

## 315. Communication of Science and Technology as an Instrument for Social Inclusion

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**Abstract.** In Brazil, it is a constitutional right that every citizen should have access to knowledge. In this context, it is the mission of the Department of Popularization and Diffusion of Science and Technology to make sure that scientific-technological knowledge is accessible to all. Therefore, the Department promotes and supports events and activities related to science communication and diffusion, in order to reach peoples of all ages, cultural backgrounds, social classes and education. In this context, we pay special attention to The National Week of Science and Technology, an effective tool for science communication and promotion of social inclusion in Brazil.

**Keywords:** Communication, National Week, Popularization, Science, Social Inclusion

### Introduction

Brazil is a large country. Most of the scientific and technological production and dissemination happen in the South and Southeast regions, where the most prominent universities and science centers/museums are located. As a result, only 1% of the population visit a science museum each year. Hence, we face the great challenge of bringing science and technology to isolated regions, where people do not have easy access to such knowledge, and in most cases do not understand the value of science and technology for their lives and for the development of the country. Over the past years there has been an expansion of the actions related to the popularization of science and technology in Brazil, but the structure is still fragile and limited.

In face of this issue, the Department of Popularization and Diffusion of Science and Technology (henceforth “The Department”) of the Secretariat of Science and Technology for Social Inclusion (SECIS), promotes and supports science and technology events and activities, giving priority to the poorest or underprivileged parts of the country, in order to give these vulnerable people an opportunity to learn about science, technology and the scientific development and research in the country. The main purpose is to engage municipalities and local actors so that they will be responsible for designing and implementing activities or events that are most suitable in terms of the local characteristics, such as population (education level, cultural background, etc) and the scientific gaps that exist in their city or region. In supporting local actions, The Department intends to potencialize the learning process and promote social inclusion.

Having this in mind, one of the most important instruments The Department has for science and technology dissemination and popularization throughout the country is the National Week of Science and Technology (henceforth “The Week”). The Week was established in 2004, and its main goal is to mobilize the population, especially children and teenagers, around themes and activities of science and technology, stimulating creativity, scientific thinking and innovation [1].

To implement The Week, each estate has its own local coordination and counts on the active participation of city and estate governments, of education and research institutions and scientific-technological entities.

The paper is structured as follows. In Section 2 we present in more details SECIS and The Department, with their main lines of action. Section 3 introduces the National Week of Science and Technology, its history over the years, its activities, its growth and reach. In Section 4 we describe how communication of science can be used as a tool for social inclusion. Finally, in Section 5 we present our conclusions and future steps.

### Actions for Social Inclusion

The promotion of social inclusion has been one of the main lines of action of the Brazilian Government since 2002. When President Lula took over, he committed himself to the improvement of the population’s standard of living, to the creation of new jobs and generation of income, with special focus on the underprivileged.

In this context, the Government created, in 2003, the Secretariat of Science and Technology for Social Inclusion at the Ministry of Science and Technology (MCT). The mission of SECIS is to promote social inclusion through actions that make use of science and technology to improve quality of life, stimulate employment and income generation and lead to the sustainable development of the country.

Regarding the strategic priorities of Science, Technology and Innovation (CT&I) for Social Development, SECIS follows two lines of action:

- Popularization of science, technology and innovation and the improvement of scientific education; and
- Diffusion of technologies for social inclusion and social development.

The Department of Popularization and Diffusion of Science and Technology works under the first line of action above. Its role is to promote and support any activities related to science and technology popularization, such as science fairs and olympiads, science exhibitions, museums, science centers, publications, television and radio programs and films. In order to enable these initiatives, The Department acts together with education and research institutes, scientific entities, governmental organs, newspapers, television and radio stations. The Department also works to strengthen scientific journalism.

Two examples of the events supported by The Department are the Brazilian Fair of Sciences and Engineering (FEBRACE) and The Brazilian Mathematics Olympiad of Public Schools (OBMEP). FEBRACE is a national fair that stimulates the young scientist. It plays an important social role, encouraging creativity and reflection in students, through the development of projects with a strong scientific basis in the different areas of sciences and engineering [5].

The Brazilian Mathematics Olympiad of Public Schools (OBMEP) is directed to public schools, and has the commitment to show the importance of Math for the future of these youngsters and for the development of the country, besides encouraging young talents and giving opportunities for them to pursue scientific careers [2].

The diffusion of science and technology plays an important role for the development of citizenship, where social inclusion is a natural consequence. Also, it greatly contributes for the consolidation of a strong scientific culture, where science communication is one of the most important factors. In this context, the National Week of Science and Technology is the most successful tool The Department possesses to extend its reach towards all those who are eager for scientific knowledge.

