






kidsINNscience Innovation in Science Education


Turning Kids on to Science

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collaborative research project (SICA)
involving 10 countries from Europe and Latin-America





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kidsINNscience aims to...

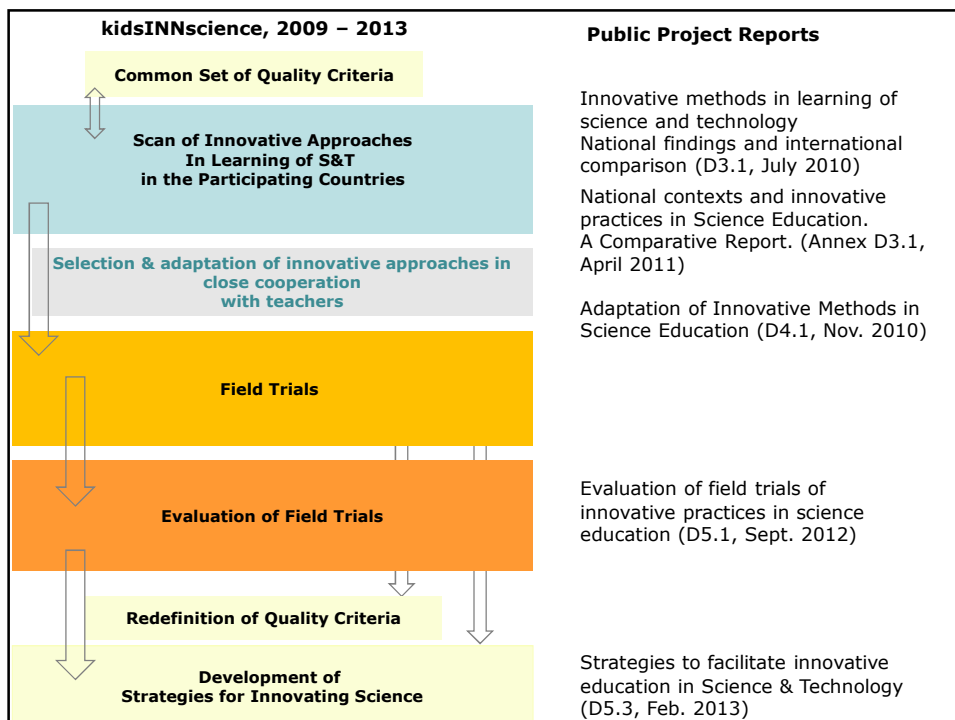
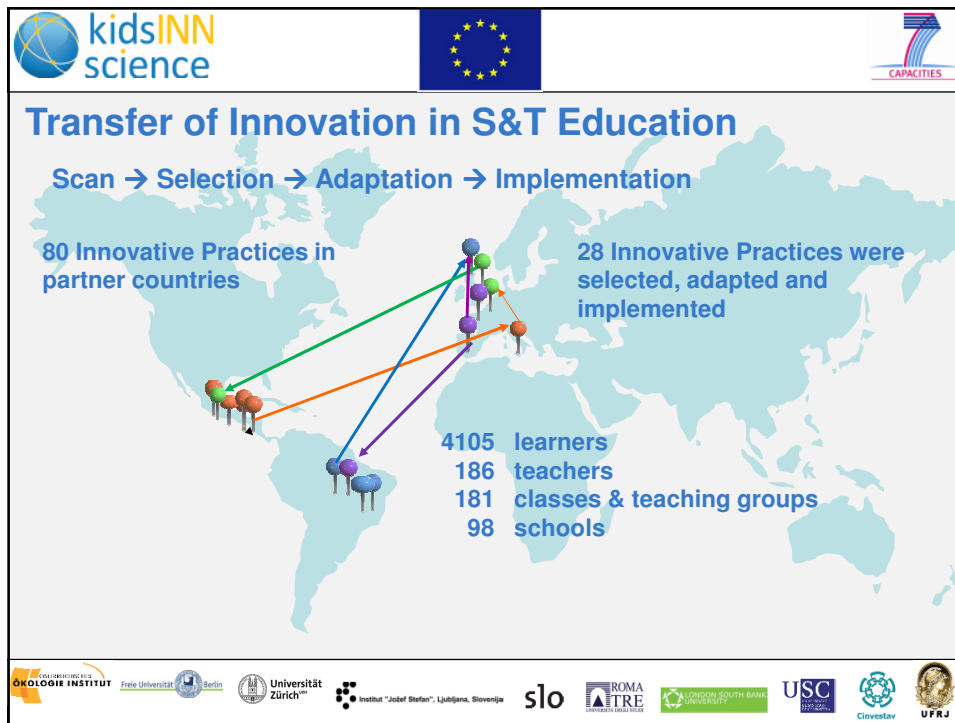
- ... improve performance and interest in S&T among young people.
- ... help generate changes toward more active learning systems in science and technology (S&T) education.
- ... facilitate educators at different positions in the educational system to operate more creatively within the system.

kidsINNscience investigated

how to successfully transfer innovation in S&T education from one educational context to another, from one country to another.
























Eighty Innovative Practices

6 early years education

20 primary

28 lower secondary

26 upper secondary







32 Inquiry Based Learning or Problem Solving




32 Practical work or Hands-on activities




7 Gender Issues

15 Cultural/multicultural issues











8 Equity/Inclusiveness

Key words	Curriculum relevance
Problems addressed	Description of the IP
Quality criteria	Information available
Innovation appraisal	Critical features for sustainability
Relevant information	Critical features for transferability





What do we mean by Innovative Practice?

