

# Inspiring Science Education – European Union Project

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## Abstract

*Inspiring Science Education is a project dedicated to all about providing the tools to make science education more challenging, more playful and above all more imaginative and inspiring for today's students, the citizens of tomorrow's world. Teachers, trainers, experts in Science education are working together to help them build a better world for everyone.*

**Keywords:** Inquiry-based learning, inspirational digital resources, scientific research activities

## 1. Introduction

Inspiring Science Education is a pan-European project bringing together partners in 15 countries, including many experts in the field of Science Education. The mission of the Inspiring Science Education project is to provide digital resources and opportunities for teachers to help them make science education more attractive and relevant to students' lives.

Large-scale take-up amongst European Science teachers is the project's aim. Pilot activities will take place in 5000 primary and secondary schools in 15 European countries.

During these pilots, teachers will be accessing interactive simulations, educational games and eScience applications and integrating them with extra-curricular activities, such as field trips to science centres and discovery parks, and virtual visits to research centres.

Teachers will also have the possibility to access remote and online labs, and relevant scenarios for their use in the school classroom.

Students will be inspired to use eTools and digital resources to learn Science, Technology, Engineering and Maths (STEM related subjects) in a practical, competitive and exciting way “(<http://www.inspiringscience.eu/project>, accessed 2015)”.

### 1.1 Partnership

The partners of this project are: AtiT– Belgium, Bulgarian Research and Education Network – Bulgaria, Cardiff University – United Kingdom, Consiglio Nazionale Delle Ricerche – Italy, Croatian Academic and Research Network – CARNet – Croatia, Dublin City University – Ireland, Ellinogermaniki Agogi Scholi Panagea Savva – Greece, European Physical Society, Fondazione IDIS - Citta della Scienza – Italy, Fraunhofer Institute for Applied Information Technology FIT– Germany, Helsingin Yliopisto UHelsinki – Finland, Humboldt – Universität Zu Berlin – Germany, Institute of Accelerating Systems and Applications – Greece, Institute of Educational Policy – Greece, International University of La Rioja – Spain, Intrasoft International – Luxembourg, Learnit3d – United Kingdom, MENON – Belgium, NUCLIO - Núcleo Interativo de Astronomia – Portugal, Open University Guglielmo Marconi – Italy, SETApps – Greece, SIVECO – Romania, The Serious Games Institute – Coventry University – United Kingdom, Tiedekeskussäätiö Heureka – Finland, University of Duisburg-Essen – Germany, University of Bayreuth – Germany,

University of Piraeus Research Center – Greece, University of Twente – Netherlands, Velti – Greece, Vernier Technology (Europe) – Ireland.

## **2 Why Inspiring Science Education?**

Nowadays the studies are revealing the existence of a lack of interest in students' Science learning. They find the school science not relevant, even boring and unrelated to the world around them. Current school science leaves many students untouched in developing broad ideas of science that could help understanding of things around them and enable them to take part in decisions as informed citizens. The goal of science education is not knowledge of a body of facts and theories but a progression towards key ideas which enable understanding of events and phenomena of relevance to students' lives "(Harlen, 2010)".

On the other hand, an inspirational teacher can make wonders. Inspirational science teachers are at the heart of successful science teaching – ask any scientific Nobel prize-winner who had the greatest influence on their decision to become a scientist and invariably the answer will be – my Science Teacher! So what is it that makes a science teacher truly inspirational? That's one of the conundrums we aim to unravel in the Inspiring Science Education project. That's why we will be setting up workshops and exchanges, communities of practice and learning opportunities for science teachers and teacher trainers aimed at helping them find ways to make their teaching of science more inspirational "(<http://www.inspiringscience.eu/project>, accessed 2015)".

## **3 How to inspire Science Education?**

This project goal is to motivate and to inspire the Science learning and that is why Inquiry-based learning (IBL) is used to embrace curiosity, fundamental human trait, as a natural impulse to learn and think. Inquiry-based learning (IBL) is a method of instruction that places the student, the subject, and their interaction at the centre of the learning experience. At the same time, it transforms the role of the teacher from that of dispensing knowledge to one of facilitating learning. It repositions him or her, physically, from the front and centre of the classroom to someplace in the middle or back of it, as it subtly yet significantly increases his or her involvement in the thought-processes of the students "(Lee May, 2013)".

In an IBL activity the students are: asking their own questions, formulating hypotheses, designing investigation, interpreting data, communicating in various ways, collaborating each other, asking new questions and reflecting on their knowledge, all with the support of their teacher. By collaborating in pairs and groups, students can share ideas and thoughts and so they can reach deeper understanding, social development and interpersonal skills.

The outcomes of such learning activities are: more motivated students, critical and higher order thinking, problem solving and deeper understanding of the world, good communication and collaborative skills, better retention of information, better, independent, adaptable and engaged students with research and analysis skills, more creativity and finally lifelong learners.