## **The National Week of Science and Technology**

The Week was established in 2004, by means of a presidential decree. It intends to show the importance of science and technology in our lives and for the development of the country, and also offer an opportunity for the Brazilian population to get to know and discuss the results, relevance and impacts of scientific and technological research and applications.

All those who are interested may participate in the activities of The Week. The main actors involved are: universities and research institutions; public and private schools; institutions of technological education, centers and museums of science and technology; scientific and technological entities; research support foundations; environmental parks, conservation units, botanical gardens and zoos; estate and city secretariats of science and technology and education; public and private companies; journals, television channels and radio stations; governmental organs; non- governmental organizations and other entities of the civil society [1].

Among the activities of the Week, there are science tents in public squares; open days in research and education institutions; science fairs; contests, workshops and seminars; scientists going to schools; scientific initiation journeys; scientific excursions; events integrating science, culture and art. In terms of science communication, we can cite the distribution of books and 350,000 copies of the National Week of Science and Technology Journal, the exhibition of films and scientific videos, and the broadcast of science popularization programs on radio and television. Still, 20 DVDs with television programs and scientific diffusion videos from different countries are distributed for public exhibitions in all estates.

Over the years, the Week has seen a substantial growth, both in the number of participating cities and activities developed, as can be seen in Table 1. In 2009, only in Brasília (the capital of Brazil), around 120,000 people visited the stands and exhibitions taking place at the “Tent of Science”, a giant tent erected at the heart of the capital during The Week. The fact that The Week reaches continuously more people, all over the country, clearly shows that it represents a very effective means of communicating science and technology to people of all ages, cultures, social classes and education level, with no distinctions.

Every year The Week has a different theme. On its first edition, in 2004, the theme was “Brazil, Look at the Sky!” and in 2005, “Brazil, Look at the Water!”.

From 2006, the themes were chosen to go hand in hand with an international or national relevant celebration or date. The Week’s third edition worked with “Creativity and Innovation” to celebrate the centenary of 14 Bis’ first flight (the first self-propelled airplane, designed by the Brazilian inventor Santos Dummont). A replica of the plane

flew over the Ministry Esplanade in Brasília during The Week. Thousands of educational and diffusion activities paid homage, throughout the year, to the great Brazilian inventor Santos Dummont.

In 2007, the theme “Earth” was chosen to celebrate the International Year of Planet Earth, established by the United Nations (UN). In 2008, The Week was set about “Evolution and Diversity”, because of the 150th anniversary of the Theory of Evolution by Natural Selection, by Charles Darwin.

Finally, in 2009, the theme was “Science in Brazil”, to bring to the general population knowledge about the science and the technology produced in the country. The International Year of Astronomy was also celebrated; thousands of Astronomy activities were promoted during The Week and over the year, reaching around 2,5 million people [1]. Thousands of books, folders

**Growth of The Week over the years**

Year	Activities	Cities
2004	1,842	252
2005	6,071	332
2006	8,654	370
2007	9,700	390
2008	10,859	445
2009	24,978	492

*Table 1 – Yearly growth of The Week in the country, in terms of the number of participating cities and activities developed [2].*

and booklets about varied themes (Santos Dummont, Carlos Chagas, Brazilian scientists, Astronomy, experiments, etc) were distributed throughout the country.

This year, The Week happened from the 18th – 24th of October, and its theme was “Science for Sustainable Development”. Beyond promoting the most diverse diffusion activities, it stimulated the debate about strategies and ways to use the Brazilian natural resources and its rich biodiversity sustainably, always aiming at an improvement of the socioeconomic conditions of the population. Science for Sustainable Development showed that science and technology are essential factors for the development with social, economic and environmental quality.

On the other hand, the General Assembly of the United Nations declared 2010 as the International Year of Biodiversity. The UN is stimulating all countries to seek a growth in collective awareness regarding the importance of biodiversity, by means of local, regional and international actions. The Week 2010 was designed to go hand in hand with this international effort.

Among the activities signed up for The Week this year, we highlight: science tents in several capitals of the country, like Brasília and Rio de Janeiro; a large popularization event, scientific initiation and science fair at the Federal University of Santa Catarina; the regional representation of The Week at Rio Grande do Norte reached the interior of the state, with the programs Research goes to School and School sees Science; joint actions in the North region, integrating the Brazilian activities with the Colombian National Week of Science and Technology; the first scientific display in Maranhão; the truck of science of the Catholic University of Rio Grande do Sul went to São Paulo.

Preliminary statistics indicate that in Brasília, for example, The Week was quite successful. Most of the attractions were interactive, with displays of live animals to illustrate the biodiversity of the country, hands-on experiences, videos, workshops on the most diverse themes, all related to biodiversity and sustainable development. Data for other estates and cities are still being computed.

