

Inquiry-based Science Education in Brazil

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A crisis

- Outcome of international student assessment
 - Science and mathematics
- Low performance of Brazilian students
- A reaction from the public, press, politicians
- Initially small but taking momentum

Disappointment

- Prizes in science olympic games
- Growth of scientific activity in Brazil (1.4%)
- Recent achievements
 - Fuel from renewable sources, cheaper than oil
 - Deep-sea oil drilling
 - Aircraft industry (4 Billion US\$)
 - Technicized agribusiness (soy, eucalyptus...)

Science Centers

- Started in 1980
- Today: 100 centers and a national association
- Contribution: materials, teacher training
- Low impact

To be expected

- Low coverage of fundamental education in the 20th century
- Universal coverage reached in 2000
- Teacher training is a major problem
- Science started in the 4th grade (11 year-old students)
- Early science education: still a new idea

Action

- Inquiry-based science teaching programs
- Many initiatives: Unesco, universities
- Multiple scattered efforts
- The Inter-Academy Panel and national Academies
- Brazilian Academy of Sciences support to programs based on the “La Main à la Pâte”

Growth

- Target: 35 million students
- Activities based on “La Main à la Pâte”
- In 2001, a mission of 12 teachers and professors came to France for 4 weeks
- Teacher training started on July 2001
 - in São Paulo, module on *Water*
- So far, 40 persons trained in France

Lamap in São Paulo

	Teachers and coordinators	Schools	Children
Phase I - Project implantation July-December 2001	60	3	1 940
Phase II - Expansion 2002	500	28	18 500
Phase III - Expansion 2003/ 2004	1 600/ 1860	102 / 115	60 000 / 70 000

In Rio de Janeiro

- Program associated to a graduate school course in Science Education
- Since August 2001: development of strategies and materials
- Objective for 2004: 18 municipalities, 29 schools and 156 student classes involved

In São Carlos

	Teachers	Schools	Students	Propagators/ cities
2001	47	08	1134	
2002	92	44	2950	05 / 02
2003	254	73	6469	12 / 05

How to speed the process?

- Engagement of authorities (Federal, State and Municipal)
- A recent fact (May 27): public hearing at the House of Representatives
- Proposal of a national pact
 - Beyond parties and groups of interest

New actors

- Institute Sangari (UK-based), Clickidea and other entrepreneurial groups
 - Produces materials akin to *Science for all Children* ou *Main à la Pâte*
 - Good logistics
 - Funds for investment
 - Entrepreneurial continuity
- Need for assessment and relationship protocols

Unexpected outcome

- Impaired children from special classes
- Stimulus for physical activities
- Sensorial stimulation
- Joint activities between *special* and *regular* classes

Activities with impaired children



ABC na Educação Científica

Mão na Massa - Brasil II

- Inicialmente 4 pólos (redes escolares)
- Hoje 12+ pólos: Jaraguá do Sul/SC - SME
- São Paulo e São Carlos - SME e SEE
- EJA/SP, Ilha de Vera Cruz
- Fiocruz/RJ - SME e SEE
- Ribeirão Preto/SP - SME,
- UFES/ES - Vitória
- UFV/ MG - Viçosa
- UFPb/ Pb - Campina Grande

III Latin American Meeting

“La Main à la Pâte”

S. Paulo/Abril/2004

- Presentations from 12 sites in Brazil
- Argentina, Brasil, Chile, Colombia, Paraguay, Uruguay, France
- Plenary speakers: Pierre Léna and Eduardo M Krieger on “Science Teaching and the Access to Citizenship”

Accounts from teachers

- If I make an experiment with a thermometer I have to explain measurement and this is science but it is also math...
- ...this leads me to searching books and Internet..."
- ...to value observation as a means of learning...

Water boiling



Accounts II

- ...within the topic “water”...children were asked to watch a thunderstorm taking notes and discussing them with colleagues: perceptions, conclusions and feelings.
- ...cloud formation associated to the physical states of water, properties of liquid water...

Observing solution behavior



Accounts III

- *...spontaneous text writing was very rich. Unidentified texts were posted and corrected by the children...*
- *...when children write we can observe their spelling...*
- *...within the project classes we can diagnose their writing, understanding and oral abilities...*

Reporting



Accounts IV

- From a school coordinator: “interesting methodology that can be applied to other disciplines. It involves practical activities and new personal interaction patterns and creates new attitudes. Students have a stronger participation from the classes.”
- ...students learn about team-work and task-sharing...

Examination of a soil sample



Accounts V

- *“...we assigned tasks. This reassured the children...loved to have their own tasks...”*



Conclusions and Perspectives

- **Growing interest**
- **Improved teacher abilities and attitudes**
- **Current efforts focused on in-service training, but...**
- **...should be introduced in the formal teacher education**
 - **Need to convince Faculties of Education and Teacher Colleges**

Shortcomings

- **Classes are often too large (40 children)**
- **Evaluations are lagging behind**
- **Low assessment of propagators**
- **Project personnel absorbed in training activities**
- **But: interest is increasing continuously**