Digital Technologies for Opening Up Education

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… the speaker …

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- **Past Chair**, IEEE Computer Society Technical Committee on Learning Technology (2008-2012)
- **Senior and Golden Core Member**, IEEE Computer Society
- **IEEE Computer Society Distinguished Service Award**, July 2012
- Co-author of **325 publications** with at list **1430 citations** (**h-index:21**)
- Received **7 times Best Paper Awards** in International Conferences on Learning Technologies
- **Guest Editor** of **26 Special Issues** in International Journals
- **Member of Editorial Board**, **22** International Journals in Learning Technologies
- **Keynote/Invited Speaker** on **56** International and/or National Conferences in Learning Technologies
- **General** and/or **Program Committee Chair** in **35** International Conferences in Learning Technologies
- **Program Committee Member** in **356** International and/or National Conferences in Learning Technologies
- Project Director, Principle Investigator and/or Consultant in **65 research projects** with external funding **14M Euro** (1991-2016)

overview

- **Digital Technologies for Learning and Education**
  - When ? Why ? How ? Which ?
- **Key Technology-supported Educational Innovations**
  - Opening Up Education to facilitate Personalized Learning
  - Connecting Learning inside/outside Physical Classrooms through the Digital Cloud
- **Examples of European and Global Initiatives towards Large-Scale Implementation of Technology-supported Educational Innovations**
  - Europe: ODS – ISE
  - The World: China – ALECSO - India
- **Current Technical, Pedagogical and Organizational Challenges**
  - Smart Integration of Physical Learning Spaces and the Digital Cloud

Digital Technologies for Learning and Education

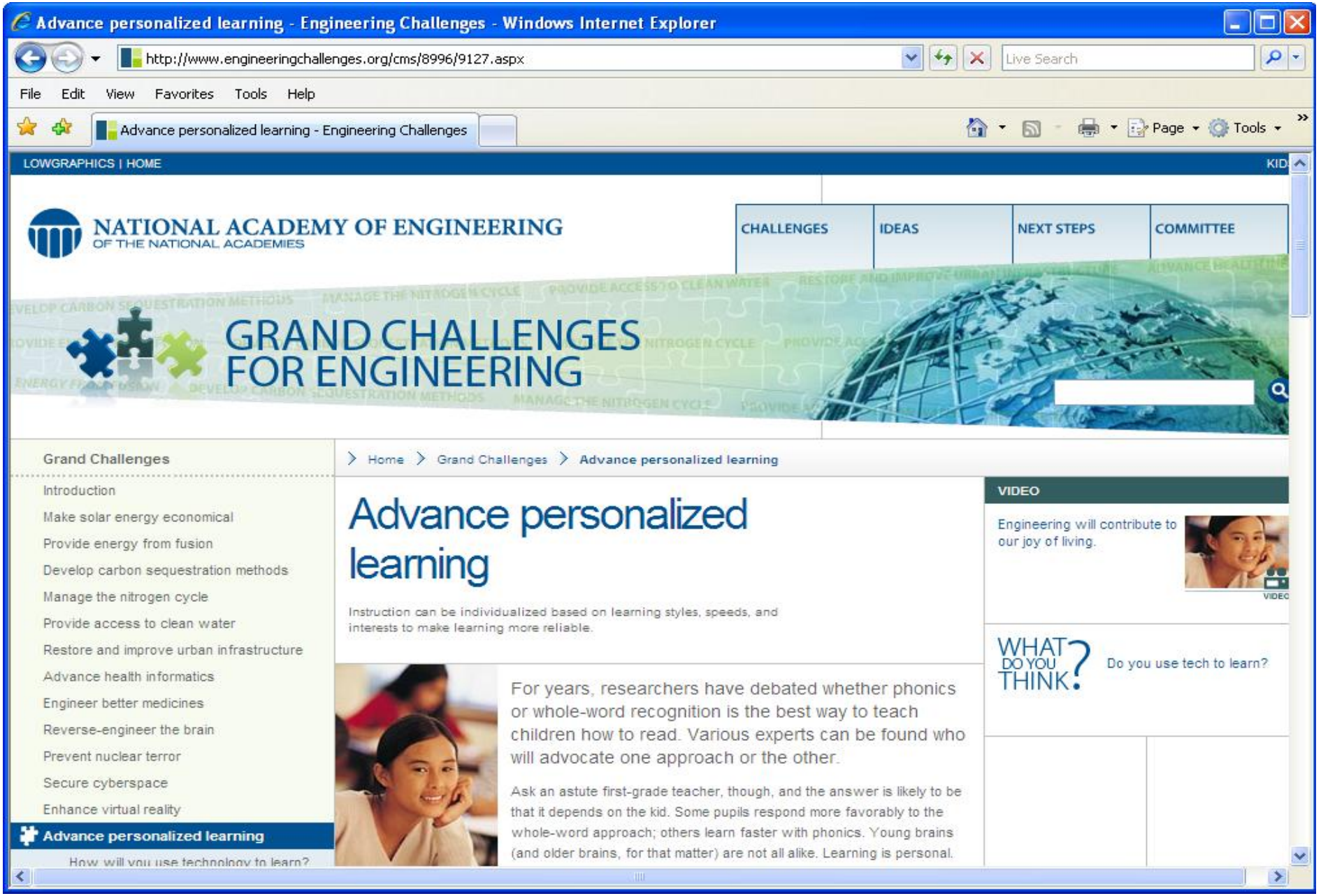
When ? Why ? How ?Which ?

Digital Technologies for Learning and Education

when ?

Digital Technologies:

- technology as an enabler for ***transformations***
- use to provide ***learning experiences*** that would not possible without the digital technologies



http://www.engineeringchallenges.org/cms/8996/9127.aspx

«personalized learning»

teaching – scaffolding - feedback

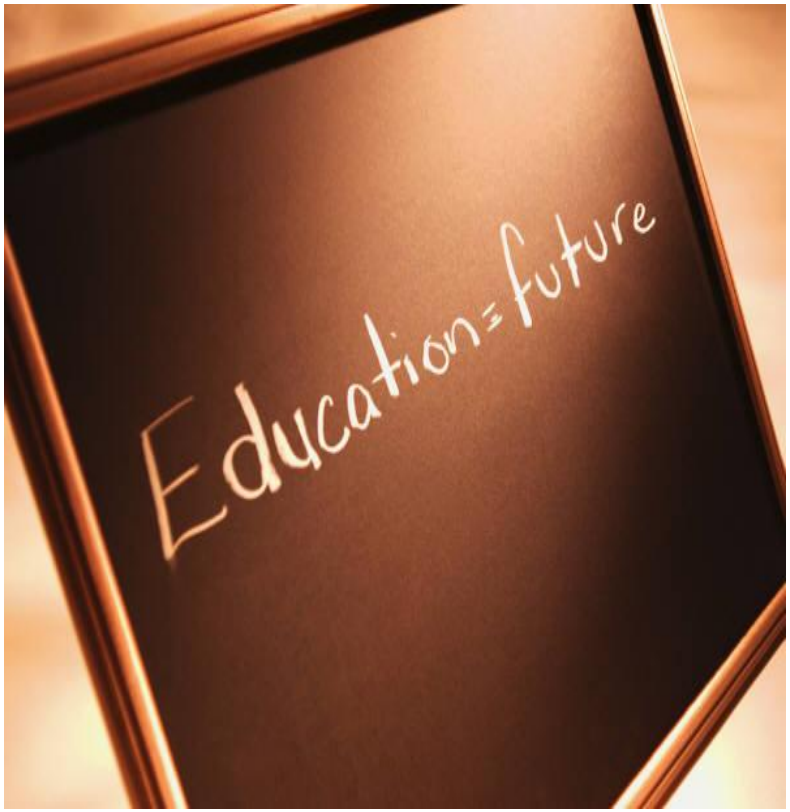
(«*learning experiences*»)

adopted to

individual students

Digital Technologies for Learning and Education

why ?



