



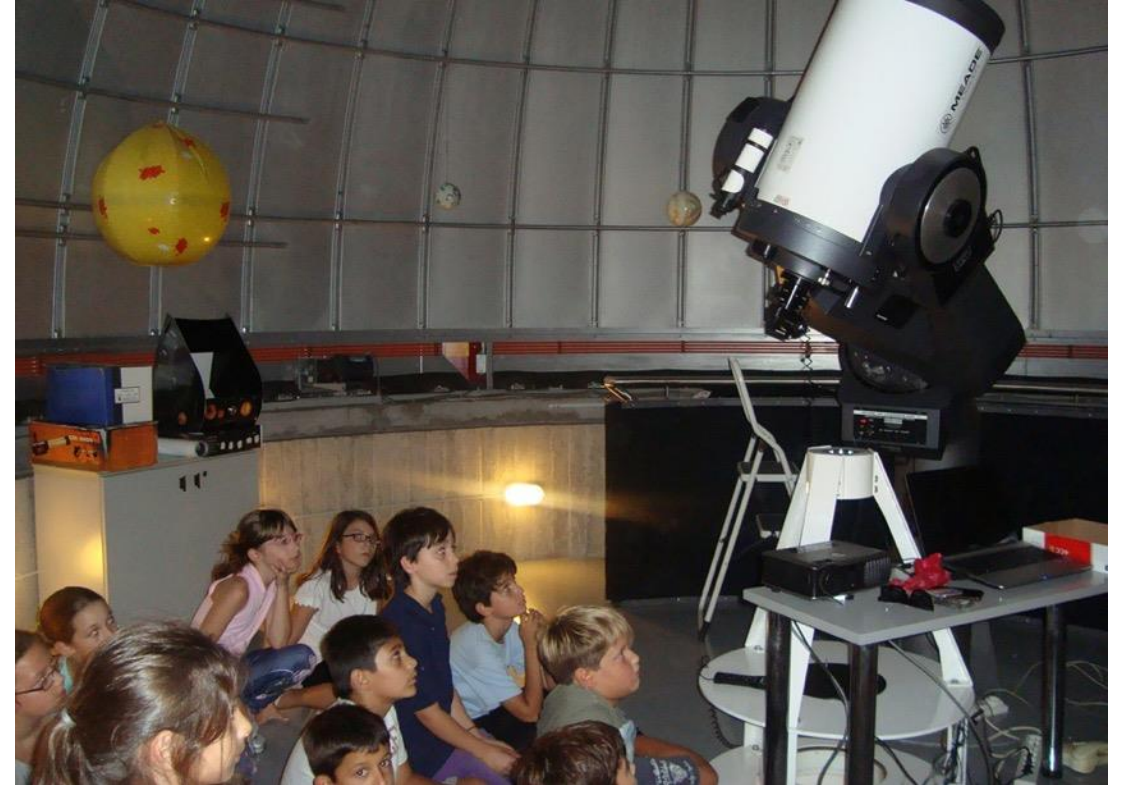
Σχεδιάζοντας το Σχολείο του Αύριο

16^ο Ετήσιο Σεμινάριο της Ερμούπολης για την Κοινωνία της
Πληροφορίας και την Οικονομία της Γνώσης
16-18 Ιουλίου 2021



