

Promoting science teaching and learning with IBSE

Ana Gostinčar Blagotinšek

University of Ljubljana,

Faculty of Education

**Workshop on high school physics: innovative teaching,
hands-on science, gates to research – Cheia, July 2010**

Outline:

- Why are new approaches needed?
- Some experience with implementing a new approach from Slovenia.
- IBSE

21st century challenges:

- alarming decline in young people's interest for Science studies,
- low public esteem of Science;
- sustainable development is under threat,
- citizens will be unable to cope with every-day life demands.

Reasons? Solutions?

- Educational system and the way science is taught at school.
- **Inquiry-based teaching methods could provide solutions.**



EUROPEAN
COMMISSION

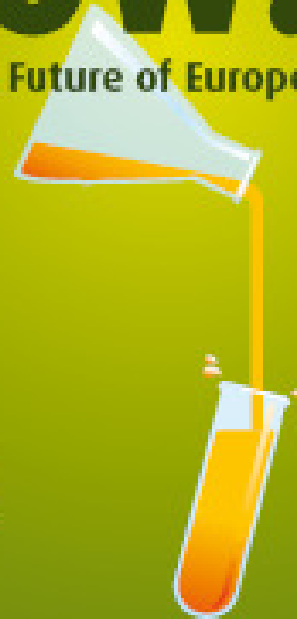
Community research

$$f(x) = \cos(x^2) + 1$$



Science Education NOW:

A Renewed Pedagogy for the Future of Europe



EC PERIT GROUP



04/08/2007 10:12

Attitude towards Science

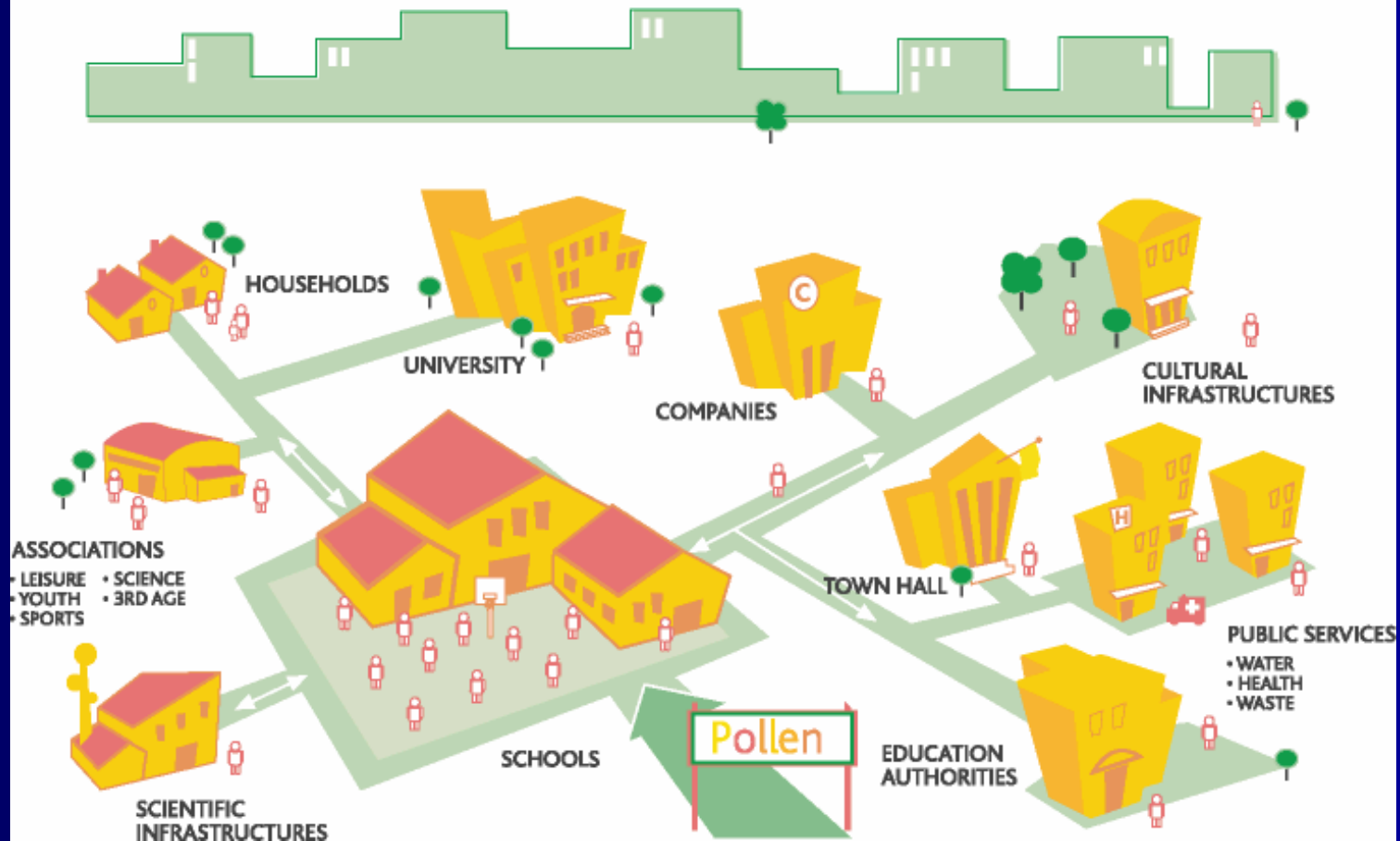
- depends on public status of Science
- is not formed at the age, when youngsters choose their careers, or immediately before that
- is strongly affected by relevance (girls).