Digital Technologies as an enabler for

incremental or *disruptive* ***transformations***

to the way that individuals, groups and organizations

"***learn***" and the way to "***assess"*** learning in 21st Century

Objectives: From acquiring new "*knowledge*" to develop new and relevant "*competences*"

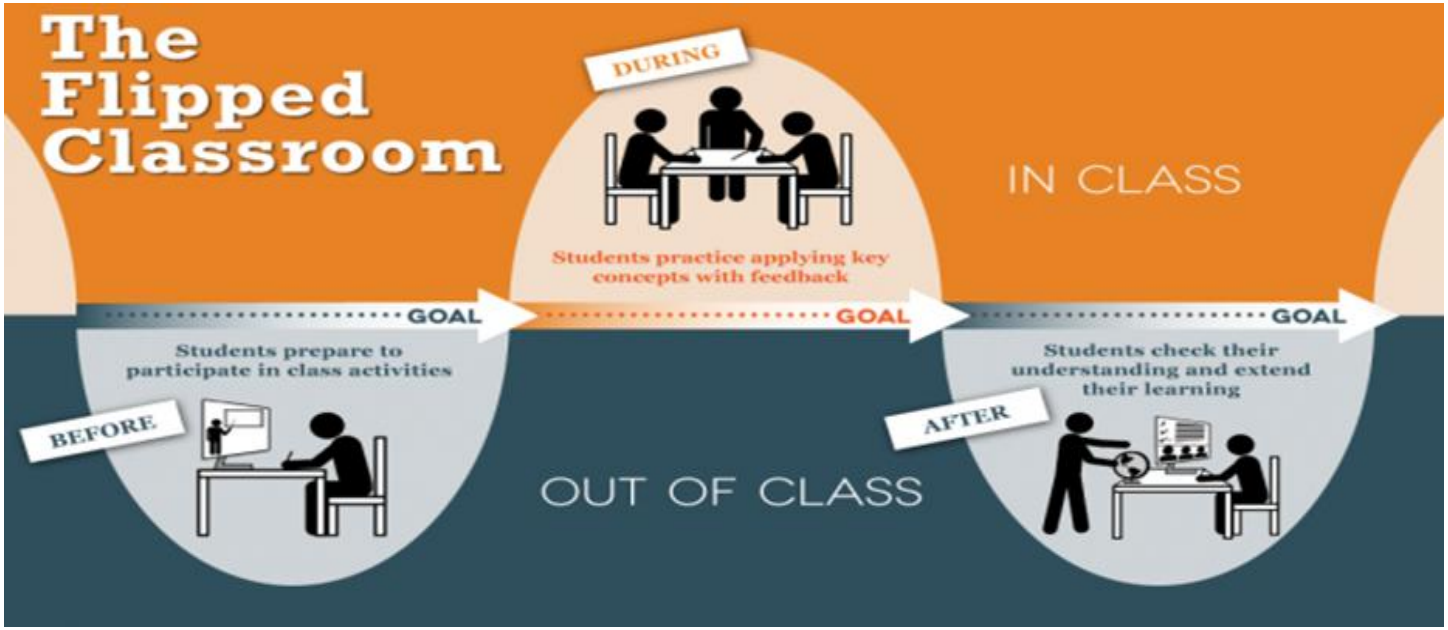
Methods: From "*classroom*" based teaching to "*context-aware*" personalized learning

Assessment: From "*life-long*" degrees and certifications to "*on-demand*" and "*in-context*" accreditation of qualifications

Digital Technologies for Learning and Education

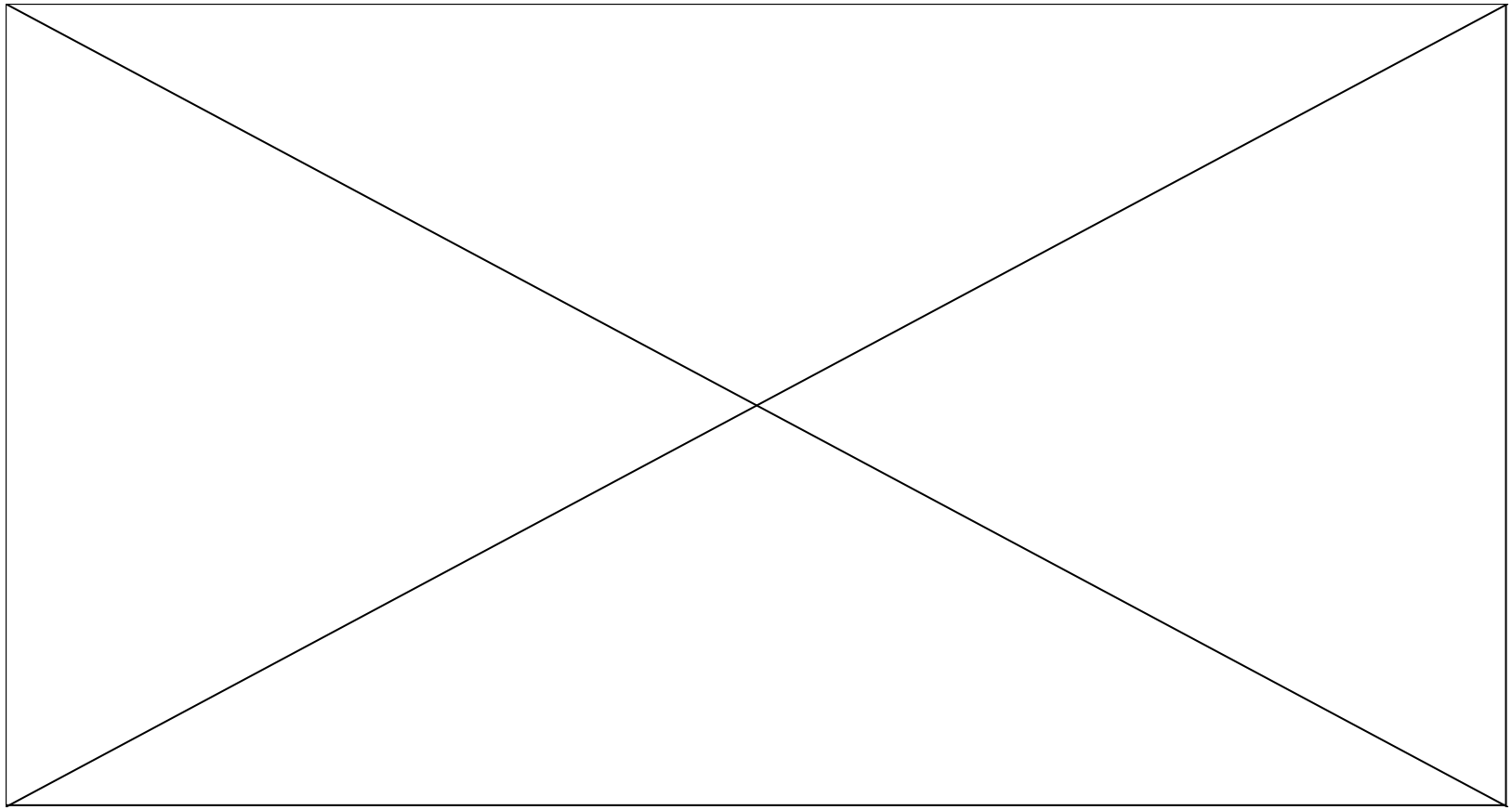
how ?