**The Week as a Tool for Social Inclusion**

Brazil is a vast and diverse country, where people from different regions have very different cultural, educational and social backgrounds. Due to these huge contrasts, it is difficult to reach the whole country in equal measure and a considerable portion of the Brazilian population lacks access to scientific and technological knowledge, museums, science centers, research/educational institutions. This, in turn, contributes to the generation and perpetuation of a society that is illiterate in scientific-technological matters.

Historically, several factors are responsible for this long-standing problem. Usually, the interfaces between science and culture are ignored, as well as ethical questions, which leads to a natural disinterest in science and technology. Also, there is no recognition that scientific production is a process that follows a specific method, involving risks and



uncertainties. Science and technology are usually pictured as a black box: something of difficult understanding that is very exclusive, infallible and unquestionable. This picture reinforces the belief that science and technology belong in the universities and research institutes, and cannot be used to generate better life conditions to the poor. Added to the small academic valuation of outreach activities, we have, overall, a very restricted appreciation of the importance that science and technology have for social inclusion.

Moreover, in Brazil there is no tradition in planning public policies for science and technology popularization (even less with focus on social inclusion), which results in a very limited amount of funds destined to support or develop outreach activities.

As a consequence of all these factors, the general perception of science and technology in the country is still very incipient. A survey conducted in 2006 [3] showed that either people do not have the habit of going to museums/science centers or these facilities do not exist where they live. When asked why they are not interested in science and technology, most of the interviewees answered that they do not understand it, therefore, they do not read about science in newspapers or books. Finally, people do not care to discuss science and the latest scientific-technological developments of the country because they think they have nothing to do with it. Paradoxically, most of the interviewees think that science brings more benefits than harm to mankind and agree that funds devoted to the scientific and technological development of the country should be increased. The survey interviewed 2,004 adults, men and women, of different education levels, socioeconomic classes and cultural backgrounds.

We conclude, therefore, that science in Brazil is not properly disseminated. Nonetheless, people are aware that this is an important matter for the development of the country, which means that more actions in science and technology popularization would certainly be welcomed. Note that whatever dissemination movement that existed in the country until now was not directed to poor people, which greatly contributed to their situation of severe social exclusion.

In this context, social inclusion can be reached in three ways: (i) by giving people access to knowledge so that they can understand what is around them and have autonomy to demand solutions for their problems; (ii) by giving people access to knowledge so that they do not feel less important or forgotten by those who had more opportunities in life; (iii) by showing people, particularly children and teenagers, that they can succeed in life and contribute to the development of the country, by following a scientific career, since science is not a black box – it can be understandable by all.

Regarding (i). It is important to start from the principle that the general knowledge of science and technology is part of our society and is the tool to promote the development of the country. Hence, it is essential that this knowledge is available to all, so that people can pose questions, make suggestions and follow the government's actions and public policies related to science and technology.

The strategic priorities and investments made in science and technology by the government may be determinant for a solid improvement – or not – in the lives of the population. However, the population ignores these facts and feels powerless and disconnected when it comes to making decisions about what science and technology can do for them.

In May 2010, the Brazilian MCT, among others, promoted the fourth edition of the National Science, Technology and Innovation Conference, which analyzed the current situation of the Brazilian Science and Technology System, presented and discussed new proposals to subsidize the creation of a public policy specific for Science, Technology and Innovation in Brazil. This year, among its activities, the Week published and opened for discussion the results of the Conference, giving the population an opportunity to participate in the decision-making process regarding the future of science and technology in the country.

A short version of the “Blue Book”, the final document containing all the resolutions and proposals that arised during the 4th Conference, was distributed as a supplement to The Week's Journal. This document is now available for public consultation, so that everyone can give their opinions and suggestions about the plans that will guide the Science and Technology Policies for the next years.

Besides being an instrument for science popularization, The Week plays an important socio-political role in calling people to provide some feedback to the government as to what their most pressing needs are and what they expect for the future. The more people understand and participate, the more socially included they feel. And the more benefits they obtain from the developments of science and technology.

Regarding (ii). Since it is difficult to build and maintain museums/science centers everywhere in the country, people must have access to alternative science and technology events/activities. This is one of the main missions of The Week: to reach people who would not have access to scientific-technological knowledge otherwise.

It has been shown that informal events for science learning can stimulate science interest, build learner's scientific knowledge and skill and help people learn to be more comfortable and confident in their relationship with

science [4].

This argument can be verified by confirming that the public response to The Week has been very positive over the years. Its growth, in terms of the number of municipalities involved and activities developed, has been very noticeable, as mentioned in Section 3 and seen Table 1. This means that every year The Week touches more people and extends its reach further into the country. Especially in the North region of Brazil, where access to most of the population is complicated due to the extension of the Amazon Forest, and in the interior of the Northeast region where the poorest people of the country live, The Week brings a new horizon.

