

inSpIring **SCIENCE** education

risorse e strumenti tecnologici per una
didattica innovativa

Smart EDUcation & TEChnology days
Città della Scienza, Napoli 10 Ottobre 2014

Valentina Berni
Università degli Studi Guglielmo Marconi



The Inspiring Science project has received funding from the European Union's ICT Policy Support Programme as part of the Competitiveness and Innovation Framework Programme. This publication reflects only the author's views and the European Union is not liable for any use that might be made of information contained therein.



CIP- ICT Programme: “ISE” si propone di contribuire:

- all’implementazione dell’Agenda digitale per l’Europa
- alla promozione dell’ eLearning per la modernizzazione dell’educazione e della formazione

DURATA: 36 MESI (Aprile 2013 – Marzo 2016)

Le attività pilota coinvolgeranno 5000 scuole primarie e secondarie in 15 Paesi.

LE SCUOLE	
Country	Total Number of Schools
The Netherlands	100
Greece	420
Croatia	313
Finland	313
France	417
Ireland	207
Romania	417
Belgium	103
Italy	417
Germany	521
Spain	521
Bulgaria	313
UK	521
Portugal	417

Il partenariato: Dimensione Europea

30 partner in 15 paesi in

Europa:

Ministeri

Università

Centri e Associazioni di Ricerca

Italia:

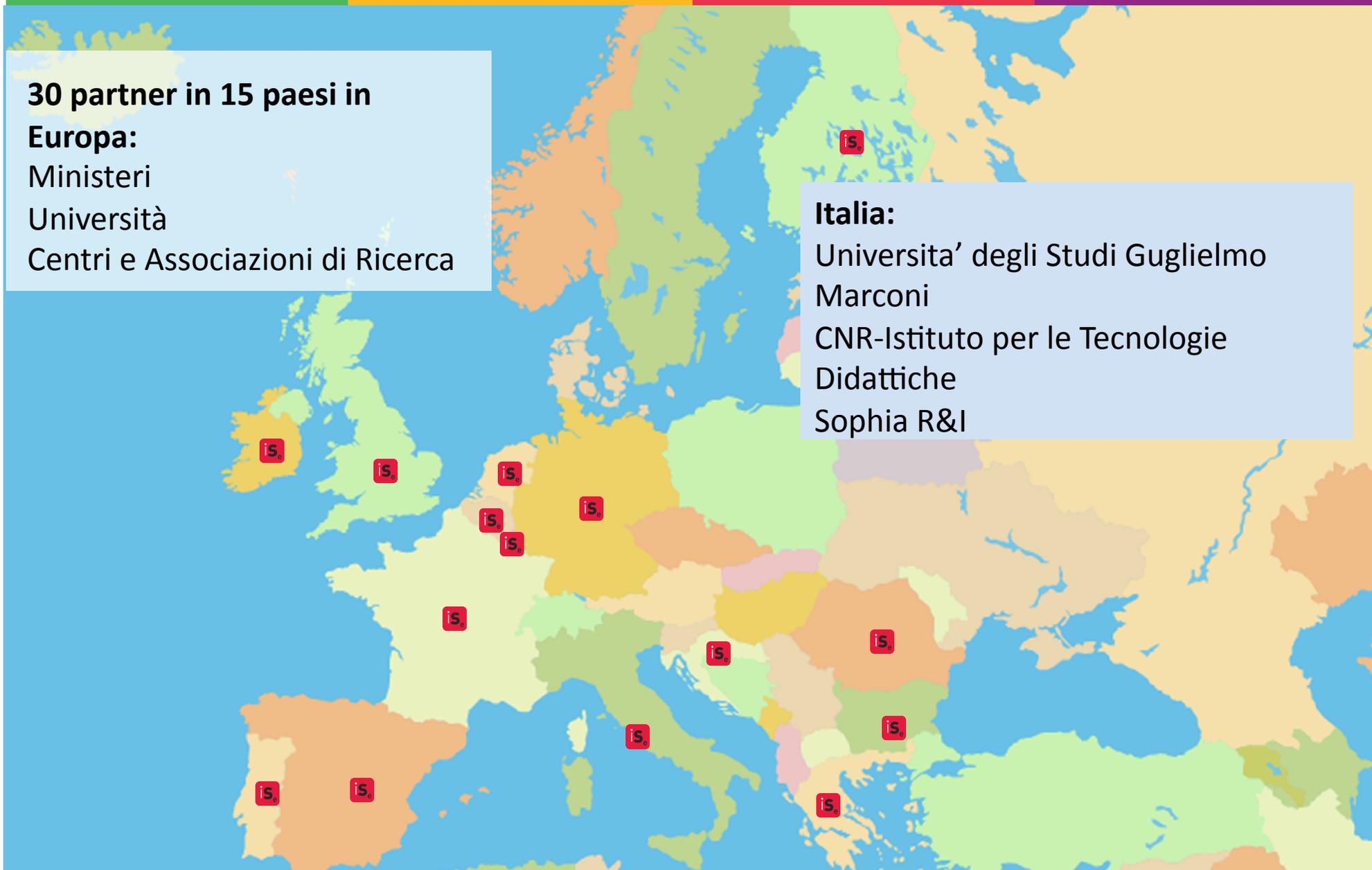
Universita' degli Studi Guglielmo

Marconi

CNR-Istituto per le Tecnologie

Didattiche

Sophia R&I





Risultati emersi Rapporto Rocard e Science Education in Europe:

- Tendenza al declino dell'interesse dei giovani verso le scienze e la matematica
- Mancanza di una educazione scientifica soddisfacente ed attrattiva, con conseguente calo nell'apprendimento
- Abbandono degli studi scientifici dopo la scuola obbligatoria



Necessità di una riforma nella educazione scientifica che abbia come obiettivo quello di attirare l'attenzione e l'interesse degli studenti



Passare dall' Approccio Deduttivo all' **Approccio induttivo** - più spazio all'osservazione e alla sperimentazione, l'insegnante guida gli studenti nella costruzione della propria conoscenza – IBSE



Lo studente è coinvolto in prima persona e chiamato a svolgere un ruolo attivo e dinamico durante la lezione in classe



Inquiry Based Science Education

6



- Permette lo sviluppo di competenze scientifiche di alto livello
- Aumenta l'interesse e conseguentemente il rendimento degli alunni
- Stimola la motivazione degli insegnanti

Utilizzo dell'IBSE in Inspiring

7

Raccolta di strumenti tecnologici e risorse digitali che vengono messe gratuitamente a disposizione degli insegnanti

Formazione docenti sulla adozione dell'IBSE e la costruzione degli scenari

Introduzione graduale degli strumenti nelle lezioni in classe



Gli Strumenti

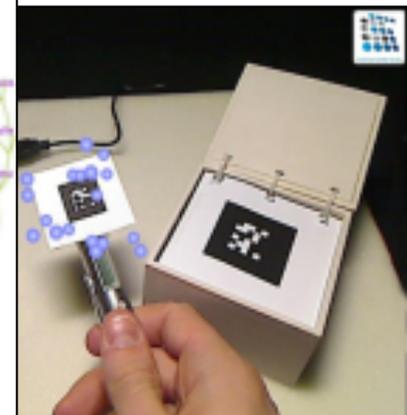
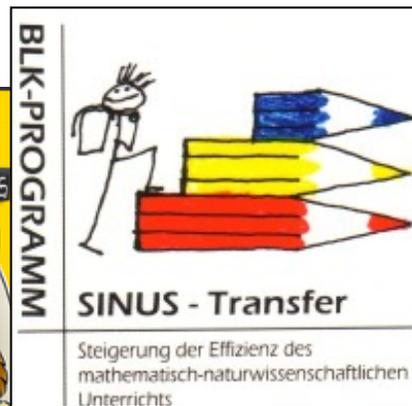
Laboratori Remoti e Virtuali

Repository e Portali

Giochi Educativi

Applicazioni Tecnologiche e Simulazioni

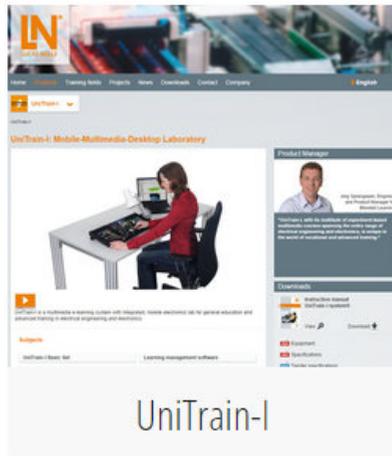
Softwares per testare modelli e fare test per future applicazioni



www.inspiring-science-education.net/showcases



Showcases



UniTrain-I



CERNland



Vernier Video Physics



Open Science Resources



CERNland



CERNland

CERNland is a virtual theme park featuring games, multimedia applications and films. It is designed for 7-12 year olds to show what is done at CERN and inspire an interest in physics.

[Learn more about CERNland](#)

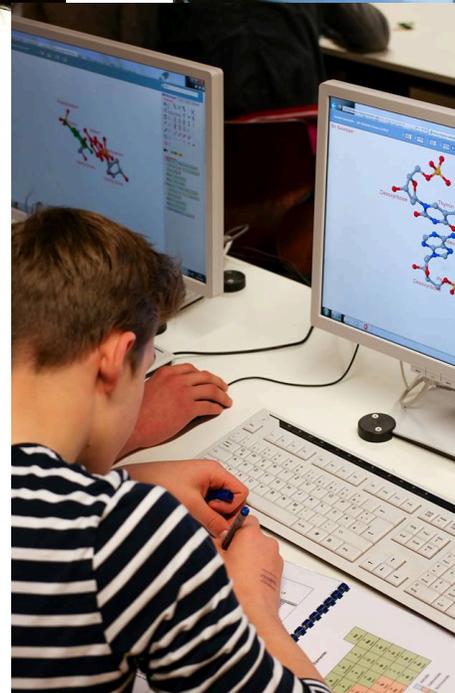
Take a look at the Learning Scenario

Demonstrators for ideas to use in the classroom

[1_51_Why all this fuss with the Large Hadron Collider.pdf](#)

Attention Teachers - if you plan to use either Demonstrator please give us your feedback afterwards! Save this [link](#) to complete the short evaluation form. Thank You.