The Flipped Classroom



The Flipped Classroom

http://www.youtube.com/watch?v=ojiebVw8O0g



Digital Technologies for Learning and Education

which ?

- **open access** to
  - digital resources/practices
  - digital tools
  - digital courses/classrooms
- via **multiple devices**
  - smart phones – tablets - laptops
  - game engines
- supported by
  - **cloud** technologies and **cloud** infrastructure

Opening Up Education

Open Educational Resources (OERs)

OPEN EDUCATIONAL RESOURCES

OER or LOs Repositories

- web-based systems that
  - organize, classify, store and share OERs (or Learning Objects – LOs) and their associated metadata
- national – thematic
- include limited explicit information about the **learning and educational context of use** of their hosted OER

OER Repositories

Examples

OER Commons, USA

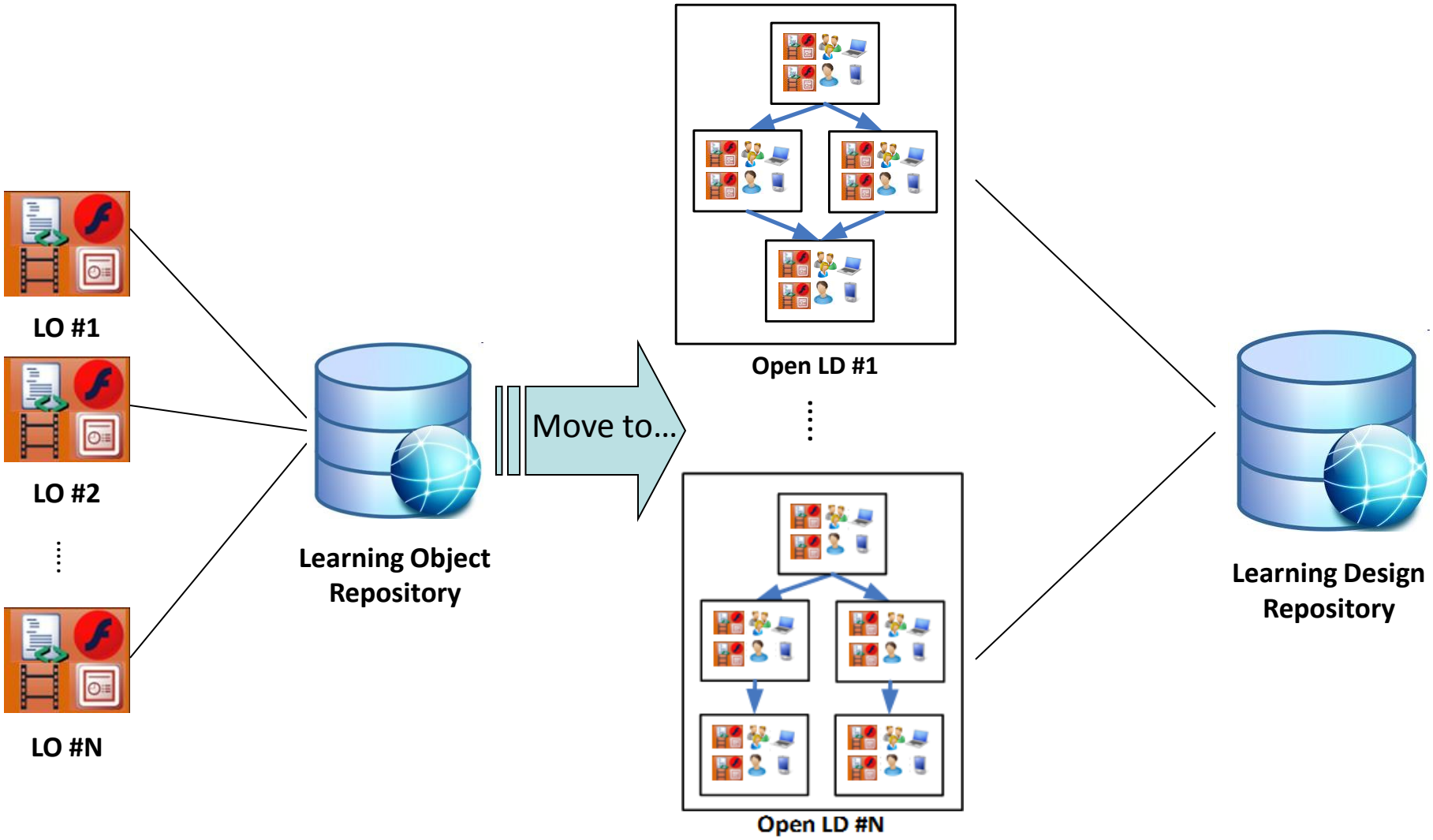
MERLOT, USA

Learning Resource Exchange, EU

Le@rning Federation, Australia

Jorum, UK

From OERs to Open Educational Practices (OEPs) and OEP Repositories



OEP Repositories

The Canadian LD Repository, Canada

LAMS Repository, Australia

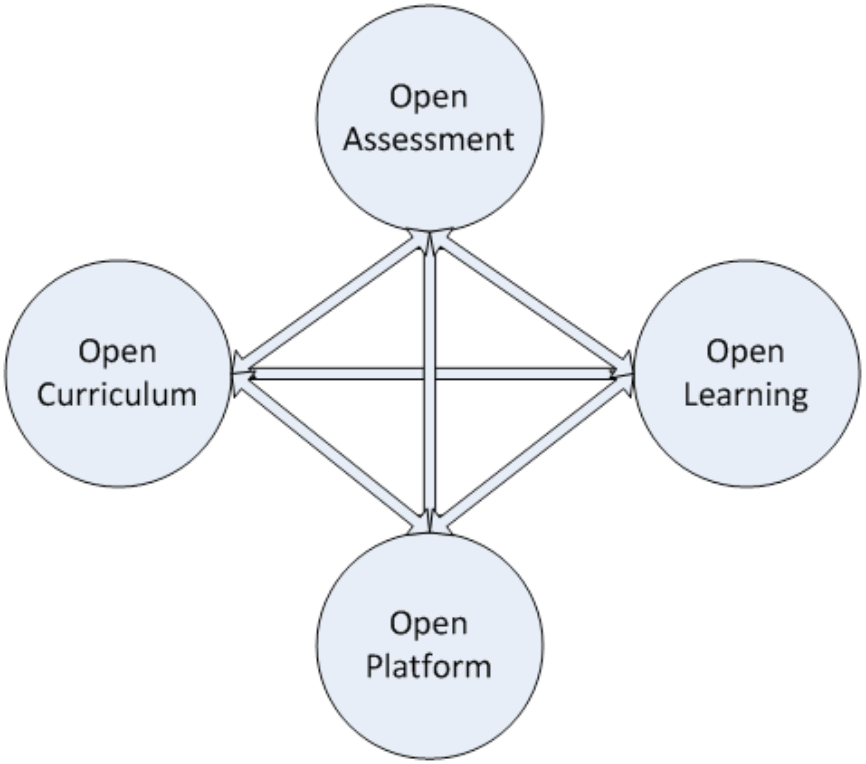
iCOPER LD Repository, EU

OSR LD Repository

COSMOS LD Repository, EU

Opening Up Education - Aspects of Openness

- **Open Curriculum:** learners can mix educational resources, learning activities, and/or educational courses for different disciplines to meet their needs. This places learners in charge of their own learning and ensures that they will learn what they need to meet their personal desires and requirements.
- **Open Learning:** teachers, experts and/or peers can share new ideas and new understanding during the learning process. This provides learners with opportunities for self-determined and independent learning.
- **Open Assessment:** instead of formal evaluation of learning results, previously led by accredited education providers, assessment of what learners have learned can be carried out by their teachers, others and peers during the learning process via peer to peer or crowd-sourced assessment with on-demand accreditation for learners.
- **Open Platform:** cloud–based provision and the use of open standards make it easier for different platforms and services to exchange information and data