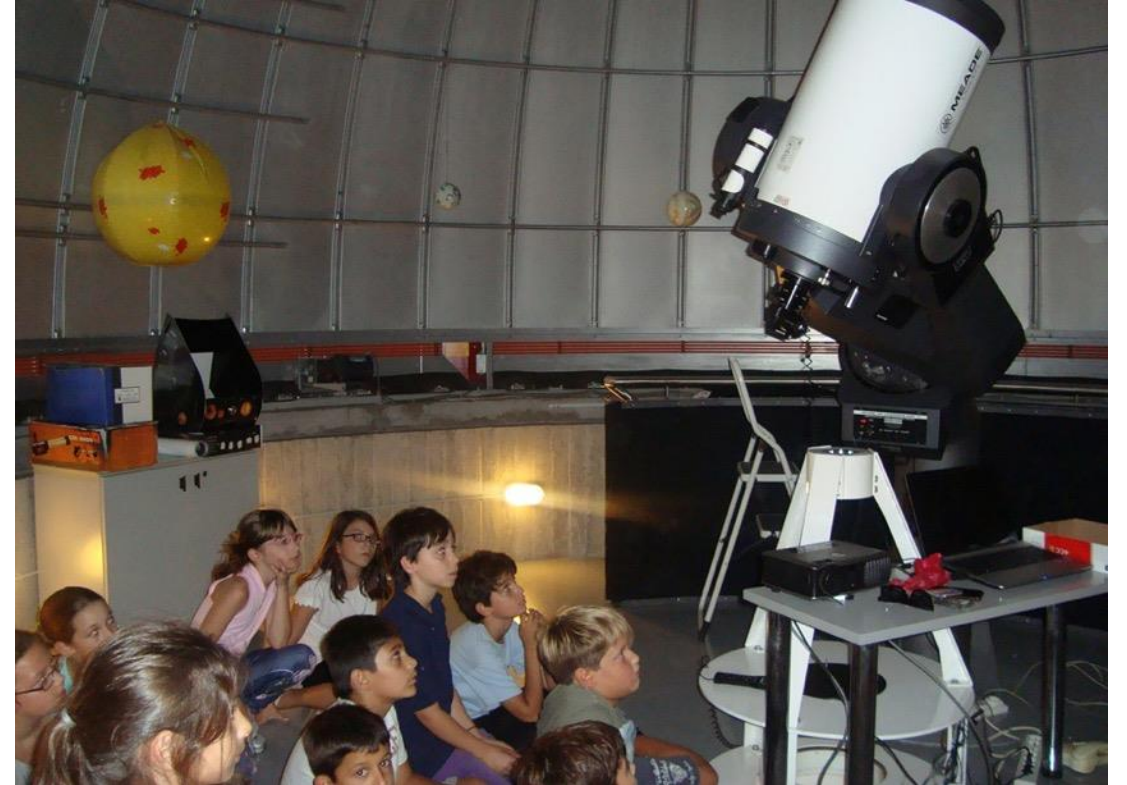
ELLINOGERMANIKI AGOGI

Άγγελος Αλεξόπουλος
Τμήμα Έρευνας & Ανάπτυξης
ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ



Ellinogermaniki Agogi The School

Established in 1961, EA is a multi-unit educational institution with more than 2200 students, 235 teaching staff and 330 administration staff, making an ideal testing ground for innovative methodologies and tools.



Ellinogermaniki Agogi The R&D Department

The R&D Department was founded in 1994 with the aim of designing advanced educational materials. A key focus has been on the exploitation of state-of-the-art ICTs in the education process to enhance teaching and learning.



EKT
ΕΘΝΙΚΟ ΚΕΝΤΡΟ ΤΕΚΜΗΡΙΩΣΗΣ &
ΗΛΕΚΤΡΟΝΙΚΟΥ ΠΕΡΙΕΧΟΜΕΝΟΥ
ΕΘΝΙΚΟ ΣΗΜΕΙΟ ΕΠΑΦΗΣ ΓΙΑ ΤΟ
ΠΡΟΓΡΑΜΜΑ ΟΡΙΖΟΝΤΑΣ 2020

SWAFS
2014 - 2019

EKT | Η ελληνική συμμετοχή στο Πρόγραμμα "Science with and for Society"
Ελληνικοί Οργανισμοί
με τη μεγαλύτερη συμμετοχή και χρηματοδότηση (1)

