parabola of a research project.

The 2015 experiment was designed and performed by a team of researchers in behavioral economics led by Angela Sutan, LESSAC, Dijon-Bourgogne, that designed an experiment to study the different attitudes of the audience toward common goods in an environment characterized by non-renewable resources [details in Lohéac et al., 2017]. The 2017 experiment, led by Hugo Mercier at ENS Paris and Jean Nicod Institute, explored the circulation of ideas in large groups by proposing different tasks to the audience gathered in large lecture rooms, and measuring how different answers propagated in the room with respect to a given set of parameters controlling the communication among participants [details in Claidière and Mercier, 2021]. In 2019, based on an original idea of Thierry Brassac, a research team from Montpellier University proposed a participatory research in developmental psychology on the comforting power of objects, asking all the ERN

audience to bring, measure and discuss their favorite childhood teddy bear, and upload their results on a collaborative website. Researchers then used this data to explore correlation between quantitative measurements and qualitative and narrative descriptions collected by the visitors themselves during the event through a combination of on-site and on-line data-collection devices.[2] In all cases, the public of ERN was invited to participate in group activities, following a carefully designed protocol to provide robust data, exploitable for research purposes. In all cases, by actively participating in the research effort, the public was strongly engaged and eager to learn details of the research activity. In other words, all GEP experiments consisted in engaging activities, leading to enriching dialogues between scientists and the public and high-quality learning outcomes, but also led to a concrete progress of research and to the publication of at least one scientific paper in peer reviewed journals in each case.

By combining a major communication activity and a research activity within the same event, the GEP makes participation driven by science a wonderful opportunity for public engagement, and reshuffles the traditional relationship between scientific production and dissemination: the dissemination action is the driver and the funder of research, rather than the opposite. Overall, the GEP creates a single, large-scale event that is at the same time a research and a communication activity, in which the interests of researchers (collecting valuable data for publications) and of the public (learning, discussing, dialoguing about a research project) converge.

Exhibitions as platforms for participation

Exhibitions are an easily recognizable communication device, accessible, particularly welcomed by school groups and curiosity-driven audiences. At Traces, we researched ways to transform *exhibitions* (a display of acquired knowledge) into *explorations* (a tool to investigate open questions and eventually produce original knowledge), by making them platforms for participation [Bron, Leroy and Merzagora, 2018]. We report here three examples.

Science, a history of humor

La science, une histoire d'humour was an exhibition that grew (literally) in 2012–2013 at Espace des Sciences Pierre-Gilles de Gennes, the science culture venue of ESPCI Paris and PSL University in Paris, managed by Association Traces. The exhibition pushed the idea of a crowd-sourced, evolutionary exhibition to the extreme. It started completely empty, with a call for participation inviting scientists and general audience to take their favourite science jokes from their lab doors, their power-points, their comic books, etc. and share them in the exhibition spaces. On the exhibition site, a system of scanners, printers, blackboards, magnetic boards allowed the public to add their jokes to the displays. An on-line connected printer allowed the public that had nothing to propose to print and expose a joke sent remotely by other members of the public unable to visit the exhibition. After a first kick-off event involving mainly scientists, but also television stars, policy makers, writers, artists, all coming with their jokes, the exhibition kept growing throughout its 7 months of opening, and through a series of thematic events. During the whole period, the visitors/producers were invited to "come with their jokes" and add

[2] https://nuitdeschercheurs-france.eu/?GrandeExperience2019.

them to the display. During the events, they kept bringing in original content from their homes, labs, memories, or rearranging the existing content on site in different ways: for example, by nominating the less understandable jokes, by rearranging all the jokes on display according to the scientific disciplines (all items were displayed on movable, magnetic supports), by adding comments on jokes about sexism or research funding (by far the most represented topic), or by adding sexually explicit drawings in the science centre toilets, as not all of the content could be showed in the exhibition spaces. The exhibition ended empty, after a last event in which visitors were asked to "dismantle" it, and all of the content went back to the homes, labs, memories of other users.

In terms of content, the exhibition presented how science reflects on itself, and how society reflects on science through humour and parody. By looking at jokes, caricatures and parodies, in newspapers, movies or TV series, as well as at comics hanging on the labs doors wall or included in scientists' power-point presentations, visitors could — after having some good time — reflect on how science and scientists live and work, humour and private jokes providing very rich insights about a community. This participatory approach allowed to produce a 100% crowdsourced exhibition and a platform of exchange on visions of science through the lens of humour. The whole content was selected and displayed by the visitors, and in particular by scientists amused by the principle and willing to expose their jokes and reflect on them. The same content selected by a curator would certainly have resulted in a more coherent and polished exhibition, but it would have placed a clear dividing line between the interest of scientists and the interest of the public, and it would have induced a more passive posture in the visitors.