European Commission (2011). Public consultation on opening up education - a proposal for a European initiative. Directorate-General for Education for Culture. Retrieved December 12, 2013, from http://ec.europa.eu/dgs/education_culture/documents/consult/open_en.pdf

From the

Physical School Classroom

to the

Digital Cloud

Connecting Learning inside/outside Physical Classrooms through the Digital Cloud

- **connect**

Within Classroom-based activities	Outside Classroom-based activities	
	Within School	Outside School
via Cloud Digital Technologies		

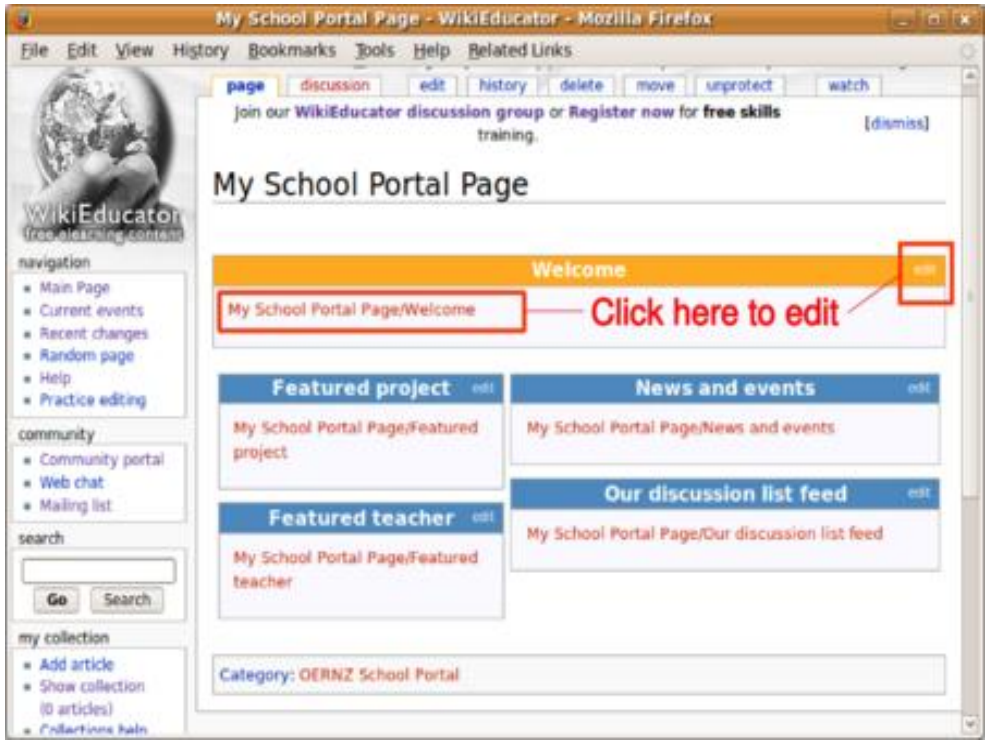
- **sharing**

People		
Resources	Practices	Tools/Services
Interaction Data		

On School Premises

School Portal/CMS

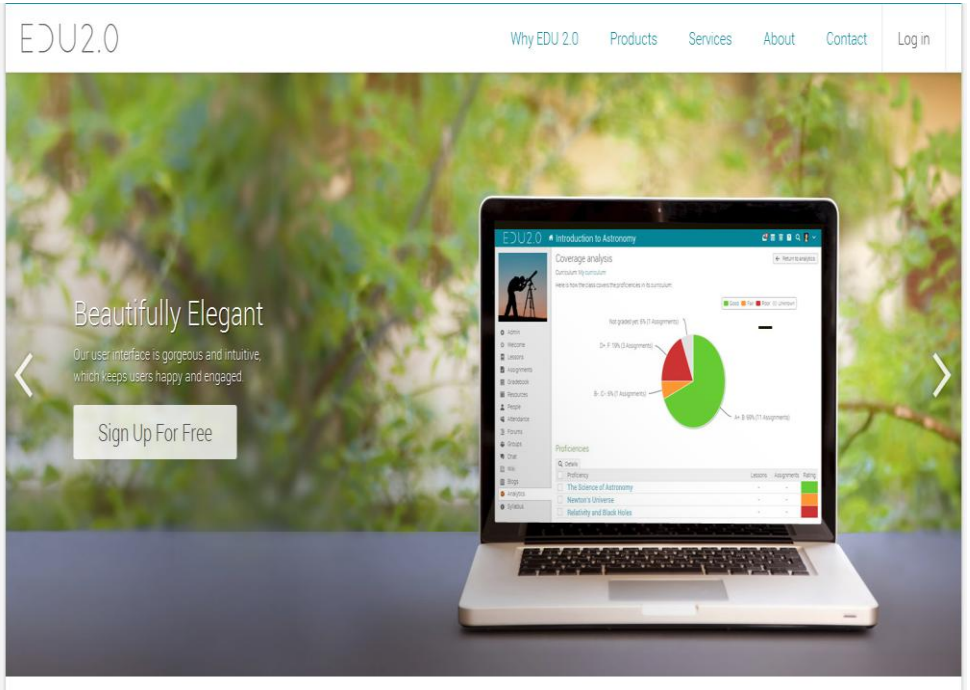
- Schools use their own technology infrastructure for hosting their portals/CMSs
- Schools portals/CMSs based on open source solutions or custom-based solutions (possibly with an extra cost)



On Digital Cloud

School Portal/CMS as SaaS

- Cloud infrastructures, which offer (a) hosting power, (b) computing power
- Each school can easily create its own portal/CMS – Software as a Service (Saas)
- No need for (a) programming skills and (b) cost for technology infrastructure procurement and maintenance



On School Premises

Teachers' Communities

- They are not easily organized
- Best practices can not be easily communicated among their members
- Collective knowledge not easily stored and maintained
- Local coverage
- Limited opportunities for professional development

On Digital Cloud

Web-Based Teachers' Communities

- Online collaboration tools such as Forums, Chats, Wikis, Virtual Worlds for retaining and advancing communities' knowledge
- Share and reuse eductional practices (Open LDs) and educational resources (OERs)
- Beyond local restrictions, wider participation
- More opportunities for professional development

On School Premises

Physical Laboratories

- Space and time constraints
- Limited type of experiments
- Accessibility issues
- High equipment procurement and maintenance costs
- Safety issues

On Digital Cloud

Online Laboratories (Virtual, Remote)

