

Oswaldo Cruz Institute: symbol of Brazilian science



Oswaldo Cruz Institute: the Scientific Education Program and the "ABC in Scientific Education - Hands-on Project"

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The Oswaldo Cruz Institute / FIOCRUZ

- A centennial institution and its integrated missions - transmission of scientific power in critical vigor and locus-tradition and transformation.
- **The history of the institution mingles with the history of scientific knowledge itself in Brazil (data from 2000):**
- 736 articles published in well-known publications.
- 1.200 research programs and projects of technological development.
- Production of 2.000.000 of reacting agents for diagnosis.
- 9.000 students enlisted in its graduation courses.
- **Pioneer spirit: a social commitment and a pluridisciplinary view.**

The gap between the high level of knowledge and the population's degree of information tends to grow in all social classes, in more developed countries and in less developed as well

Où en sont les connaissances scientifiques des Français?

Quelques formules bienmémorisées: 76% des Français connaissent la valeur de Pi et savent qu'Arquimède s'était écrié Eureka en sortand de sa baignoire... Mais pourquoi au fait?

Encore 23% de nos compatriotes pensent que le soleil tourne autour de la terre...

... Alors la formule $E=MC^2$ a beau faire partie du patrimoine de l'humanité, chacun a plus présent à l'esprit l'image du génial farceur tirant la langue plutôt que la signification profonde de la fameuse équation. La science recèle tant de mystères...

Les Français sont 58% à réclamer plus de sciences à l'école.

(sources chiffrées: Louis Harris 1996)

In spite of all the scientific and technological development, some diseases have emerged again (after having been eradicated a long time ago).

In Brazil, Fiocruz is an example of an institution that is quite active in the domain of specialized information.

Since 1982: broad elaboration and distribution of materials to the population.

In 1994: its own TV channel was created - the Health Channel (Canal Saúde), in addition to making shows for other open channels.



**However information is not enough: We must invest in formation!
Scientific education to meets the demand of improving quality of
life.**

Health is a synonym of quality of life - therefore it is linked to environmental conditions (water, air, soil) and innovating techniques in agriculture or related to human reproduction. All of this requires knowledge and also a critical and ethical attitude regarding the development of science and technology.

Therefore it is more and more necessary to get academic institutions involved in scientific education by establishing partnership with schools.

The Scientific Education Program: the experience of the Oswaldo Cruz Institute / FIOCRUZ

Current challenges for scientific education, specially for the education of biological sciences and health: professional training for a society in mutation - social and ethical commitments and an interdisciplinary approach.



THOU SHALL NOT CLONE!

Research in biology and scientific education: partnership



Partners



The Project "ABC in Scientific Education": the result of an exchange between the French and Brazilian Academies of Sciences

- ABC: scientific literacy and support by the Brazilian Academy of Sciences (**A**cademia **B**rasileira de **Ci**ências);
- Participation of the French Consulate in Rio de Janeiro (and of the French Embassy at a national level);
- An international project that aims at improving scientific education primary school or the first years of school - lack of training for teachers in Science, yet it is an advantage, because they are polyvalent during the initial period of education;
- Scientific literacy with the concern of providing a process and a direct contact between teachers and scientists with the participation of professionals of didactics of science;

Attention: it is not a simple process of stimulation to experience, but rather a process that stimulates questioning, elaborating predictions, testing explanatory hypothesis, and it is also an attempt to build an environment for debating ideas by developing the student's capacity to dialogue and argue among them by comparing their opinions about the issues that are presented as a challenge.

-It is against exclusion, thus reducing the distance between scientific culture and the community and also valorizing the culture of illiterate families by trying to make them become partners;

-It offers training for teachers trainers, in addition to class teachers, in partnership with the state and municipal Secretariats of Education and supervision during the phase of implementation and while the project is going on at schools;

-It provides guidance for a shared construction of educational materials, which are adequate to the methodology of the project;

-It provides other quality materials that have already been created;

-Internet site: exchange between participating groups - Brazilians and other countries and exchange of innovation in terms of content and methodologies created by teachers involved.

Current issues of science

- To stimulate scientific vocation more and more.
- To develop creativity in science.
- To promote interaction between the different areas of knowledge.