'A good practice is innovative if it aims at changing and/or improving the learning/teaching in a regular context

- *The innovation **should address to one of the problems** nationally perceived as important and should be in the content – and/or in approaches to content – and in teaching/learning methodologies.*
- *Every innovation is relative to a cultural context and a good innovation should achieve successful results concerning the problems addressed*
























What makes an IP sustainable and transferable?

- *'An innovation is **sustainable** if it can be implemented for several years by a 'regular' classroom (or school) with 'regular' but motivated teachers, without special extra requirements (in terms of resources, time, teacher development, etc.)*
- *'An innovation is **transferable** if the core of innovation and the problems addressed are clearly described, the critical points are highlighted, and if it is flexible enough to be adapted to different contexts.*















































**Adaptation of innovations:
a process of a dynamic nature**




- Assumption: Innovative practices (IP) work better if they are **adapted** to local contexts
- Intensive **involvement of teachers'** networks is a requisite for the success of the project
- Starting point: Deliverable 3.1, **80 IP**
- **Adaptations are a developmental process, rather than a 'product'**
- The process of adaptation had a dynamic nature, involving **interactions** among University researchers, teachers, schools, curriculum

28 Innovative practices adapted

- from 80 IPs 28 were adapted (35%)
- IPs originating from all partner countries
- one ('Potatoes don't grow on trees') in 4 countries
- three in 3 countries, six in two countries
- 18 IPs in one country











Example: From 'Potatoes don't grow on trees' to 'Potatoes may grow on air'

Torque pre-school teachers & USC researchers chose 'Potatoes don't grow on trees' from Italy, and cooperated in designing new tasks and a project, carried out twice during five months January – June 2011 / 2012 in six pre-school classes


Most Galician children have experience with potato planting & don't believe that 'Potatoes grow on trees'

Aeroponics (growing in an air or mist environment) was implemented, requiring children to construct artifacts

The new focus highlights the nature of **plant nutrition**: building matter from CO₂ from air






Curiosity: Can we see the "starch bags"?
Cooked ham has starch!


What is inside potatoes that feeds us? Is it found in other foods?

One child brought (her father's) pictures about potato's amyloplasts




They asked to see them: they dyed some potato gratings with iodine, looked through the microscope

They tested different foods with iodine










Drawings of 'starch bags' (amyloplasts)


















Evaluation of Field Trials

Effectiveness with respect to the problem addressed and three additional important areas of innovation of S&T education: Diversity and Inclusiveness, gender aspects and activity based and learner centered approaches such as IBTL (inquiry-based teaching and learning).




1. What strategies for teaching and learning in S&T motivate teachers and learners in the participating countries?

The feature appreciated most frequently was "**practical activities**" (38% of the statements), e.g. hands-on activities to manipulate and experiments, which are open-ended and serve a purpose, such as to decide among alternative explanations.

The majority of the implementations are judged **effective** (78% of the summaries).


















2. What similarities and differences are there in innovating S&T teaching and learning in the participating countries?


Running the field trials:
Some countries involved teacher education.
Some partners met regularly with the teachers.




Context:
The majority of the field trials took place in co-educative public schools. In four countries, a few private schools participated. The participating schools are not representative for the individual countries and do not allow generalizations for the entire country.

Features facilitating a successful adaptation and implementation of an IP in another country:

- the original IP is attractive and close to the learners and the teacher and matches the syllabus or curriculum (or can be matched)
- alternatively, the syllabus or curriculum are flexible
 - the educational authorities, colleagues and parents are supportive towards innovation
- the teachers are free to adapt the IP according to their needs (context and interests)
- the teachers are interested in their professional development
- the professional development stretches over a certain amount of time and allows the exchange with critical friends













Strategies for innovating S&T education

Professional learning communities
Strong support should be given to existing professional learning communities or connections should be established in order to create professional learning communities or to foster cooperation between such communities

Diversity and inclusiveness / gender
A discussion of diversity and inclusiveness / gender issues should be included in teacher education as early as possible; the regular observation of groups of pupils and identification of problems existing will contribute to raise awareness regarding these issues. This awareness in turn is the basis for improved management of these aspects.




Teacher education

Teachers are seen as the most important key change agents, therefore teacher autonomy in implementing innovative practices and hands on activities should be fostered strongly. Teacher education is a key aspect and should be supported by educational research results but also by cooperation among educational researchers, teachers and schools supporting each other.

Sharing of IPs
A selection of innovative and up-to-date practices, well described and documented in the national language, should be available to a variety of key change agents, among them teacher associations and institutions for teacher education and professional development. In addition, access to persons with the necessary content and pedagogical knowledge regarding the IP should be provided.
















Practical work and specialist resources
 The creation of a network of schools and research institutions should be strongly supported: schools should be enabled to increase the use of equipment and the related activities in science education, either by purchasing their own new and up-to-date equipment or by sharing resources with others when the needs arise.


Flexibility & teaching freedom
 Curricula should consist of a limited compulsory core curriculum together with other suggested topics, thereby leaving the teacher to choose among different contents and methodologies.

Authentic context of science education
 Teachers and schools should be supported to increasingly include everyday life aspects into science education, enabling learners to benefit from higher motivation and interest.















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