- Availability beyond time and space constraints
- Access to state-of-art experiments (high energy physics, remote telescopes)
- Provisions for people with physical disabilities
- No cost for equipment
- Simulate abnormal situations of experiments (virtual labs)
- Repeat experiments without constraints

iLABS
Remote Lab Access

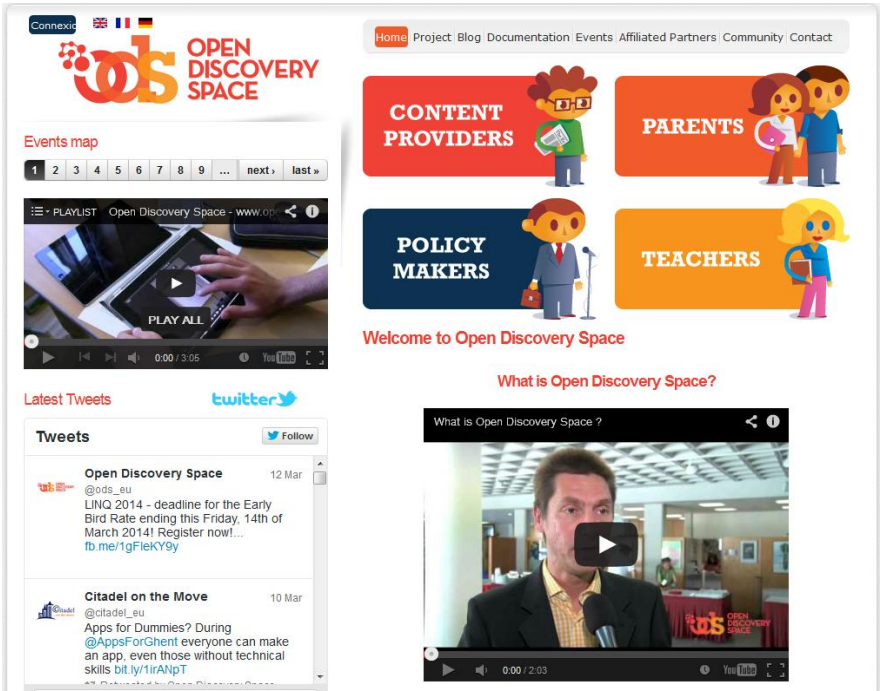
Large-Scale Implementation of Technology-supported Educational Innovations: Initiatives in-progress

In Europe

Open Discovery Space (ODS) Project

http://www.opendiscoveryspace.eu/

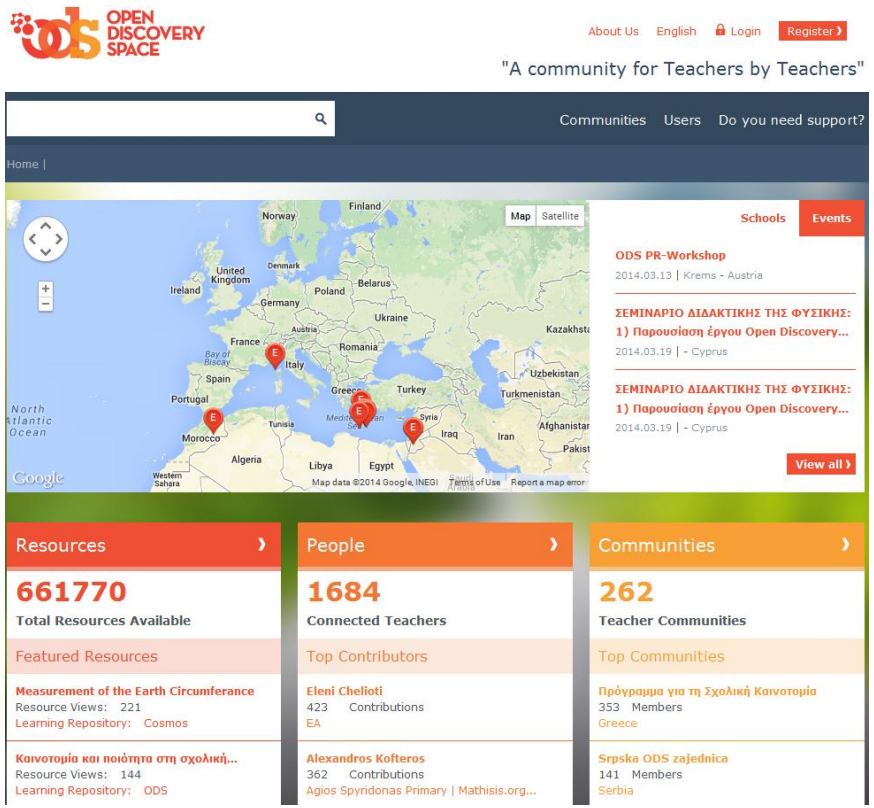
- **Open Discovery Space** - *A socially-powered and multilingual open learning infrastructure to boost the adoption of e-Learning Resources*
- to support mainstreaming by orchestrating open access to more than **1,5M OERs/OEPs** from **75** active existing LORs/LDRs in Europe
- ***15,3M€*** *(public and private)* investment
- Started April 2012



ODS Portal

http://portal.opendiscoveryspace.eu/

- Search/Share OERs/OEPs on the Cloud with a wide network of teachers and practitioners
- Create/participate to Teachers' Communities (national, thematic) – Access to a number of online collaboration tools
- Develop my own School Portal on the Cloud and share my school resources (OERs/OEPs)



ODS Portal

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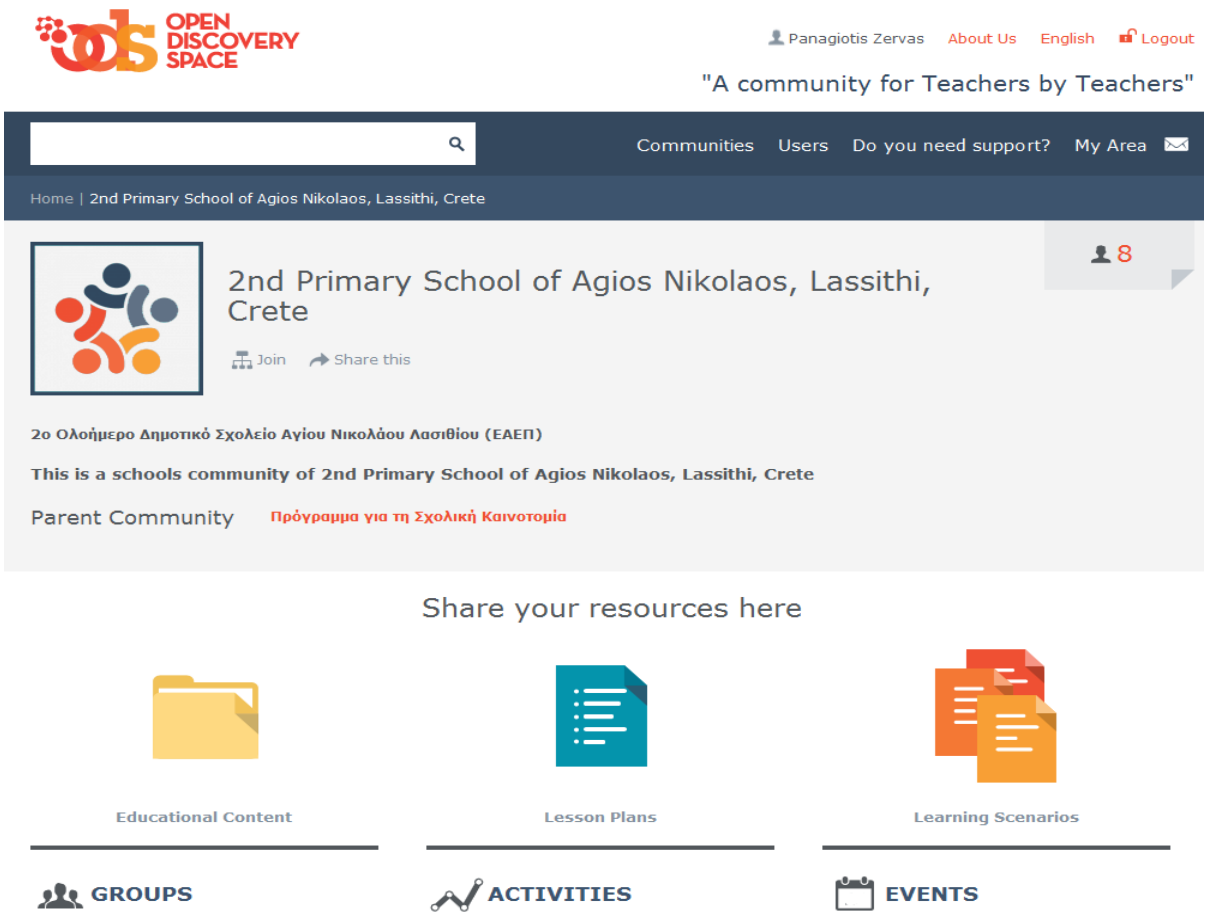
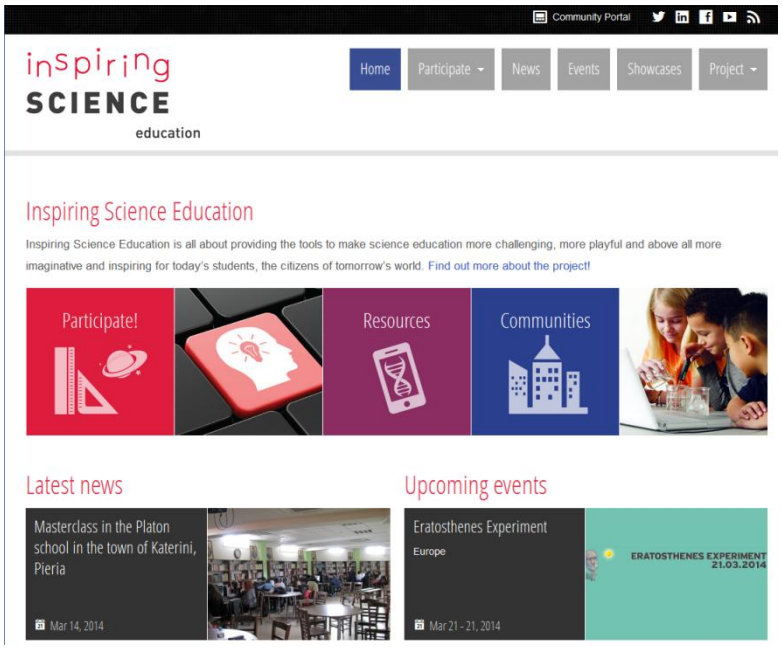