Frugal science

Science Frugale was a forum-exhibition presented in 2017 in the same venue.[3] The exhibition wanted to explore how to do low-cost experimental scientific research by hacking various available technologies (for example, an old CD ROM player found in the waste bin can be transformed in a fully performing microscope, using optical components, lasers, but also high precision mechanical parts...), at the crossroads between experimental scientific research, maker culture, and cooperation with developing countries. It was a small, low-cost project developed by Traces in collaboration with "Physique sans Frontières", a group of the French Physics Society and PSL University, with the support of the Ile-de-France Region. It involved a small group of highly committed exhibition professionals (Nathan Morel, Colette Pitois alias @Colpizen, Studio Millimètre) a very long list of contributors (experimental scientists, app developers, radical feminists, Arduino geeks, engineering students, FabLab enthusiasts, creative teachers, engaged artists, etc.), and a lot of work done by the visitors themselves.

The exhibition was a work in progress, constantly changing over time, in which the majority of the objects on display (frugal scientific instruments) were actually built by the visitors themselves in a series of workshops, tailored to the needs of specific audiences or designed in order to cross knowledge among the different profiles

[3] An online version is available at https://explore.univ-psl.fr/fr/exposition-virtuelle/science-frugale; see also http://www.science-frugale.fr.

listed above. The process of exploring the topic, finding new ideas, and actually building the objects to be put on display was all done in collaboration with the audiences. The exhibition was awarded the Mariano Gago — ECSITE award 2017 for its participatory approach. Following this recognition, an in-depth paper was published in the Spokes magazine, describing the details of the project, its value for the different audiences, as well as its shortcomings [Bron, Leroy and Merzagora, 2018].

The science of choice

Sous influence — la science du choix ran throughout 2019 at ESPGG. In connection with the EU funded project Siscode[4] it explored how an exhibition can be used as a tool for co-creation. *The science of choice* investigated how current advancement in cognitive neurosciences and the increasingly ubiquitous presence of algorithmic decision making in our personal or professional life impact the notion of choice and the meaning of the term "choice". This open question was posed to scientists and many other groups, including the lay public: in fact, the exhibition was designed as a platform through which different groups and different forms of expertise (scientists, technicians, commercials, designers, science communicators, teachers, AI experts, ...) could meet and explore the notion of choice in the contemporary world.[5] In this case, a participatory exhibition became something more than a device to display scientific knowledge with a contribution from the visitors: it became an enabler of co-creation events (by providing a stable context and container for the events) and a support to document them (by providing a visible space to the outcomes of the events, in the form of pictures, drawing, schemes or performances generated during the events). More details on one of these explorations, about algorithms as spectator of culture, can be found in Merzagora, Ghilbert, Boniface et al. [2021] and Merzagora, Ghilbert and Meunier [2022].

These three examples show, within the limit of small-scale actions, various ways in which an exhibition can contribute to, or be the product of, participatory science communication. In fact, on one hand these exhibitions were conceived and/or built by visitors, thus being the product of a participation process. On the other hand, exhibitions were thought of as instruments to promote participation, both in order to foster participation culture, and to use participation to explore elusive corners of science and knowledge: whether to exchange humor and jokes, to become environmentally and socially-aware makers of scientific instruments, or to discuss the future of choice (clearly a scientific as much as a citizen question), scientists and the public were not assigned separate seats, but they all gained from a common platform.

E-Fabrik', digital engagement for social link

The key idea and concept of the E-FABRIK' project[6] is bringing together disabled people and young adults in NEET (Neither in Employment, Education or Training) to develop, design and build concrete solutions and prototypes which respond to the everyday needs of disabled people, using digital fabrication tools and digital resources of their neighborhood in a collaborative design process. Guided by

[4] https://siscodeproject.eu.

[5] The full list of events composing the "science of choice" exploration can be found in French on the ESPGG website: https://www.espgg.org/Evenements-Sous-Influences-la.

[6] http://www.efabrik.fr.

