

## “Espaços da Ciência” of the CECIERJ Foundation

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**Abstract.** *In the frames of “Espaços da Ciência” program, Science Centers and Planetariums have been built in different small towns of the Rio de Janeiro State. This innovative project, unique in Brazil, intends to promote the diffusion and popularization of science and technology for the general public, but is primarily aimed to students and teachers of the local and regional schools. These Science Centers contribute also to improve science teaching by offering their facilities to the regional schools. These Science Centers in the hinterland are important for the local populations that usually don't have access to social events of scientific and cultural nature.*

**Keywords.** Diffusion and popularization of science, hands-on experiments, science centers, scientific education.

### 1. Introduction

“Espaços da Ciência” is one of the programs developed by the Sector of Scientific Divulcation of the CECIERJ Foundation [1], a public agency of the State of Rio De Janeiro. The CECIERJ is a development of the CECIGUA - Center of Sciences of the Guanabara, established in 1965. The Centers of Science (CECIs) had been created in different states of Brazil in the decade of 1960. The CECIs had as its objective the capacitating of teachers, the production and the distribution of text-books and laboratory materials for the schools of its respective states, and the improvement of education in science [2].

The existence, nowadays, of more than 100 centers and museums of science in Brazil reflects the concern of educational and research institutions on the education in science and formation of teachers.

The museums of science are characterized by its approach: of first generation are those that present expositions of collections (as museums of natural history), second generation the ones

that have as approach the scientific advance and the development of industry - some with apparatus of the type press buttons to obtain one single answer (push-button interaction), and third generation the ones that present scientific phenomena and concepts through the interaction of the public with the exhibits (hands-on interaction) [3].

A more recent approach is aimed to a multidiscipline view of science museums, in which the scientific culture is understood as part of the general culture and therefore needs social, historical and cultural elements to acquire meaning. In this new way of interactivity with the public, general and regional elements must be considered —as the process of globalization, the professional specialization, the emergence of new educational approaches and practices, the increasing urbanization and the degradation of the environment [4].

The initial approach of the “Espaços da Ciência” (Science Centers) program of CECIERJ Foundation was based in the interactive museums of science, of third generation, in which predominate the philosophy of “learning-by-making” and the absence of the exposition of historical objects.

### 2. “Espaços da Ciência” of the CECIERJ Foundation

In the “Espaços da Ciência” program, Science Centers and Planetariums have been built in the Rio de Janeiro State hinterland. This is an innovative project, without similar in Brazil. The first, the “Espaço da Ciência de Campos dos Goytacazes”, was opened in 1999, closed in 2003, and a new science center was opened in 2006 at São João da Barra, a neighbor county. Furthermore, Science Centers were open in Três Rios and Paracambi towns, where Planetariums were also established in 2002.

The planning of these science centers is made by a partnership of the town hall representatives

with the staff of the CECIERJ, represented by the general coordinator (Vera Cascon) and the technical supervisor (Francisco Amaral) of the "Espaços da Ciência" program.

This program intends to promote the diffusion and popularization of science and technology for the general population, but is primarily aimed to the students and teachers of the regional schools.

In these Centers, interactive expositions are presented for the public, with hands-on experiments acquired, designed and build by the CECIERJ staff, and shared by partner institutions [5]. These Science Centers contribute also to improve science teaching by offering their facilities to the regional schools. In this way, the teachers can develop research and pedagogic activities with their students. This project also intends to develop cultural activities in these centers, increasing thus the interaction with the regional population. In this sense, they are a social instrument for the knowledge, development strategies and citizen conscience.

## 2.1. "Espaço da Ciência" of Três Rios

The "Espaço da Ciência" of the Três Rios town was the first new science center to be installed, in April 2002, using the old station of load train as the exhibition room and building a Planetarium beside it. In the partnership with the local town hall, the "Espaço" belongs to the Culture Coordination.

Nowadays, the "Espaço" of Três Rios presents several logical/mathematical games, about 33 interactive experiments of physics (14 of them shared by the Casa da Ciência/UFRJ) and a sector of microscopy. It is open Monday to Friday: 9 a.m. – 5 p.m. In the majority, the visitors are students and teachers of the regional schools. Besides these, several students of formation of teachers colleges visit the science center as an activity of their academic formation.

The local director is a county teacher. Of the 6 mediators, 2 of them have secondary education formation and the others 4 are graduate students.

In the permanent exhibition, this science center presents hands-on experiments that represent macroscopic phenomena of physics, mainly on mechanics, optics and electricity, establishing a correlation with the day by day of the visitors. In mathematics, there are games to stimulate the logic thought. The microscopy sector shows the presence of pathologic organisms in dirty water and the micro-fauna in

nature, as a way to wake up the public conscience for the necessity of preservation of the sources of water and for the conservation of the environment.

