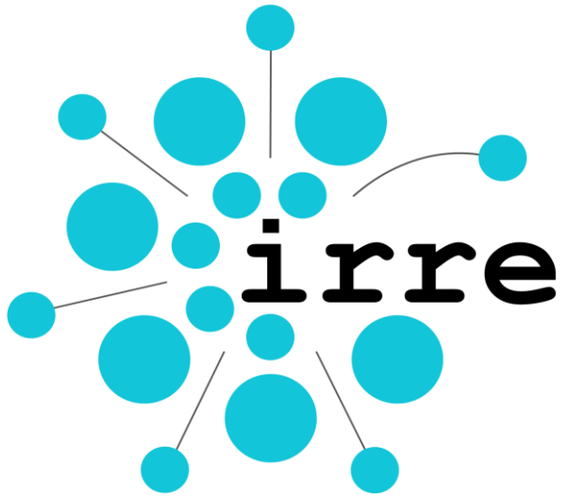

Grant Agreement
Number 612367

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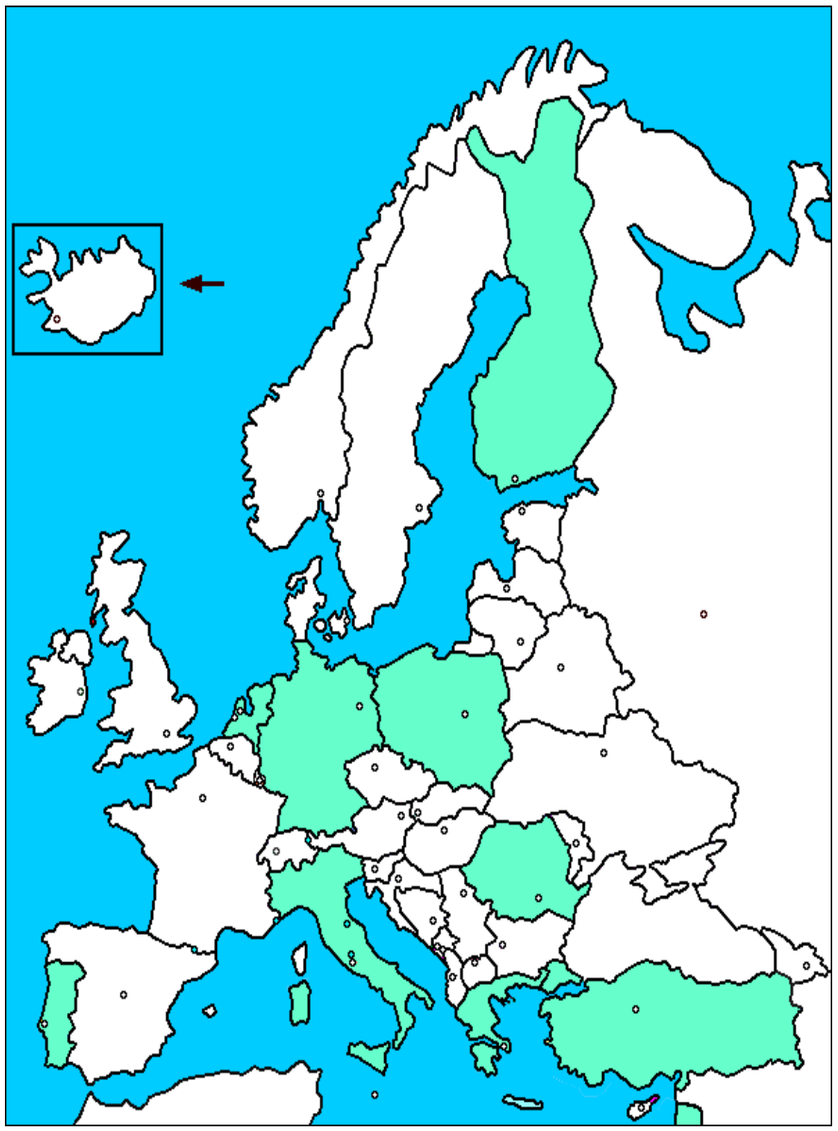
FP7-SCIENCE-IN-SOCIETY-2013-1

Activity 5.2.2 Young people and science

Topic SiS.2013.2.2.1-1
Raising youth awareness to Responsible Research and Innovation through Inquiry Based Science Education