Two aspects to take into consideration:

- Science within society
- Early (primary?) science education

A **community** approach for the sustainable growth of science education in Europe

SEED CITY The Actors



p.o.l.l.e.n.



- European research and development project, supported by the DG RESEARCH (FP6) of the European Commission.
- Twelve seed cities for science in 12 European countries.
- More info at: www.pollen-europa.net.

Community involvement

- **bottom - top**
 - Press
 - Science festivals
 - Local events
 - Study groups
- and
- **top – bottom**
 - Board of Education
 - Ministry of Education
 - City councils
 - Headteachers

A renewed pedagogy for the future ...

- Teacher are at the core of every reform.
- Teachers need education for new approaches, too.
- Good teachers are good learners.
- **Assesing determines teaching.**

To stimulate and support science teaching:

- **Teachers** should be offered
 - material,
 - methodological and
 - pedagogical resources and tools,
 - support for the daily work at school, compatible with the framework of the local curriculum.

Seminars for teachers:

- Active involvement of teachers
(teachers should be taught in the way they are supposed to teach)



(Adequate) classroom equipment:

- Teachers test all the equipment and the experiments on workshops;
- The same equipment is available for classroom use (renting for one week).



IBSE



DISSEMINATING INQUIRY-BASED SCIENCE
AND MATHEMATICS EDUCATION IN EUROPE

IBSE (inquiry-based science education)

- Imitates scientific inquiry: Practicing systematic approaches, used by scientists, in an effort to answer questions of their interest.
- Basic parts of a scientific investigation: A problem, procedure, interpretation.

IBSE (inquiry-based science education)

Pupils are doing inquiry, when they:

- are engaged with “scientific” question,
- give priority to evidence,
- formulate evidence-based explanations,
- communicate and justify explanations.

(NRC, 2000)

IBSE (inquiry-based science education) aims at

- development of process skills (observing, inferring, classifying, measurement, questioning, analyzing and interpreting data),
- combining processes with scientific knowledge,
- development of critical thinking.

IBSE (inquiry-based science education)

- Teacher-lead variants



- Pupils-lead variants

IBSE (inquiry-based science education) levels:

- Confirmation
- Structured
- Guided
 - coupled
- Open-ended
(SciTea 72(7))



Taking the plunge

- Start with teacher-lead variants within familiar topics.
- Educators can help providing examples, guides, worksheets, ...
- Move towards more student-lead versions step-by-step.

IBSE - pros

- Scientific literacy
- Life-long learning
- Ownership of the learning process
- Responsibility for one own learning and knowledge

IBSE - cons

- Not the ultimate learning approach
- Not appropriate for every topics
- Teacher's role?
- What about solid content knowledge?

Promoting science teaching and learning with IBSE

Thank you!

ana.gostincar@guest.arnes.si

ana.gostincar@pef.uni-lj.si

Workshop on high school physics: innovative teaching, hands-on science, gates to research – Cheia, July 2010