Impact on education

- By guiding science teaching towards the adventure of discovery and the pleasure of solving "enigmas";
- By offering spaces of creation, the possibility of multiple answers and a never ending chain of problem-issues;
- Thus realizing that phenomena cannot be explained based on isolated disciplines and that, generally, propositions and innovating solutions are also transdisciplinary.

in addition to the disciplines, they also promote interaction with culture

SCIENCE AS A PART OF CULTURE!

And more:

- To increase the participation of scientists in society - responsibility in disseminating updated knowledge, but with a less scientificist and more an humanistic approach, thus contributing for the possibility of a wider exercise of citizenship.

SCIENTIFIC EDUCATION - AGAINST EXCLUSION AND IN FAVOR OF CITIZENSHIP

To establish a continuous process of scientific literacy by searching for a closer bond between scientists and educators in general: participation of researches in several academic institutions and some teachers or coordinators, preferably of the public education system, both municipal and state.

Educational modules by themes:

- We have chosen topics related to water, body and air.
- Teachers have researches (scientists) as consultants in their specific areas;
- Bridges between the themes lead one kit to the other;
- Avoid inducing "expected" answers and stimulate an open sequence of questions;
- Whenever possible, begin an activity with a challenge;
- Try to work with key scientific concepts, such as cycle, system, and balance.

The investigative process

To observe or study by examination
and systematic inquiry



Hands (and head) on



The State of Rio de Janeiro: total number of students and teacher

Age (7 - 14)