### **3.1 Big ideas of and about Science**

Learning experiences should reflect a view of scientific knowledge and scientific inquiry that is explicit and in line with current scientific and educational thinking. Science education should aim to develop the understanding of a set of 'big ideas' in science which include ideas of science and ideas about science and its role in society scientific capabilities concerned with gathering and using evidence scientific attitudes. They are:

Big ideas of science:

1. All material in the Universe is made of very small particles. Light in all different wavelengths permeates the Universe. (This idea is slightly changed from Harlen's original)
2. Objects can affect other objects at a distance.
3. Changing the movement of an object requires a net force to be acting on it.

4. The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen.

5. The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.

6. The solar system is a very small part of one of millions of galaxies in the Universe.

7. Organisms are organised on a cellular basis.

8. Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms.

9. Genetic information is passed down from one generation of organisms to another.

10. The diversity of organisms, living and extinct, is the result of evolution.

Ideas about Science:

11. Science assumes that for every effect there is one or more causes.

12. Scientific explanations, theories and models are those that best fit the facts known at a particular time.

13. The knowledge produced by science is used in some technologies to create products to serve human ends.

14. Applications of science often have ethical, social, economic and political implications. (“Harlen, 2010”).

### 3.2 Key outcomes of the ISE project

- access to online, interactive tools and digital resources from all over the world that can be used for science teaching
- templates, scenarios and methodologies to support science teachers and teacher trainers in their drive to make their teaching more exciting, fun and relevant for students
- a platform that can be used by students and teachers alike to take science teaching beyond the classroom and into the realms of extra-curricular learning
- a variety of eTools and digital resources that provide opportunities for students to collaborate with each other (in or out of the classroom) or with others outside of the class
- ways in which students themselves can be involved in scientific research activities
- a strong support network for teachers

## 4 Inspiring Science Education website

Through the Inspiring Science Education website (<http://www.inspiringscience.eu/>) and the activities organised by the partners, teachers can help students make their own scientific discoveries, witness and understand natural and scientific phenomena and access the latest, interactive tools and digital resources from within their classrooms.



Figure 1. ISE website



Figure 2. ISE website

The ISE portal is also hosting IBL activities developed by the 15 teams of partners by using some of the e-tools from the portal's repository. They can be found here: <http://portal.opendiscovery.space.eu/ise/demonstrators>, accessed 2015.

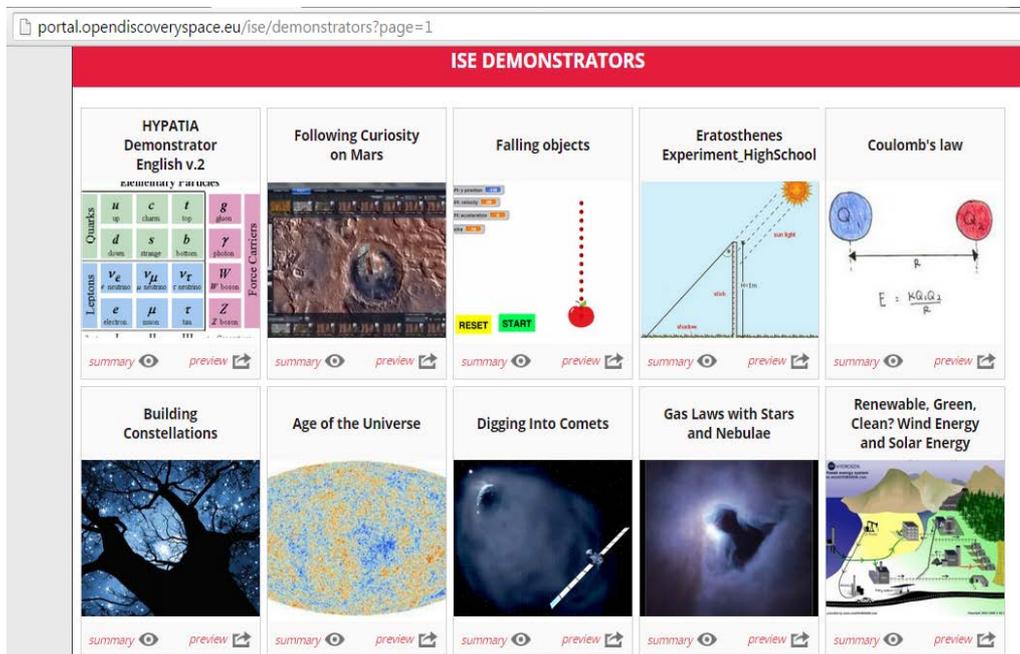


Figure 3. ISE Demonstrators on ISE portal

#### 4.1 Romanian Demonstrators

Based on some of the Big Ideas of and about Science and using the WorldWide Telescope (<http://www.worldwidetelescope.org/>, accessed 2015), the Romanian team developed 4 demonstrators for Astronomy, Science and Physics lessons. Their names are:

- Following Curiosity on Mars (<http://tools.inspiringscience.eu/delivery/view/index.html?id=d93824f5b89746c9bea155ba4b6fbd25&t=p>, accessed 2015)
- The Blue Planet (<http://tools.inspiringscience.eu/delivery/view/index.html?id=4ca6689c694143f6af473a71356c2abf&t=p>, accessed 2015)
- Is sky the limit? - A journey between stars (<http://tools.inspiringscience.eu/delivery/view/index.html?id=26cf0bfacc0647bfad1ffcecca235a6a&t=p>, accessed 2015)
- Finding a new house for humans in the outer space (<http://tools.inspiringscience.eu/delivery/view/index.html?id=b547e01954c4438a84f5026fe36803cd&t=p>, accessed 2015)

For example, in Following Curiosity on Mars, students will follow the rover Curiosity on its way to the red planet Mars by using the World Wide Telescope. The didactical approach is based on scientific inquiry in order to give students the enjoyment of finding out for themselves and initiates appreciation of the nature of scientific activity, of the power and the limitations of science. The final product of the teams of students will be the presentation of a slide show created during their journey on Mars.

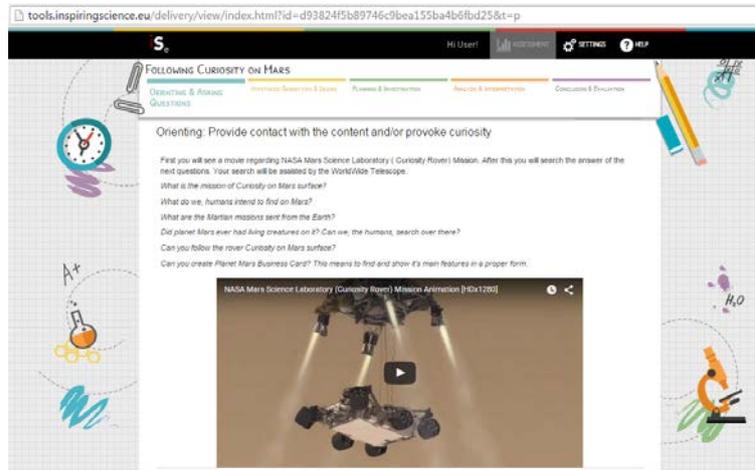


Figure 4. Following Curiosity on Mars by using WorldWide Telescope

## 5 Inspiring Science Education in Romania

The portal is hosting many communities of the science teachers. We created Romanian Science Teachers Community: <http://portal.opendiscoveryspace.eu/community/comunitatea-profesorilor-de-stiinte-723629>

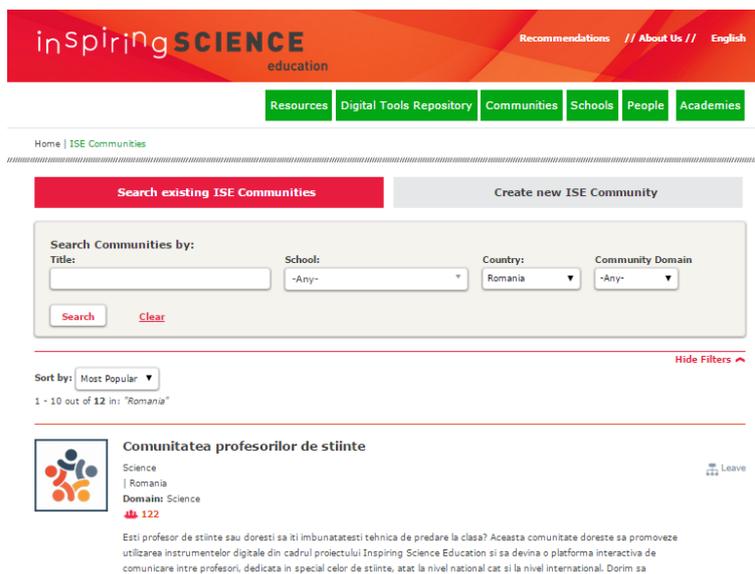


Figure 5. Romanian Science Teachers Community on ISE portal

In Romania the ISE project was promoted to over 6,000 teachers and will enroll 417 schools until March 2016. Now the percentage of enrolled Romanian schools is almost 80%. We promote all the events from the project via e-mail, press release, on the website community and on Facebook, where we created the “Inspiring Science Education Romania” page (“<https://www.facebook.com/pages/Inspiring-Science-Education-Romania/393269194159210>, accessed 2015”)



Figure 6. Facebook page of Inspiring Science Education Romania

In the 2014-2015 were organized: two visionary workshops for teachers, one student's workshop and two practice reflection workshops. In the same time we created a National Contest of Inspired Science Lessons for teachers in partnership with INTEL (<http://portal.opendiscovery.space.eu/activities/723629>, accessed 2015).

## 6 Further expected outcomes

The need to match school to digital mind (as it is demanded at the beginning of this century) has to redefine the characteristics and the expectations of the didactics.

All the stakeholders, students, parents, teachers and decision makers have to:

- a) To have easy access to abundant and full rich multimedia information and full rich multimedia interactive learning content
- b) To contribute to the production of e-content
- c) To personalize product/services
- d) To be connected (online)
- e) To receive rapid feed-back

Comparing these "new" characteristics with the ISE measurable results we are full confident that this kind of projects should continue.

## References

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