Develop my own School Portal on the Cloud and share my school resources (OERs and Open LDs)

Inspiring Science Education (ISE) Project

http://inspiring-science-education.org/

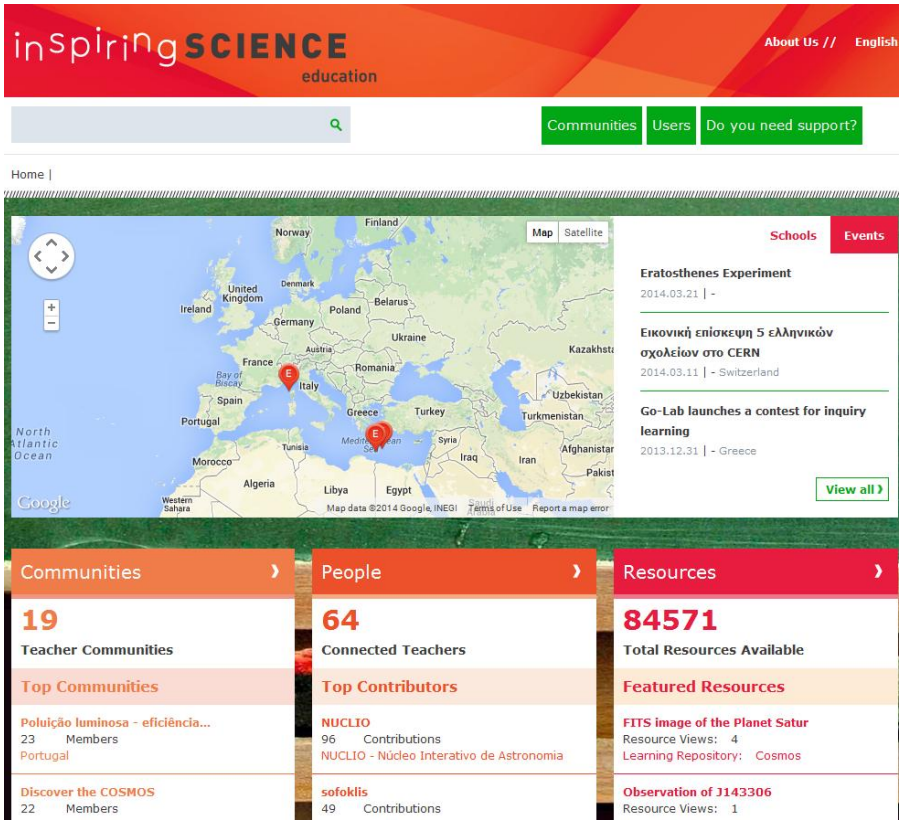
- **Inspiring Science** - *Large Scale Experimentation Scenarios to Mainstream eLearning in Science, Mathematics and Technology in Primary and Secondary Schools*
- large-scale pilots to stimulate innovative use of cloud-based tools and resources for STEM
- Target users: **5,000 primary and secondary schools** in 15 European Counties.
- ***9,8M€*** *(public and private)* investment
- Statrted April 2013



ISE Portal

http://portal.opendiscoveryspace.eu/beta/ise

- ***Design*** Lessons/Scenarios by using existing resources and tools (such as online labs, AR/VR tools) and store them on the cloud
- ***Deliver*** Lessons/Scenarios to students.
- Collect ***Educational Data*** for student assessment



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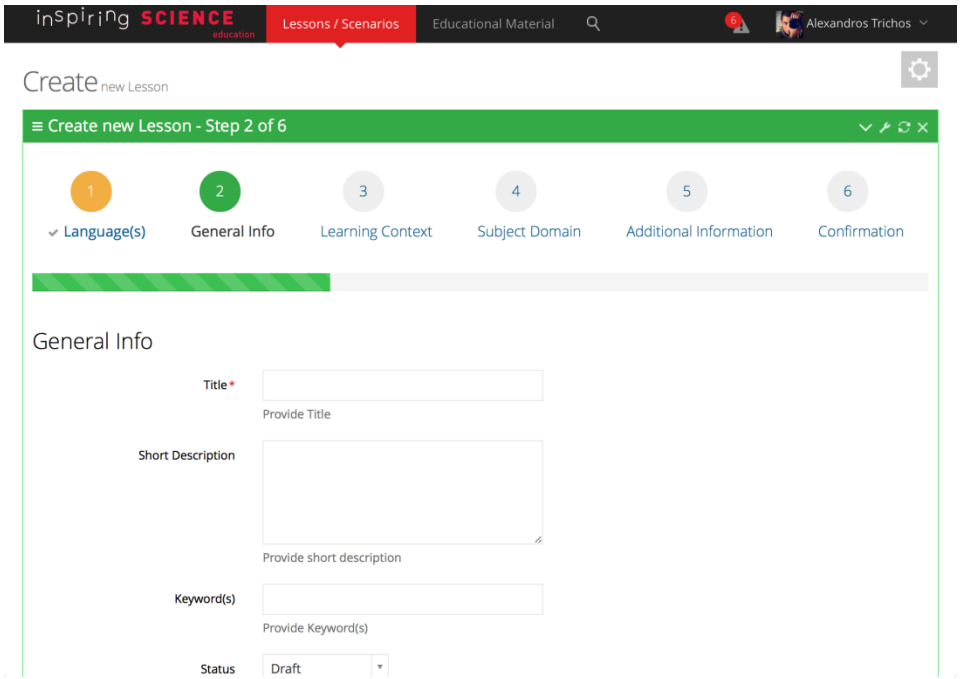

