

# 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% of the world's scientific literature
- Recent achievements
  - Fuel from renewable sources, breaks even with oil at 22 US\$/barrel
  - Deep-sea oil drilling
  - Aircraft industry (4 Billion US\$)
  - Technicized agribusiness (soy, eucalyptus...)

# Not an exception

- Low coverage of fundamental education in the 20<sup>th</sup> century
- Universal coverage reached in 2000
- Teacher training is a major problem
- Science started in the 5<sup>th</sup> grade (11-12 years)
- Early science education: still a new idea

# Action

- Inquiry-based science teaching programs
- Many initiatives: Unesco, companies, universities
- Low coordination of activities
- The Inter-Academy Panel and national Academies
- Brazilian Academy of Sciences support to programs

# Growth

- The target: 35 million students
- Activities based on “La Main à la Pâte”
- 2001: 12 professors and teachers visit to France
- July 2001: training in Brazil
  - In são Paulo, modulus on *Water*

# Lamap in São Paulo

	<b>Professores e coordenadores</b>	<b>Escolas</b>	<b>Crianças</b>
<b>Fase I - Implantação Julho a Dezembro de 2001</b>	<b>60</b>	<b>3</b>	<b>1 940</b>
<b>Fase II - Expansão 2002</b>	<b>500</b>	<b>28</b>	<b>18 500</b>
<b>Fase III – Expansão 2003/ 2004</b>	<b>1 600/ 1860</b>	<b>102 / 115</b>	<b>60 000 / 70 000</b>

# In Rio de Janeiro

- Program associated to the graduate school in Fiocruz
- Since August 2001: development of materials and strategies
- Objective for 2004: 18 municipalities, 29 schools and 156 classes



# In São Carlos

	<b>Professores</b>	<b>Escolas</b>	<b>Estudantes</b>	<b>Propagadores/ cidades</b>
<b>2001</b>	<b>47</b>	<b>08</b>	<b>1134</b>	
<b>2002</b>	<b>92</b>	<b>44</b>	<b>2950</b>	<b>05 / 02</b>
<b>2003</b>	<b>254</b>	<b>73</b>	<b>6469</b>	<b>12 / 05</b>

# How to speed up the process?

- Engaging authorities (federal, state and municipal)
- On May 27: public hearing in the Congress House or Representatives
- On November 9: conference in Brasilia
- Call for a national pact
  - Overcoming partisan interests

# Remarkable results

- **Children from special classes**
- **Stimulus for physical activity**
- **Sensorial stimulation**
- **Joint activities between *regular* and *special classes***

# III Encontro Latino-Americano do “Mão na Massa”

*S. Paulo/Abril/2004*

- Presentations from 12 groups
- Argentina, Brasil, Chile, Colombia, Paraguai, Uruguai
- Speakers: Pierre Léna and Eduardo M Krieger on “Science teaching and the access to citizenship”

# Atividades com crianças com necessidades especiais



# From the teacher reports

- “Se eu faço um experimento com um termômetro, tenho de explicar medidas. Consigo reunir ciências e matemática.”
- “...isso me leva a consultar livros e a Internet...”
- “...valorizo a observação como uma forma de aprendizagem...”

# Ebulição da água



# Preparando soluções





# Mais relatos

- *...a redação espontânea era muito rica. Textos não-identificados eram afixados e corrigidos pelas crianças...*
- *...quando as crianças escrevem, podemos observar sua redação...*
- *...durante os projetos das classes podemos diagnosticar sua capacidade de redação, de compreensão e de comunicação oral...*

# Relatórios



# Um modelo: “meme”

- Um replicante cultural
- Analogia: gene
- Características
  - São hábitos, modos de pensar, comportamentos, gostos, modelos
  - *Podem* ser benéficos ou prejudiciais aos que os expressam
  - A principal lógica: propagação

***Susan Blackmore, The Meme Machine, OUP 1999***

# Science Education

- The method
  - Experiments, models, verification
- Information: facts
  - A conception of the world
- Criticism, uncertainties
- Ethics
  - Impacts of innovation: environment, employment, quality of life
- Decision-taking based on the best available science

# Conclusions

- Fast growth
  - But still a long way to go
- Good feedback
  - Positive qualitative feedback
- New participants
  - Interest of municipalities and schools