Sperimentazione in corso e valutazione



2015 anno internazionale della luce e delle tecnologie basate sulla luce

- Creare un progetto che coinvolga almeno 2 insegnanti da 2 o più paesi diversi
- Utilizzare alcune delle risorse/strumenti disponibili nel portale ISE
- Adottare l'IPBS



Project Worksheet

[EXAMPLE]
Measuring luminosity to detect exoplanets

Teachers' names:
First-Name FAMILY-NAME (School, Country), ...

The project (max. 1000 words)

In order to provide our pupils with an idea of the size of the Universe and the reasons to explore it, we decided to do some research regarding extra solar planets. Extra solar planets or exoplanets are all the planets that do not belong in our solar system. In 2012, 1700 planets in 114 planetary systems including 461 multiple planetary systems were discovered [Ref 1].

Planets are extremely fast objects compared to the stars they orbit around (parent star). Because of this, they can only be observed under specific circumstances which have led to the development of specific observational methods. In the transit method, when a planet crosses the disk of the parent star, the star's observed brightness drops slightly. The amount by which the star dims depends on its size and on the size of the planet, among other factors. The bigger the planet compared to the star the bigger the dim. For example, for a planet that orbits around the HD209458 star the percentage is 1.7% [Ref 2].

With these premises at hand we can evaluate the possibility of the existence of liquid water on the planet surface and thus the possibility of harbouring life.

Simulation of the luminosity drop

In order to produce a simulation using the transit method School A first created the simulation of a planet's transit in front of the parent star using PowerPoint with 0 choices for the size of the planet. As the simulation begins, the planet starts moving from left to right, its motion, entrance and exit point have been set by School A.

Fig 1 - Two screenshots from our ppt simulation.

Fig 2 - Left: Screenshot from the Scratch programme we wrote in order to record the luminosity of the parent star. **Right:** The set up in School B.

School B used 2 laptops to perform our experiment: one by running the simulation and a second to capture data using the scratchboard. As demonstrated in Figure 2, the scratchboard was placed in front of the screen at 15cm distance. This distance was selected after numerous tests so that we could ensure that variations in luminosity were not dependent on the screen distance and the radius of the exoplanet.

The procedure was followed during our experiment as follows:

- School B chose the planet's radius and played the PowerPoint simulation.
- During the few seconds that the simulation was running, we recorded the data given by the light sensor of the Scratchboard using our Scratch simulation.
- The simulation data was stored in a .txt file that was sent to the students in School A. We processed it using Excel in order to produce our light curves. The light curves for different planet radii (see Fig 3).

Fig 3 - Light curves (left: A, middle: C, right: F).

According to the observation and Figure 4, it seems that the luminosity is linked to the ratio of the radius of the planet and the star.

Fig 4 - Luminosity drop in function of the ratio of the radius of the star and the planet.

With additional data, scientists could use this curve to get the radius of the planet without calculus.

aprile 2015 – selezione dei finalisti
giugno 2015 – cerimonia di premiazione al **Science on Stage Festival di Londra**

Le Comunità di Inspiring

13

- Organizzazione webinar e workshop
- Forum di discussione interno delle comunità ISE
- Condivisione materiale didattico
- Video conferenze
- Supporto nella sperimentazione e valutazione

The screenshot displays the website interface for the Inspiring Science Education community. At the top, the logo 'inspiring SCIENCE education' is visible, along with navigation links for 'About Us // English'. A search bar is present with the placeholder text 'Search for ISE educational resources...'. Below the search bar, there are four green buttons: 'ISE e-learning tool', 'Communities', 'Users', and 'Academies'. The main content area features a header for the community: 'Home | Inspiring Science Education sperimentazione scuole italiane'. Below this, there is a profile card for the community, which includes a logo of three stylized figures in blue, orange, and red. The text on the card reads 'Inspiring Science Education sperimentazione scuole italiane' and includes a 'Share this' link. A notification bubble shows '28' members. Below the card, a welcome message states: 'Benvenuti nella comunità italiana di scuole del progetto Inspiring Science Education. In questo spazio a voi dedicato potrete trovare le ultime notizie sulle attività in corso in Italia, interagire con altri docenti coinvolti nella sperimentazione e scambiare esperienze, opinioni e buone pratiche.' At the bottom of the page, there is a section titled 'Share your resources here' with three icons: a book with a red bookmark, a green plug, and a black book with a red bookmark. The footer contains the 'inspiring SCIENCE education' logo.

ERASMUS+ BANDO 2015

KA1 Mobilita' docenti
Per partecipare ai corsi ISE organizzati
nei paesi partner

Ulteriori informazioni

15

Website

www.inspiringscience.eu

Social media

www.twitter.com/InspiringScienc

www.linkedin.com/groups/Inspiring-Science-Education

www.facebook.com/InspiringScienceEducation

www.youtube.com/channel/InspiringScienceEducation

Contatti

Valentina Berni: v.berni@unimarconi.it