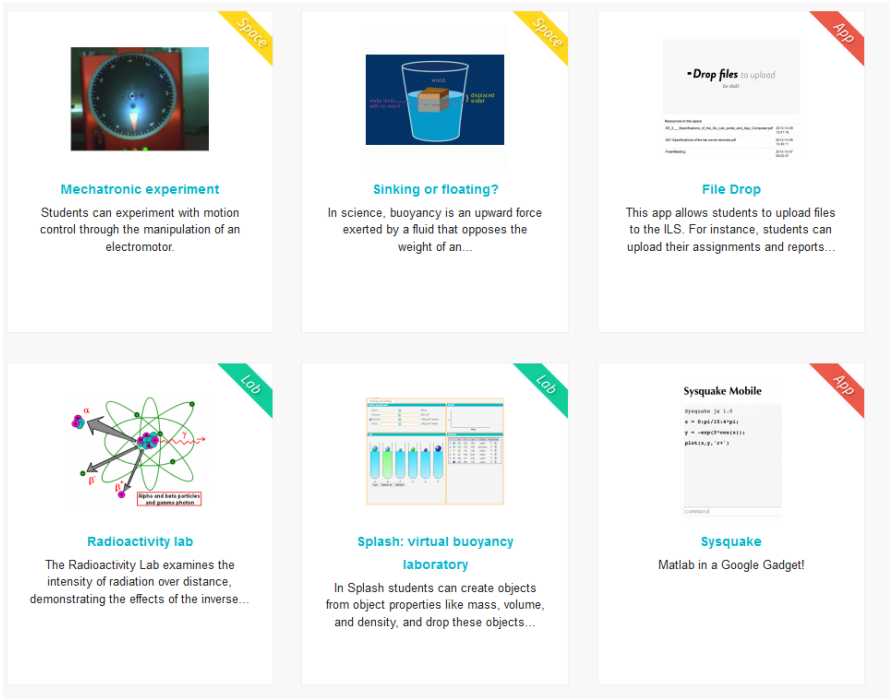

Design Lessons/Scenarios by using existing resources and tools on the cloud (such as online labs, AR/VR tools)

ISE Portal

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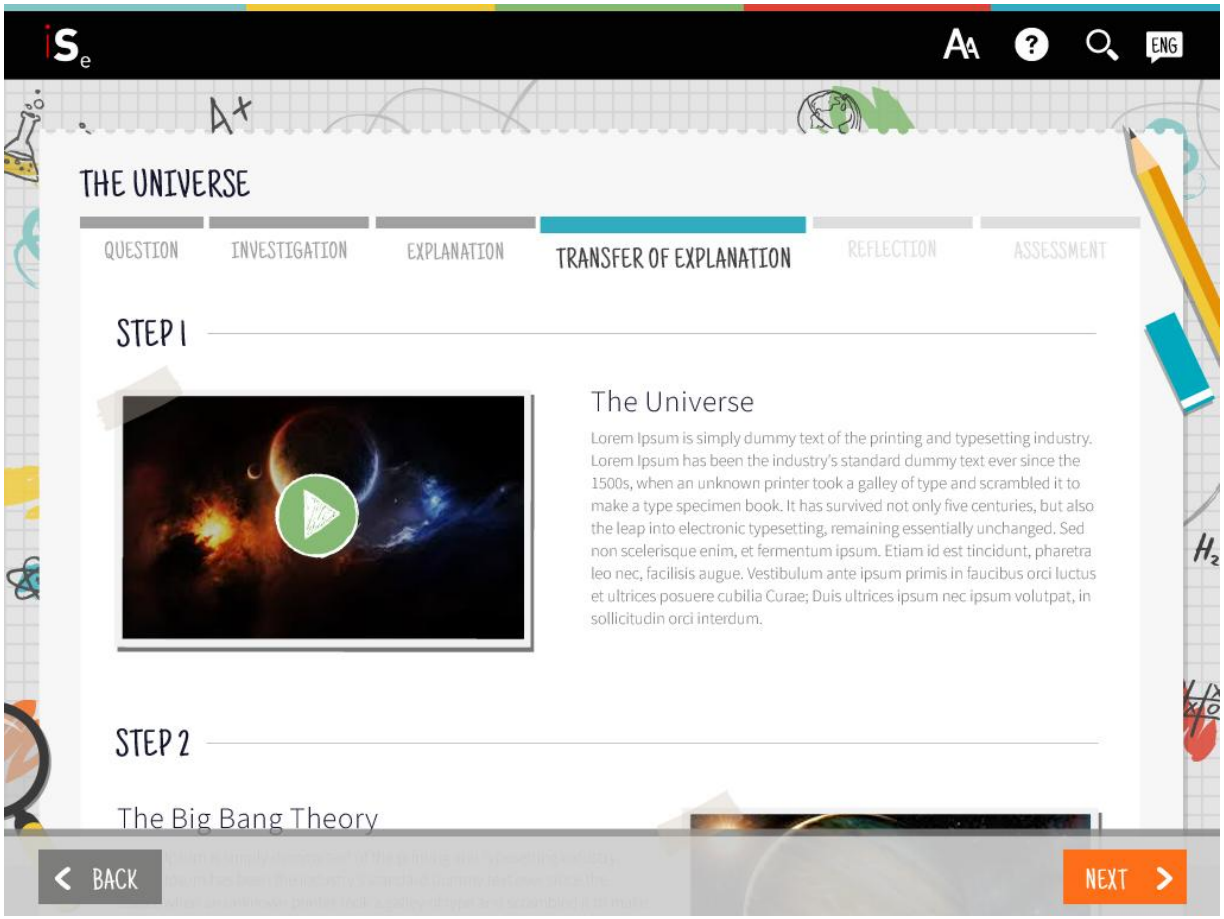


Deliver lessons/scenarios to your students and monitor their progress

Elsewhere in the World

INDIA

- Built a **School in the Cloud** Initiative (based on Self-Organised Learning Environment, SOLE), Prof Sugata Mitra

CHINA

- Ministry of Education National Program on Application of e-Learning in the Social Computing Environment: e-Textbook and e-Schoolbag Initiatives

ARAB League Educational, Cultural and Scientific Organization (ALECSO)

- Cloud Computing Services in Education and Arab Open Educational Resources

Technical – Pedagogical – Organizational Challenges

Different Levels of Technology-Supported Educational Innovations

- **Level 1:** simple technological shift from local hosting to the cloud – practical added-value but not transformative [Infrastructure]
- **Level 2:** enhance classroom based activities with access to a wider set of resources/tools – incremental school based innovation [Resources – Teachers Competences]
- **Level 3:** orchestrate personalized learning experiences inside but mainly outside the school classroom – transformative innovation [Educational Policies and Organizational Changes]

Smart integration of *Physical Learning Spaces* and the *Digital Cloud*

- **connect**

Within Classroom-based activities	Outside Classroom-based activities	
	Within School	Outside School
via Cloud Technologies		