14 Partners from 10 countries

- University of Groningen (Netherlands)
- Weizmann Institute of Science (Israel)
- Leibniz Institute for Science and Mathematics Education(Germany)
- Deutsches Museum (Germany)
- Bogazici University (Turkey)
- Universidade de Lisboa (Portugal)
- University of Palermo (Italy)
- University of Jyväskylä (Finland)
- University of Bologna (Italy)
- University of Crete (Greece)
- Jagiellonian University (Poland)
- Valahia University Targoviste (Romania)
- University of Helsinki (Finland)
- Eugenides Foundation (Idryma Evgenidou) (Greece)




IRRESISTIBLE

irresistible

Coordinator: Jan Apotheker
University of Groningen
(Netherlands)

A project on teacher training combining formal and informal learning focused on Responsible Research and Innovation

Teacher training

It is based on the use of *Communities of Learners* (CoL) formed by 4 or 5 teachers, university researchers and experts of out-of-school learning.

In a second step each teacher involved in a Community of Learners will in their turn act as a coach for another Community of Learners

Formal (at school) Learning

- **IBSE (inquiry based science education)**

- **6E method**
  - ***Engage***
  - ***Explore***
  - ***Explain***
  - ***Elaborate***
  - ***Exchange***
  - ***Evaluation***

Informal(at a science museum or festival) Learning

Formal (at school) and Informal(at a science museum or festival) Learning

The nature of Formal and Informal Learning contexts is different

- ✓ Different histories, purposes and trajectories
- ✓ Once seen as a dichotomy → complementary
- ✓ Recently , many calls for
- ✓ "Bridging the Gap"

Why bridge the gap?

It increases the variety of learning opportunities for all kinds of learners

- ✓ increases student motivation for learning
- ✓ expands student conceptions of learning and knowledge
- ✓ develops new student skills and abilities

How to bridge the gap?

Involvement of experts of Science Centers to help the students to make own exhibits

Raising youth awareness to Responsible Research and Innovation

- **Increasing content knowledge about research by bringing topics of cutting edge research into the program**

- **Fostering a discussion among the students about RRI issues on the topics that are introduced**

Raising youth awareness to Responsible Research and Innovation

1 Portugal	Genomics and oceanography
2 Finland	Climate change
3 Turkey	Nanoscience
4 Poland	Nanotechnology (catalysis)
5 Netherlands	Healthy ageing
6 Romania	Solar energy and specific nanomaterials
7 Italy	Nanotechnology
8 Israel	Renewable energy (nanoscience)
9 Germany	Oceanography and climate change
10 Greece	Nanoscience applications

Nanotechnology

Physicists are mainly interested in nanoscale objects that are simple from a chemical viewpoint and do not exhibit any specific intrinsic function (atoms, clusters of atoms, small molecules).
In these cases functions arise from ensembles of such objects (i.e. nanoparticles, nanostructured materials, nanoporous materials, nanopigments, nanotubes, nanoimprinting, quantum dots…).
The development of this kind of nanotechnology has already led to many innovative applications, particularly in materials science, such as the materials used in photovoltaics, in the construction of LED, and the development of carbon nanotube-based materials employed in several fields.

Nanotechnology

Chemists focus their interest on nanoscale objects that have complex chemical composition, show peculiar properties, and perform specific functions. Each single nanoscale object is, therefore, capable of performing a function that is intrinsically connected to its chemical nature and structure. Nanoscale objects of this type behave as real devices and machines at the molecular level and are present in nature where perform a variety of functions, from the light-harvesting antennae of the photosynthetic
systems to the linear and rotary motors that work in our body. In the last twenty years chemists have learned to construct artificial molecular devices and machines that are expected to be of great importance in several fields. For example, they will open new ways for storing, processing, and transferring information, develop new approaches to diagnosis and therapy in medicine, find new solutions for the energy and environment problems.

Nanotechnology

Focal points to be addressed concern:

- The educational problem of misconceptions about nanoscale objects (atoms, molecules, cells, etc.)that arise from naïve interpretations of the nano-level images disseminated by media, and how to avoid or overcome them through instruction
- The historical background of nanotechnologies that enable students to better understand the nanoworld through the development of the atomic and molecular theories
- The great impact that the development of nanotechnology has for everyday life and will have for the future of mankind, also pointing out the ethical problems that can arise

Responsible Research and Innovation

It is based on six key issues

- *Engagement of researchers, industry and civil society in the research and innovation process*
- *Gender equality*
- *Science education*
- *Ethics*
- *Open access to the results of publicly funded research*
- *Responsibility of policy makers to develop harmonious models for RRI*