In the evaluation of the public frequency, a trend of reduction of the interest of the public for the permanent collection of these spaces was perceived. To avoid this, we are trying a renewal of the exhibitions, turning these spaces more attractive for the general public.

In June 2007, the temporary exposition "Os Sentidos da Vida" (Life Senses), shared by Museu da Vida/COC/Fiocruz, was presented in Três Rios science center. Before this exposition, new members of the staff had been selected and enabled to play their role as mediators between science and visitors (Fig. 1).

The selected mediators are graduate students of Biology and of Physics Teacher's Licentiate of Distance Higher Education of the CEDERJ/CECIERJ Foundation.



**Figure 1. The mediator (left) and the visitors of the Três Rios science center**

The answer of the general public, mainly of primary and secondary school, was very positive: in June 2007 the influx of visitors was greater than that registered in all the year of 2006.

After this, others temporary expositions were showed in the "Espaço", with partners like the ISE/FAETEC – Superior Institute of Education.

The "Espaço da Ciência" participates on existing town events with the goal to promote its interaction with the local community and the scientific diffusion. In all of these events, in public squares, the hands-on experiments are the most interesting activities for the general public.

As result of these recent modifications (new mediators and expositions) in this space, they had been registered about 3.500 visitors in 2007, a considerable increase in comparison to the public of about 800 visitors in 2006.

## 2.2. “Espaço da Ciência” of Paracambi

The “Espaço da Ciência” of the Paracambi town was opened in August 2002 with the support of the local county office of education. This center of science is being restructured, because recently (2008) has been transferred to the new Science Museum of Paracambi constructed by the town hall.



Figure 2. The Paracambi science center

The “Espaço” of Paracambi presents a sector of microscopy, logical/mathematical games, a sector of computers for educative proposals and about 40 interactive experiments (mainly of physics) (Fig. 2).

The “Espaço da Ciência” of Paracambi operating hours are Monday – Friday: 9 a.m. – 5 p.m.

Before the current changes, this science center had a good attendance, about 4.000 visitors per year, the majority of them students and professors of the regional schools.

## 2.3. “Espaço da Ciência” of São João da Barra

The “Espaço da Ciência Maria de Lourdes Coelho Anunciação” of São João da Barra town was inaugurated in December 2006. In its beginning, January – March, 2007, it had an audience of about 2.000 people, the majority of

them spontaneous visitors who frequent the beach of Atafona, where it is located.

This “Espaço” is an interactive science center of physics, mathematics, biology and astronomy, established and coordinated by the CECIERJ Foundation in partnership with the local town hall, and with the collaboration of professors of the State University of Norte Fluminense (UENF).

The “Espaço da Ciência” of São João da Barra presents 6 aquariums of fresh water and one of marine water with native and exotic fauna species of the regional aquatic ecosystems, a sector of microscopy, logical/mathematical games, a sector of computers for consultation, interactive experiments of physics (Fig. 3) and 2 telescopes.

Nowadays, its staff is composed of one local coordinator, 7 administration and technical support employees and 6 mediators (graduate students).

The “Espaço da Ciência” of São João da Barra, which has its localization in a touristic place, presents a potential to combine the influx of a spontaneous public, especially in summer and weekends, with the schedule school group visits. This characteristic is reflected in its operating hours: Tuesday - Sunday: 9 a.m. - 5 p.m. and in summer are increased to Tuesday – Friday: 9 a.m. – 7 p.m., Saturday – Sunday: 9 a.m. - 8 p.m.

In an effort to fortify the space as a center of culture and research, lectures and mini-courses in areas of science are periodically organized.



Figure 3. Hands-on experiment at São João da Barra science center

### 3. Conclusions

Science Centers in the hinterland are important for the population that does not have access to the great urban centers, where normally are concentrated the events of scientific and cultural nature.

In Brazil, this is an innovative proposal of creating science centers in small towns, and the program is still very new and similar experiences don't exist in the country that could serve as example.

For each science center, it is needed the discovery of its vocation. In this way, it is being necessary to analyze the deficiencies and to point the respective solutions for each case

The science centers are of a great importance as a place of formation of experts and research in the scientific diffusion area. In the "Espaços da Ciência", graduate students of sciences (biology, physics and chemistry) and mathematics teacher's licentiate have been enabled to play their role as mediators. In this way, these future teachers, who normally do not find in their towns many options of work in their academic areas, have the opportunity to experience the pedagogic practice in non-formal education activities and to develop research projects.

In a further improvement of this program, the goal will be to aggregate general and regional elements that could allow a larger interactivity with the public of these science centers, transforming the hands-on interaction into minds-on experience for the visitors [6].

In this way, this program intends to contribute for the improvement of the learning of science, citizen awareness of the importance of science and scientific literacy in our societies.

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