Traces' facilitators, following a detailed protocol lasting from a few weeks to a few months, young people and disabled persons meet, get to know each other, identify a problem of the disabled person, learn how to use Fablabs and digital tools, prototype, test and finalize a solution to the problem, and eventually celebrate their achievement. The "solution" might be very simple, such as a 3D-printed handle that enabled one participant with mobility problems to become autonomous in taking a shower, or a tailored timer for one participant that had problems in managing daily routines. The process leading to the solution, on the other hand, is always extremely rich on the human and social side, and generates a strong appetite and motivation for STEAM learning in the young people in NEET. Situated at the interface between digital, social and professional inclusion of disadvantaged young people, the project has five main objectives: 1) Bringing together young people and people with disabilities in a creative community; 2) Designing and building concrete and open-source solutions regarding the everyday needs of people with disabilities; 3) Creating long-lasting partnerships between organisations from different fields: disability, youth and digital creativity like fablabs and makerspaces; 4) Seizing new technologies through active solidarity and becoming an actor in its territory; 5) For NEET participants, discovering a motivation for technology learning, learning how to use new digital tools and developing new competencies. In 5 years, more than 200 highly documented prototypes were realized collaboratively (see the full description at www.efabrik.fr), but more importantly, hundreds of people experienced a highly rewarding experience of STEAM learning, the creation of social links, a solution to practical pressing problem, and an active contribution to social and technological innovation [Martineau, 2021].

E-Fabrik' is entirely a co-creation project, in which the objectives of science education, social link, solutions of practical problems and multi sectorial dialogue are all met at the same time. E-Fabrik' is not, strictly speaking, a science communication project: but one component, young people far from school and employment, discover and learn a lot about digital technology and its importance in contemporary society. And it is not, strictly speaking, a participatory process: but all the process is entirely user led, and participation is at the core of the outcome. In our view the features outlined above do correspond, if taken all together, to a good definition of participatory science communication.

Raconte-moi tes technologies: intergenerational dialogue as a way to recognize the value of each participant's sociotechnical knowledge

In the intergenerational dialogue project "Tell me about your technologies"[7] elderly people and children discuss, through a facilitated activity, about their personal knowledge of technologies such as a typewriter, a floppy disk or a vocal AI based assistant. Activities take places in homes for the elderly, in elementary school, in flea markets, in public libraries, and revolve about a set of physical objects that can be manipulated… At the core of the exchanges is the discovery by each of the participants that: they hold an amazingly rich and diverse knowledge about the world around them, regardless of the level of social recognition society gives it; their knowledge is relevant for other people, and most notably for people from other generations; and that exchanging this knowledge is enriching both emotionally and intellectually [Martineau, Mignan and Merzagora, 2014].

[7] http://www.tes-techniques.fr.

In doing so, the project is emblematic of Traces' approach of setting up science communication activities starting from people's knowledge, rather than from their ignorance. Once again, although neither science communication nor participation are the core of the initiatives, the combination of the two — learning about old and new technologies through collecting and valuing the knowledge of other participants about them — becomes a true source of participation. People are, at the same time, the source and the recipient of knowledge exchanges, and without their contribution the activity would simply not exist. As a result, they recognize themselves as valuable and respectable sources of knowledge: a very precious form of empowerment in our view.

QSEC^2 — when scientific questions become citizen challenges, and vice versa.

The participatory project "QSEC^2 — questions des sciences, enjeux citoyens" (science questions, citizens' issues)[8] explored many different ways of embedding citizens' contributions in the design, implementation, and life of a participatory travelling exhibition, funded by the Île-de-France Region in order to bring public engagement with science in remote areas of the Parisian region [de Sousa and Garraud, 2019]. Two exhibitions, one about "Air", the second about mobilities ("trajectoires"), were produced by a group of 8 civil society organizations together with professional exhibition developers and groups of concerned citizens. Within a previously designed general framework, citizens were participating by developing specific aspects of the exhibition. In some cases, they provided ideas for new concepts to be developed; in other cases, they practically designed an exhibition element; in other cases, they organized local events; and in other cases, they contributed to all of the above. For the case of *Trajectoires*, the exhibition about mobility, this ranged from providing a full history of the urban change of a neighborhood due to mobility policies, to collecting examples of "travelling words" thanks to the multicultural nature of the group, to the inclusion in the exhibition of self-produced videos allowing to treat issues such as migration history, or mobility for the disabled through dance-contact approach.

