



“Inquiry Based Science Education in Europe: Setting the Horizon 2020 Agenda for Educational Research?”

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The Problem



Assumptions

Projects on Inquiry in Science & Mathematics (IBST, IBSE, IBL etc) are at a mature stage within EU Framework Programme 7

- Much learning about the practicalities and benefits of inquiry has already taken place
- Horizon 2020 could provide opportunities for inquiry-based education and beyond, if we develop a common voice and value system across our research community

HORIZON 2020

- *Health, demographic change and wellbeing*
- *Food security and sustainable bio-resources*
- *Secure, clean and efficient energy*
- *Smart, green and integrated transport*
- *Resource efficiency and climate change*

- *Inclusive, innovative and **reflective** Societies*
- *Security...*

HORIZON 2020

Education and Horizon 2020

- Education is a big enterprise (+ €500bn/year in EU) with a low profile, a variety of voices and an ill-defined set of purposes
- Education is currently changing (e.g. adopting new technologies) but in reactive mode
- A truly inquiry based education system would itself help to drive change processes in society.

Look sir! Yasmin's nearly sorted Nuclear Fusion!
It'll end global warming!

Stop that at once. We
are no longer studying
climate change

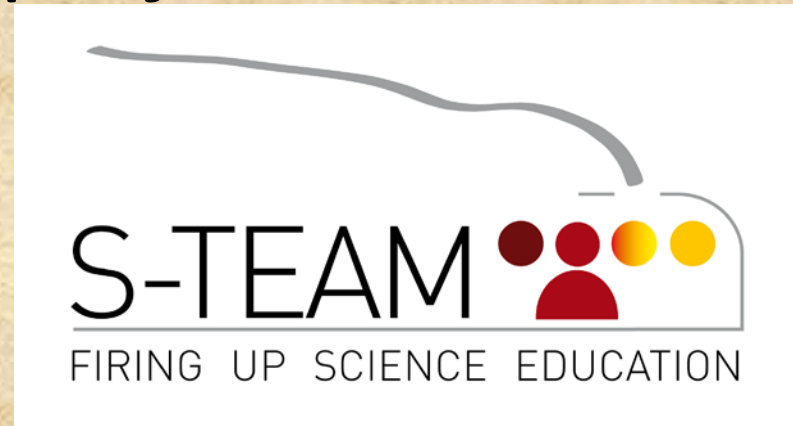


Where it is going

- Horizon 2020 provides the basis for several possible scenarios, e.g.
 - Technicist: dominated by business agenda
 - interdisciplinary collaboration
 - Democratic: taking control of research
 - Useless: no real change

What have we got to use: some existing projects

- DESIRE
- ESTABLISH
- Fibonacci
- INQUIRE
- PRIMAS
- PriSciNet
- **PROFILES**
- PATHWAY
- SAILS



- Scientix
- SECURE
- SED
- SiS Catalyst
- etc

What is inquiry?

- Inquiry cannot be reduced to a single ‘method’ (cf. phonics in teaching of reading)
- it is not only constructivism, ‘hands-on science’, or problem-based learning...
- Rather, **inquiry** is a philosophy of education, which values and enhances the ability, curiosity and critical thinking of individuals within social and scientific contexts

Inquiry-based learning

***A framework for science teaching and learning,
involving:***

- ***active engagement of students in the learning process***
 - ***epistemologically authentic procedures***
 - ***social interaction and collaboration***
 - ***holistic learning objectives***
 - ***Learning environments designed to promote construction of meaning and gradual development of skills and awareness***
 - ***assessment having a formative role in providing feedback to the teaching and learning process***
- (from Constantinou, 2012)***

What do we already know about the implementation of Inquiry?

- It takes time
- Teachers benefit from support, confidence-building and empowerment (= collaborative professional learning)
- Assessment, curricula and pedagogy should be compatible and coherent
- But success depends on definition of desired outcomes...

Criteria for success?

- More student engagement in science classes?
- Better student understanding of science topics
- Better student achievement in science exams?
- More students taking science at university?
- More students going into science-based careers?
- More responsible research and innovation coming out of schools?

The dichotomy

- Inquiry as an added ingredient in current education systems – OK but boring
- OR
- Inquiry as the basis of an educational value system based on empowerment, creativity and imagination, and with innovation and research as direct outputs from education systems

Education role in 2020

(from ECER 2012)

- Bridge between the Individual and the collective
- innovative democracy
- Community –school-university-research connections
- Professional learning provides feedback loops between school activities and social innovations
- Teachers & students as:
 - Actors in change processes
 - Producers of innovation
 - Translators of research into practice

What does this mean for IBST projects?

- There is a need to collectively form and deliver a definitive view on the role of inquiry in (science and mathematics) education, in order to inform policy
- Relationships with national contact points and research officers should be more critical

What does this mean for the EU?

- The process of creating EU work programmes needs to be more transparent and open to feedback, with clear channels of communication
- A sustainable coordination, knowledge management and professional learning process is required in order to fully realise the value of projects

Synthesis of project results

- ProCoNet: Project Coordinators' Network
- www.proconet-education.eu
- INSTEM – first conference March 2013
(funded by Comenius in LLP)
- Objective: to generate common understandings and recommendations concerning Inquiry based methods in science/maths education, including national workgroups

Practical action

- INSTEM synthesis report available mid-2013
- Email me:

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Thanks for listening!