Όνομα οργανισμού	Τύπος	Αριθμός συμμετοχών σε έργα (& αριθμός συντονιστών)	% στο σύνολο της ελληνικών συμμετοχών	Εγκριμένη Χρηματοδότηση ΕΕ	% στο σύνολο της χρηματοδότησης ελληνικών οργανισμών
ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΟΓΗ ΑΕ	Εταιρεία	5	6,10%	1.126.875,00	8,62%
ΤΕΙΔΗ ΤΕΧΝΕΣ ΑΘΗΝΑΣ	Τεχνολογικό	2	6,10%	992.219,09	7,49%
VILABS ΟΕ	Εταιρεία	3	3,66%	943.487,50	7,22%
ΕΘΝΙΚΟ ΚΑΙ ΚΑΠΟΔΙΣΤΡΙΑΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ	Πανεπιστήμιο	4	4,88%	856.255,00	6,55%
ΑΡΙΣΤΟΤΕΛΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΟΝΙΚΗΣ	Πανεπιστήμιο	6	7,32%	811.783,75	6,21%
ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ	Πανεπιστήμιο	1	1,22%	640.875,00	4,90%
ΕΘΝΙΚΟ ΚΕΝΤΡΟ ΕΡΕΥΝΑΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΚΗΣ ΑΝΑΠΤΥΞΗΣ	Ερευνητικό Κέντρο	5	6,10%	599.225,00	4,58%
INTELSPACE ΤΕΧΝΟΛΟΓΙΕΣ ΚΑΙΝΟΤΟΜΙΑΣ ΑΕ	Εταιρεία	1	1,22%	562.153,00	4,30%
ΙΔΡΥΜΑ ΤΕΧΝΟΛΟΓΙΑΣ ΚΑΙ ΕΡΕΥΝΑΣ	Ερευνητικό Κέντρο	4	4,88%	544.668,75	4,17%
ΚΕΝΤΡΟ ΕΡΕΥΝΩΝ ΝΟΤΙΟΑΝΑΤΟΛΙΚΗΣ ΕΥΡΩΠΗΣ (SEERC)	Ερευνητικό Κέντρο	3	3,66%	472.125,00	3,61%
ΕΛΛΗΝΙΚΗ ΕΝΩΣΗ ΔΗΜΟΣΙΟΓΡΑΦΩΝ, ΣΥΓΓΡΑΦΕΩΝ, ΕΠΙΚΟΙΝΩΝΙΟΛΟΓΩΝ, ΕΠΙΣΤΗΜΗΣ ΑΣΤΙΚΗΣ ΕΤΑΙΡΕΙΑ	Ερευνητικό Κέντρο	2	2,44%	392.083,34	3,00%
ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ	Πανεπιστήμιο	1	1,22%	384.881,25	2,94%
ΠΑΝΕΠΙΣΤΗΜΙΟ ΜΑΚΕΔΟΝΙΑΣ	Πανεπιστήμιο	1	1,22%	374.468,75	2,86%
EXUS SOFTWARE LTD	Εταιρεία	1	1,22%	353.750,00	2,71%
ΙΝΣΤΙΤΟΥΤΟ ΤΕΧΝΟΛΟΓΙΑΣ ΥΠΟΛΟΓΙΣΤΩΝ ΚΑΙ ΕΚΔΟΣΕΩΝ "ΔΙΟΦΑΝΤΟΣ"	Εταιρεία	1	1,22%	341.375,00	2,61%
ΠΕΡΙΦΕΡΕΙΑ ΚΕΝΤΡΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ	Δημόσιος Φορέας	2	2,44%	315.187,50	2,41%
ΕΡΕΥΝΗΤΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΑΚΟ ΙΝΣΤΙΤΟΥΤΟ ΕΠΙΤΑΧΥΝΤΙΚΩΝ ΣΥΣΤΗΜΑΤΩΝ	Ερευνητικό Κέντρο	2	2,44%	310.625,00	2,38%

Ellinogermaniki Agogi
The R&D Department

The R&D Department is responsible for facilitating and implementing the testing of innovative methodologies and tools through coordinating and participating in more than 200 EU-funded and national projects.



Open Discovery Space (FP7) was the first large-scale, pan-European attempt to engage schools in the use of open educational resources. In this framework the digital maturity of schools was assessed. EA was responsible for implementation and managed to successfully engaged 5000 European schools.

<https://portal.opendiscoveryspace.eu>



Open Schools for Open Societies (H2020) focused on school openness through STEAM, with students working on projects with an emphasis on social responsibility (RRI). Apart from the digital element, schools were assessed on how open to their local communities were. EA (coordinator) facilitated the meaningful engagement of 1100 schools. <https://portal.opendiscoveryspace.eu>

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The R&D Department

The R&D Department is responsible for facilitating and implementing the testing of innovative methodologies and tools through coordinating and participating in more than 200 EU-funded and national projects.