Participation was at the core of the production phases, as well as of the events during the exhibition life. The evaluation of the project showed a clear impact on most visitors: about 2/3 of them found a very relevant added value in knowing that some of the exhibits were actually co-created by groups of citizens and other visitors. The awareness of participation as a key element of the exhibition production triggered a high level of "quick" contributions to the exhibition by the standard visitors, such as post-it comments and reactions, adding elements to open exhibits, etc. Our interpretation of this is that participation triggers participation: the more you notice that a communication product went through co-creation or a participation process, the more you are willing to adopt a participative and engaged posture. This observation reinforces the idea that participation, in order to be effective, should always be made visible.

In a full-scale participation process (say, consensus conferences such as the 2019 French *Consultation citoyenne pour le climat*) it is essential to ensure that the consequences of participation, such as the implementation of a decision, are respectful of the initial contract. However, this engagement is not always possible in all situations. One way out is to renounce participation, unless a strong

[8] http://www.qsec2.org.

commitment to respect all decisions can be promised. The alternative approach described here is to lower the expectations (and be honest about them), make participation meaningful at some level, however simple, make participation visible, and ensure that all levels of participation, from the deeply committed person to the post-it scribbler, are valued and respected.

Participation vs. communication?

Participatory science communication, and more generally the convergence between participation and co-creation culture and science communication/public engagement culture, respond to many different objectives. Some of these are truly convergent, such as aiming at knowledge as a source of empowerment. Others are not, and we believe it is important to gain awareness precisely on these aspects.

In the PCST 2020+1 presentation we proposed some basic analysis comparing the characteristics of cultural activities and co-creation activities in the field of Responsible Research and Innovation. The table below (Table 1) shows a summary of some of the key differences we highlighted.

Table 1. Characterization of public engagement activities highlighting some differences between participation and science communication approaches.

Co-creation/participatory activities		**Cultural/communication activities**
Selected, profiled audience	$\longleftrightarrow$	Wide, unprofiled audiences
Productive outcomes	$\longleftrightarrow$	Learning outcomes
Innovation	$\longleftrightarrow$	Socialization of knowledge
Measurable consequences	$\longleftrightarrow$	Open-ended consequences

For example, co-creation and participation need to ensure a productive outcome and measurable consequences (a co-designed product or prototype, a change in a policy, an improvement in the community), which is not the case for cultural or science engagement actions, that do generate change, but do not in general have or wish to have control on it. On the other side, cultural activities and communication need to ensure a high level of accessibility, offering the possibility to be reached by everyone wishing to, which includes the concerned audiences but also the curious, the superficially interested, or even the uninterested skeptics that wish to expose themselves lightly without endorsing the value of the knowledge presented to them: in general, the latter category is hardly integrated in participatory activities, where there is a need to privilege participants directly concerned or with a desire to contribute to the issue at stake.

The examples and the associated reflections outlined above are intended to show that in order to take advantage of this hybridization, we need to develop a clear understanding of the specific features of participation and science engagement practices, and then develop a case by case approach, carefully reflecting on the need of each participant and finding ways to make the contribution of each one relevant for all.

Concluding remarks

The fertile convergence leading to participatory science communication described in the introduction is not mandatory, on the contrary: purely top down science communication activities are of great value and they respond to a true societal demand; purely innovation-oriented participatory activities, in which only selected people can participate in order to maximize the efficiency of the process and the quality of the outcome, are also of great value. But they are just a part of the story.

What we tried to extract from the examples above is how the specific, interesting features that we can observe in each spot of the continuum from science communication to participatory practices can become a learning opportunity for other spots in the same continuum.

Observing the participation world has allowed us to increase reflexivity and reveal hidden contradictions. For example, in addition to what is already outlined in the examples above, the implicit, utterly wrong assumptions that if you want to be more inclusive you should "reach more people" (that is, *de facto*, multiplying spectators at the expense of actors), or "meet them where they are" (that is, conquer and occupy spaces and time slots where "they" choose what to do — take a metro, go to a shopping mall, watch a soap opera — with contents they did not choose: an ill-conceived, almost colonialist idea!), or "make science fun" (that is, focusing on constructing an advertising image of science, rather than raising awareness about it). Recent works [Simon, 2016; Dawson, 2019; Perronet, 2018; Simon, 2010] clearly show that this is a dead-end choice, and that the actual efforts should be directed toward ensuring and enhancing relevance, and an autonomous use of acquired knowledge by the people or the communities engaged.

As stated in the introduction, in our case the main core concept that science communication has gained from the participatory world is to value people's knowledge more than people's ignorance, to never let the "lay public" concept conceal the richness of diversities, and to master this richness without oversimplifying it, recognizing for example that valuing all types of knowledge does not mean that all types of knowledge are equivalent.

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