students

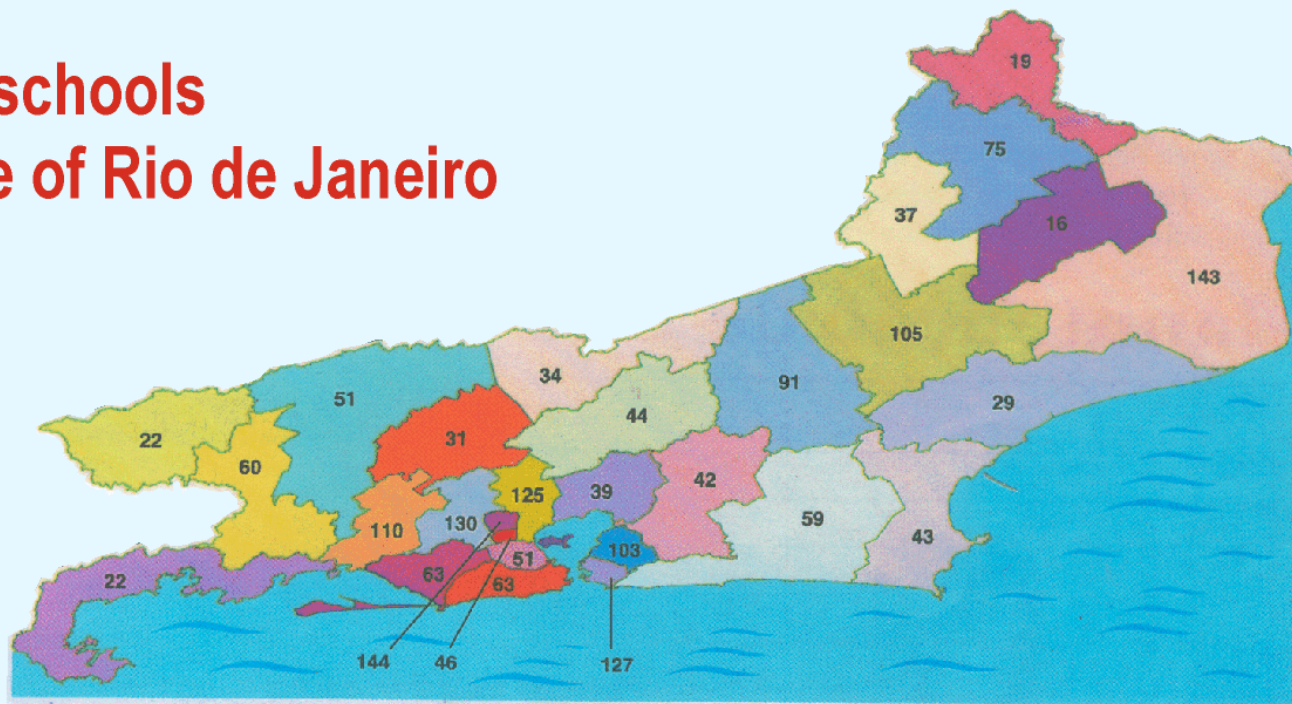
1.531.682

teachers

71.478



Map of the schools of the State of Rio de Janeiro



by Coordination Center

Schools / Coordination		
1- Northwest	1	19
2- Northwest	2	75
3- Northwest	3	37
4- North	1	143
5- North	2	29
6- North	3	16
7- Coast Region	1	43
8- Coast Region	2	59
9- Mountain Region	1	105
10- Mountain Region	2	91
11- Mountain Region	3	44
12- Mountain Region	4	39
13- Center-South	1	34
14- Center-South	2	31

15- Paraiba river Region	1	51
16- Paraiba river Region	2	60
17- Paraiba river Region	3	22
18- Ilha Grande Bay		22
19- Metropolitan area	1	130
20- Metropolitan area	2	110
21- Metropolitan area	3	144
22- Metropolitan area	4	127
23- Metropolitan area	5	103
24- Metropolitan area	6	42
25- Metropolitan area	7	51
26- Metropolitan area	8	63
27- Metropolitan area	9	63
28- Metropolitan area	10	125
29- Metropolitan area	11	46

HANDS-ON

Module about Water: URCA COVE

Traditionally, the Urca cove is a place where generations of students have had their first contact with sea life. In spite of the impact of pollution, it still keeps a rich fauna and flora that impresses those who have a chance and the will to spend some hours at its margins, investigating its incredible diversity.

WHY WORK WITH THE SEA ENVIRONMENT?

-The oceans were born with Earth itself more than 3 billion years ago. As the probable cradle of live cells, they cover 71% of our planet and their main source of energy is the sun. A process of slow and gradual evolution has originated a big diversity of forms of life that live in the waters of our planet.

-As the source of life, water has been pointed at by many researchers as the source of our future. This leads us to think in the need for its rational management in order to avoid the rupture of the balance that would put all life on Earth at risk. Thus, it is extremely important to implement an attitude of respect for marine life. In order to respect and love... it is necessary to know and admire!

Here is an open invitation for a research work at the beaches, trying to find animals in their hiding places, be it on the rocks or with "superb divers"!

-Come on! Let your spirit of research lead you!

GUIDE FOR OUR TRIP TO URCA

Questions	Objectives
1- What did you find water? What called your attention the most?	An stimulation to observe the marine enviroment, to describe the beings found by them and to biodiversity in the water, occasionally, because of the current problems, you may suggest and intervention that may lead to topics such as waste or pollution.
2- Did you find any being in these waters? Where did you find them? Why do they live there?	Stimulation to the observation of environmental factos that have an impact on the distribution of live beings in the marine environment and an invitation to identify the adaptation characteristics that have allowed these beings to live where they were found, including shapes and functions.
3- Is there food in waters?	Stimulation to debate about how to obtain food: strategies and structures.
4- How is it possible to move in water?	This item can be used as an stimulation to analyze the different ways animals move in the water, as well as to debate the issue of means of transportation in water, on the surface and in deep waters as well, thus becoming an ntroduction for an experiment on "floating/sinking".

PROPOSAL TO CONSTRUCT MATERIAL

Using the information and discussions carried out based on our guide, create a booklet of association of ideas.

Come on, hands-on!

NAME OF
THE
ORGANISM
(WITH A
PICTURE)

WHERE IT
LIVES

HOW IT FEEDS
(EMPHASIZING
SHAPE x
FUNCTION)

HOW IT
MOVES
(EMPHASIZING
SHAPE x
FUNCTION)

Topics to be developed:

WHAT ARE THE ANIMALS THAT YOU HAVE FOUND THE MOST?

WHY DID WE FIND THE ANIMALS AT THE PLACES THEY WERE?

WHO IS RELATED TO WHOM?

WHAT MAKES ONE BE A RELATIVE OF THE OTHER?

HOW CAN WE CLASSIFY THEM INTO "BIG GROUPS"?