Over 200 teachers, educational stakeholders, technology providers, policy makers, researchers, etc. come together from all over Europe and beyond to participate in 5-day training events, as part of many EU-funded initiatives.



Ellinogermaniki Agogi European
School Innovation Academy

EA organizes every summer (July) a series of Summer Schools as part of the European School Innovation Academy (ESIA) (<https://esia.ea.gr/>)

There is a major mismatch between opportunity and action in most education systems today. It revolves around what is meant by "science education," a term that is incorrectly defined in current usage. Rather than learning how to think scientifically, students are generally being told about science and asked to remember facts. This disturbing situation must be corrected if science education is to have any hope of taking its proper place as an essential part of the education of students everywhere.

Redefining Science Education

As students become absorbed with technology-based games, educators grapple with how best to use technology. Immersive simulations represent one way in which new media can enhance traditional learning experiences.

Inquiry-based science education (IBSE) has proved its efficacy at both primary and secondary levels in increasing children's and students' interest and attainments levels while at the same time stimulating teacher motivation. IBSE is effective with all kinds of students from the weakest to the most able and is fully compatible with the ambition of excellence. Moreover IBSE is beneficial to promoting girls' interest and participation in science activities. Finally, IBSE and traditional deductive approaches are not mutually exclusive and they should be combined in any science classroom to accommodate different mindsets and age group preferences.

Current Trends in Science Education

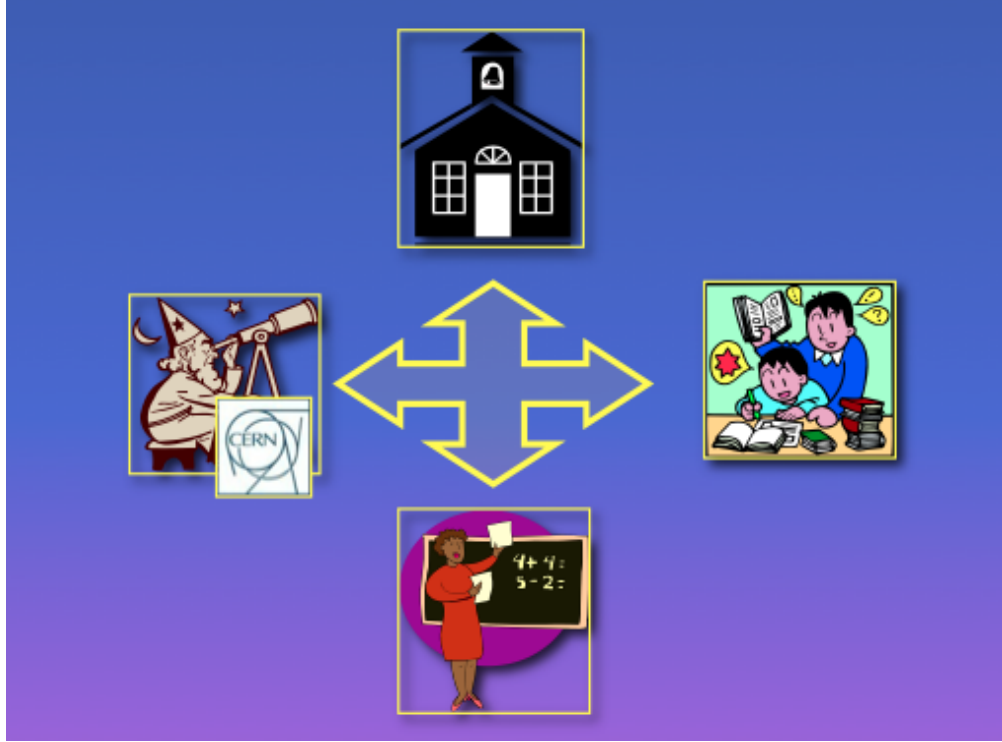
A reversal of school science-teaching pedagogy from mainly deductive to inquiry-based methods provides the means to increase interest in science.



