The Very Young Minds: a challenge for young scientists

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EPS Meeting, Paris, June 6, 2014
In school, learning to read, write, count and to reason
From 2000 onwards, science education for all becomes a global concern
Encouraging Student Interest in Science and Technology Studies

Global Science Forum

Science Education NOW: A Renewed Pedagogy for the Future of Europe

InterAcademy Panel 2008

Program to convey scientific culture to the whole people

China 2006

Science Education in Europe: Critical Reflections

Unesco 2011
Science education for all students

• A global goal making **consensus**, worldwide ;
• **Grounds** : development and skills, justice and equity ;
• **Challenges** for schools :
  1. To begin early (ages 6 to 12) ;
  2. To teach real and interesting science/technology ;
  3. To address all students ;
• **A pedagogical revolution** :
  1. Convincing education authorities ;
  2. Teacher preparation ;
  3. Ressources for the classroom.
  4. Role of scientists / engineers ;
  5. Opening the school : parents and community
1995-2014 across the world

• A wealth of pilot projects
  – *Mao na massa*, Brazil (ABC et al)
  – 做中学, China (Wei Yu et al)
  – *Pequenos Cientificos*, Colombia (Duque et al)
  – *Ensensenza Ciencia ECBI*, Chile (Allende et al)
  – *Haus der kleinen Forscher*, Germany (Skiebe et al)
  – *Primary connections*, Australia (Peers et al)
  – *Innovec*, Mexico (Fernandez et al)
  – *Engineering is elementary*, Boston USA (Miaoullis et al)

• Academies move through IAP (Allende, Léna, Lee Yee Cheong...) or in Europe
A renewal of science education in Europe

Views and Actions of National Academies

Analysis of surveys conducted in 2010 and 2011

A report of the ALLEA Working Group Science Education

(IAP Science Education Programme Regional European Council)
Inquiry **based science education (IBSE)**

**Inquiry** is a term used both within education and in daily life to refer to seeking knowledge or information by **asking questions**. It is sometimes equated with research, investigation, or ‘search for truth’. ....What distinguishes **scientific inquiry** is that it leads to **knowledge and understanding** of the natural and made world around, through **methods** which depend on the **collection and use of evidence**.

- Universality of curiosity and science;
- Diversity of cultures, languages, educations
In school, learning to read, write, count and ... to reason
1996 – today

La main à la pâte in France

1. Primary school: from 3% (1996) to 50 %;
2. Middle school: from disciplins to integrated (interdisciplinary) science;
3. Key role of Académie: political and practical;
4. Teacher is key
   – Science/engineering are more than facts to learn;
   – Opening the school: parents, community, industry;
   – Coaching the teachers: www.fondation-lamap.org
5. Dissemination and international exchanges

www.fondation-lamap.org
Harlen W, in The European Fibonacci project (2009-2013), www.fibonacci-project.eu/
What we need (R Millar, 2012)

• Greater clarity about intended learning outcomes in science/technol.
  • together with validated tools for identifying achievement

• A model of science teaching and learning
taking seriously the fact that ‘core’ science
  • is a body of accepted knowledge
  • which uses a framework of ideas and concepts
  • which do not emerge solely from a study of phenomena
  • indeed, in many cases, are deeply counter-intuitive

• This is not an argument for a ‘transmission model’ of instruction
  • but rather for one that recognises the need for, and the place of, episodes of
teacher exposition to real science and technology.
Tools for identifying student’s achievements
A Guide issued by the IAP/Science Education Program, after the Helsinki Conference 2012

Available on the IAP Website
Chinese
English
French
German
Serbian
Spanish
Changing teachers to IBSE takes time...

Exposing teachers to science and inquiry

In Education 3-13 (2011)
M Delclaux & E Saltiel
La main à la pâte, France

http://dx.doi.org/10.1080/03004279.2011.564198
Example: Lamap module for teachers, grades 1 to 7

A transdisciplinary theme;
A rigorous scientific content for the teacher;
A set of classroom sequences;
Methodological inquiry indications.
Dissemination by coaching teachers in Europe
2009-2013
6000 teachers, 300 000 students
Math & Natural sciences

Fibonacci Project

THE BIG CHALLENGE : CHANGES AT LARGE SCALE

www.fondation-lamap.org/sites/default/files/upload/media/Fibonacci_Book.pdf
Dissemination in places where teachers and science meet: UK, France, SE Asia

11 SE Asia countries
PENANG, Malaysia

UK
Sir John Holman
9 National Science Learning Centers
2006 - 2015
• FRANCE
• 9 Maisons pour la science
• au service des professeurs
• 2012 - 2018

AFRICA
Fritz Hahne
3 African Institute For Mathematical Sciences
Open questions for the future: science/technology in basic education

- Core of big ideas; interdisciplinarity
- Engineering vs. science;
- UN goals for sustainable development (2015)
- Cognitive development of teenagers;
- The school in the digital world;
- Social status & salary of teachers.
I have no more pressing obligation than to remain passionately curious

Albert Einstein
IBSE 2013 worldwide: millions of children...

*teacher training, resources, websites*...
Collaborations of La main à la pâte
Booklet with full details on
www.fondation-lamap.org/fr/9511/action-internationale
La démarche d’investigation

1. Questionnement
2. Hypothèses
3. Expérimentation(s)
4. Conclusions et communication