- **sharing**

People		
Resources	Practices	Tools/Services
Interaction Data		

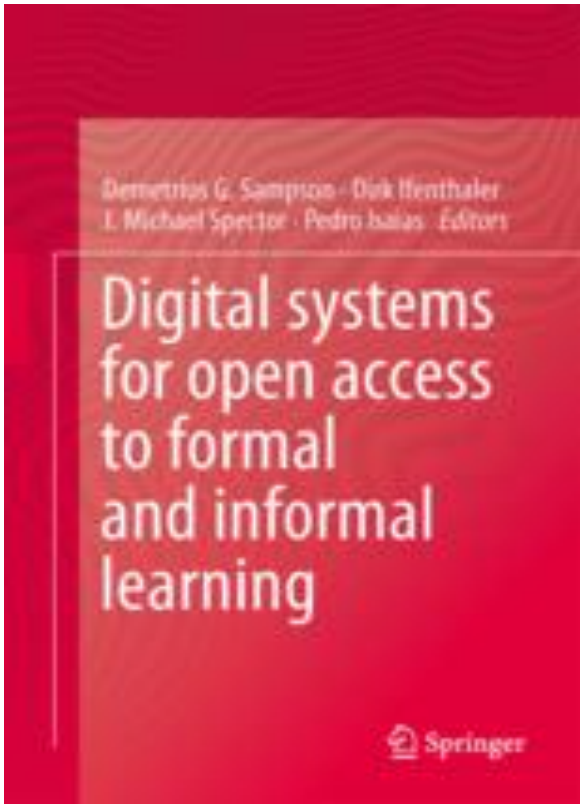
Smart integration of *Physical Learning Spaces* and the *Digital Cloud*

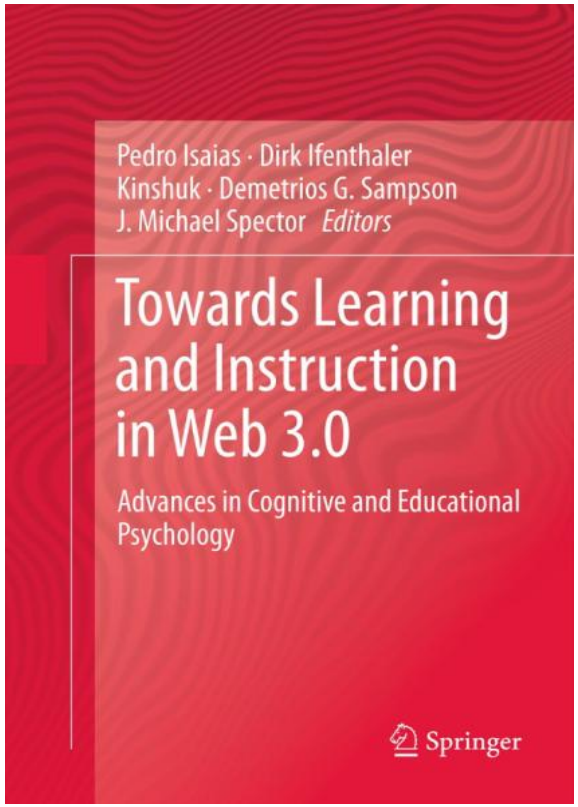
Methods and Tools

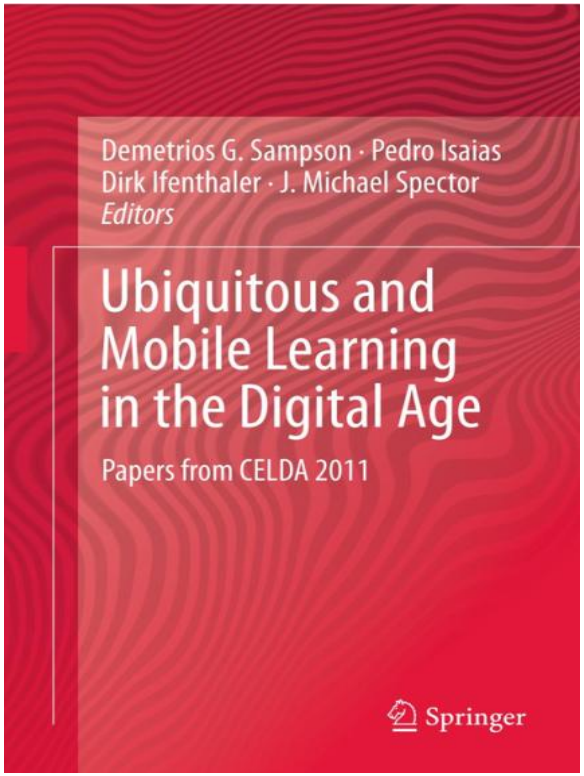
- **Orchestrate** Educational **Activities** (teaching – collaboration - scaffolding - feedback – assessment)
- **Collect** and **Analyze** Educationally Meaningful **Data** from all these activities
- In a **Smart Learning Environments** which integrate ***Physical Learning Spaces*** and the ***Digital Cloud***

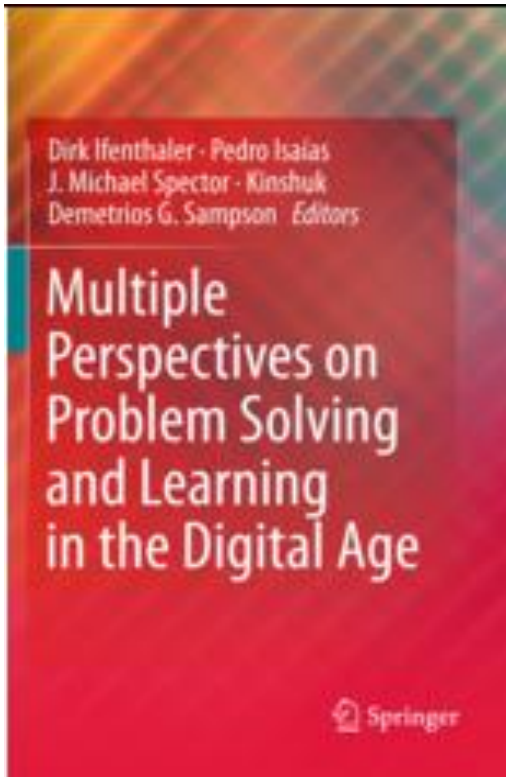
ICALT2014: The 14th IEEE International Conference on Advanced Learning Technologies - *Advanced Technologies for Supporting Open Access to Formal and Informal Learning*
7-10 July 2014 Athens, Greece

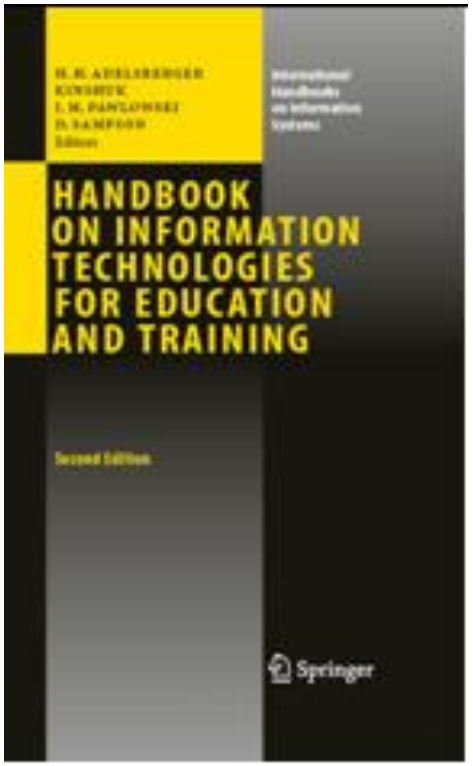
225 papers – 300 participants – 40 countries
http://www.ask4research.info/icalt/2014/











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