The introduction of problem-finding and problem-solving oriented fields of studies instead of more traditional disciplines would attract the interest of more young people.

Current Trends in Science Education

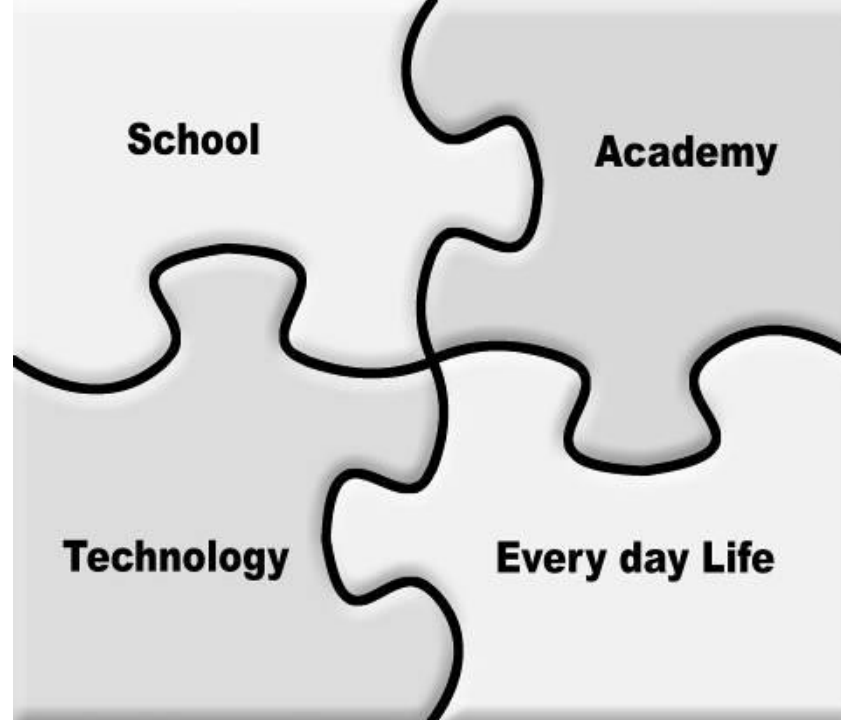
Scientific disciplines in schools have to be enlarged



Networks can be used as an effective component of teachers' professional development, and are complementary to more traditional forms of in-service teacher training by stimulating morale and motivation.

The Role of Teachers

Teachers are key players in the renewal of science education. Among other methods, being part of a network allows them to improve the quality of their teaching and supports their motivation.