These regions are disconnected from the rest of the country and the local populations live in conditions of isolation. It is, therefore, very important to bring science to them, because they have the right to it, and because these actions offer them an opportunity to see their lives through a different point of view – they realize that they can have a better future with science and technology.

As an example, the National Institute of Amazon Research (INPA) promotes events and activities in communities all over the Amazon estate, by means of e.g. online lectures or itinerant exhibitions and displays. It is noticeable that the feeling of self-confidence and social inclusion of these communities are greatly enhanced when they realize that they are part of our society and have the same rights as everybody else (Carlos Bueno, private communication).

Regarding (iii). Science communication is a very important tool to interest people in science, encouraging them to follow scientific careers, therefore building up the human resources needed for the development of the country.

This is a challenge in Brazil, especially because children and teenagers are usually not fond of hard sciences, such as Math and Physics, which originates a serious lack of human resources in these areas, hindering the governmental efforts to promote the scientific and technological development of the country.

Therefore, it is crucial that science is brought to people in an exciting manner. The most effective way to achieve this goal is to create a connection between the science they see during The Week and their everyday lives. Once this connection happens, these people develop positive science-related attitudes, emotions and identities [4], feeling stimulated to pursue more, thus strengthening the scientific-technological culture in the country.

When local actors promote and develop scientific-technological events and activities, it is easier to create a bond with the local population. Direct access to phenomena of the natural physical world is fundamental in this context, where basic aspects of daily life are framed in light of associated scientific ideas [4].

We conclude this Section by reinforcing the many aspects of The Week. It can be used as a tool to reach isolated people and help them develop a connection with scientific-technological knowledge; as a tool to demystify science to people of all backgrounds; as a tool to interest people in science and encourage them to follow scientific careers; and as a tool to disseminate opportunities through which people can express their problems and what they expect from the government and their policies.

All these aspects are complementary and, together, they bring lasting social inclusion. When the population sees science and technology as an asset and not as liability, they can demand the use of the available knowledge to improve their lives. The cycle is closed when people have the chance to be heard, when they can use the knowledge they acquired to bring pressing issues to focus and demand immediate solutions.

## Concluding Remarks

Since its first edition in 2004, The Week has been very successful, counting on a growing participation of the general public, institutions and municipalities. This shows that we are moving in the right direction; promoting local scientific events increases interest, proving that science is more accessible to learners when it is portrayed in contexts that are relevant to them, as indicated in [4]. It is worth mentioning that the success of this initiative stimulated other countries (Colombia, Uruguay, Bolivia) to create their own Science Weeks. However, there is still a lot to be done.

Among the main challenges are a greater involvement of the community and research institutions, a more effective integration with the educational system and the widening of the activities at the popular sector levels. Besides, the quality of the public communication that happens during The Week has to be continuously improved, providing more interactivity, stimulating the exchange of cultures, and shortening the relationship between science and technology and the reality of the population, always bringing to focus discussions and debates about the relevance and the ways of science and technology in local, regional and national scales.

Statistics show that The Week reaches around 5% of the Brazilian population. Since the results for 2010 are still being computed, it is possible that this number is higher today. In any case, the goal for 2022, the year of the bicentenary of the Brazilian independence, is to reach 100% of the municipalities in the country, a total of 5,500.

Even though the reach of The Week is still far from ideal, a new public opinion survey conducted in 2010 indicates that the scientific perception is increasing in Brazil. From 2006-2010, although still small, the number of

people frequenting museums and science centers nearly doubled. The population, in general, is more interested and participative.

Thanks to the innovative efforts of The Department and the Secretariat to support local activities throughout the country, people in underprivileged regions of Brazil have access to knowledge that, until now, had been neglected to them. Hence, The Week is a very effective and democratic tool to bring science and technology to all Brazilian citizens, contributing to lessen the social exclusion problems we face and to minimize the gaps left by the still small number of outreach activities and events carried out in the country.

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### **References**

- [1] National Week of Science and Technology: <http://semana.mct.gov.br/index.php/content/view/3223.html>
- [2] Ministry of Science and Technology, 2010, Plan of Action for Science, Technology and Innovation for National Development: Main Results.
- [3] Ildeu Moreira & Luisa Massarani, 2006, Survey: Public Perception of Science and Technology in Brazil, private communication.
- [4] National Research Council, 2009, Learning Science in Informal Environments: People, Places and Pursuits. Committee on Learning Science in Informal Environments. P. Bell, B. Lewenstein, A. W. Shouse & M. A. Feder (Eds). Washington, DC: The National Academies Press.
- [5] FEBRACE official site, <http://febrace.org.br>