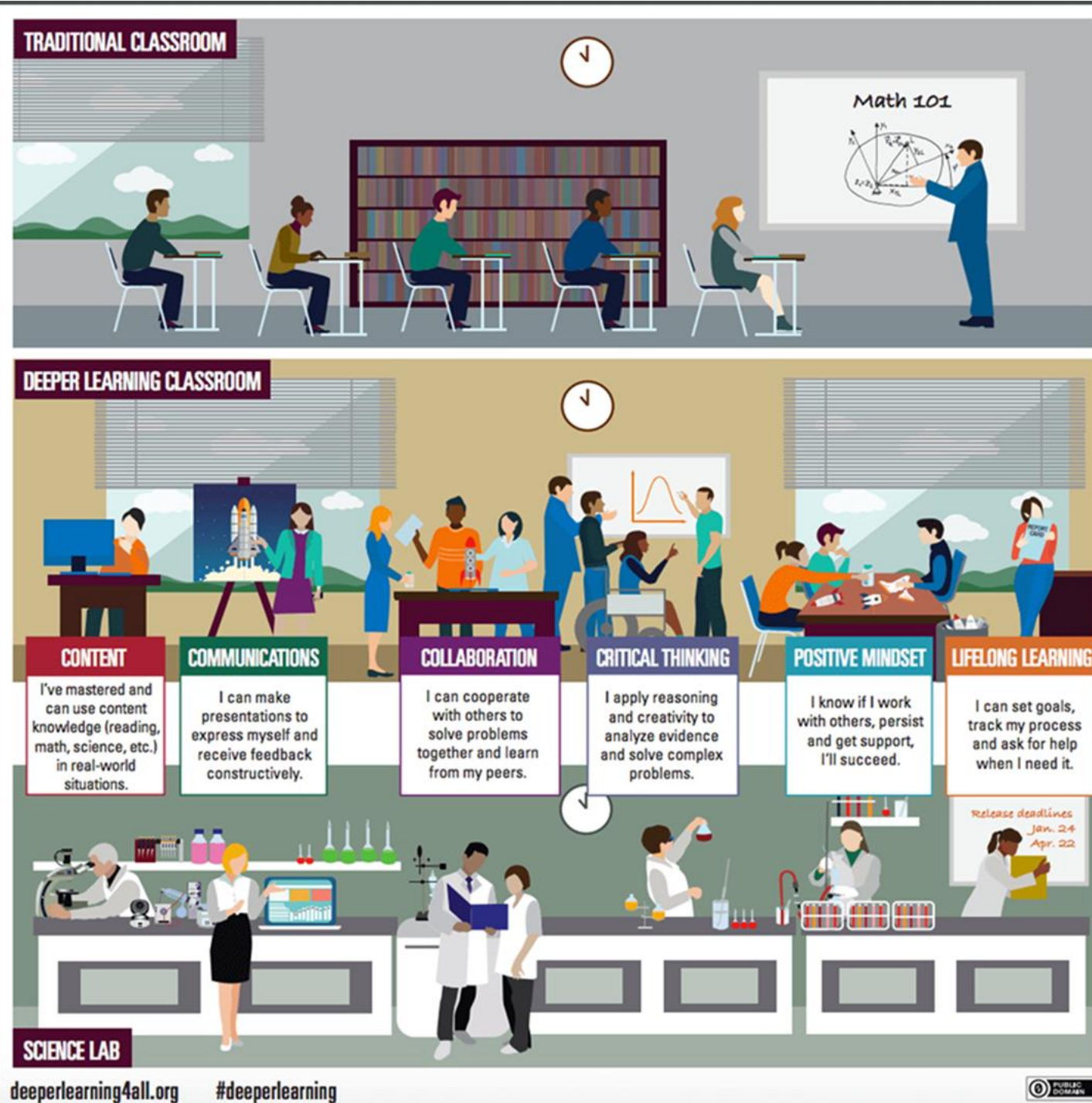
The challenge is to **re-imagine science education**: to consider how it can fit to the modern world and how it can meet the needs of all students; those who will go on to work in scientific and technical subjects, and those who will not.

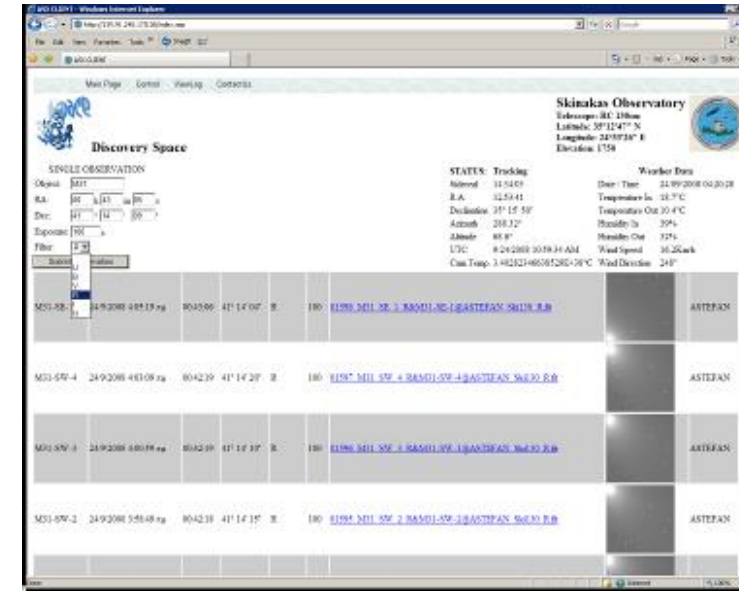
Re-imagining Science Education: The Vision

We should point to a hybrid classroom that builds on the strengths of both formal and informal teaching and learning strategies in ways that support learning of all students.



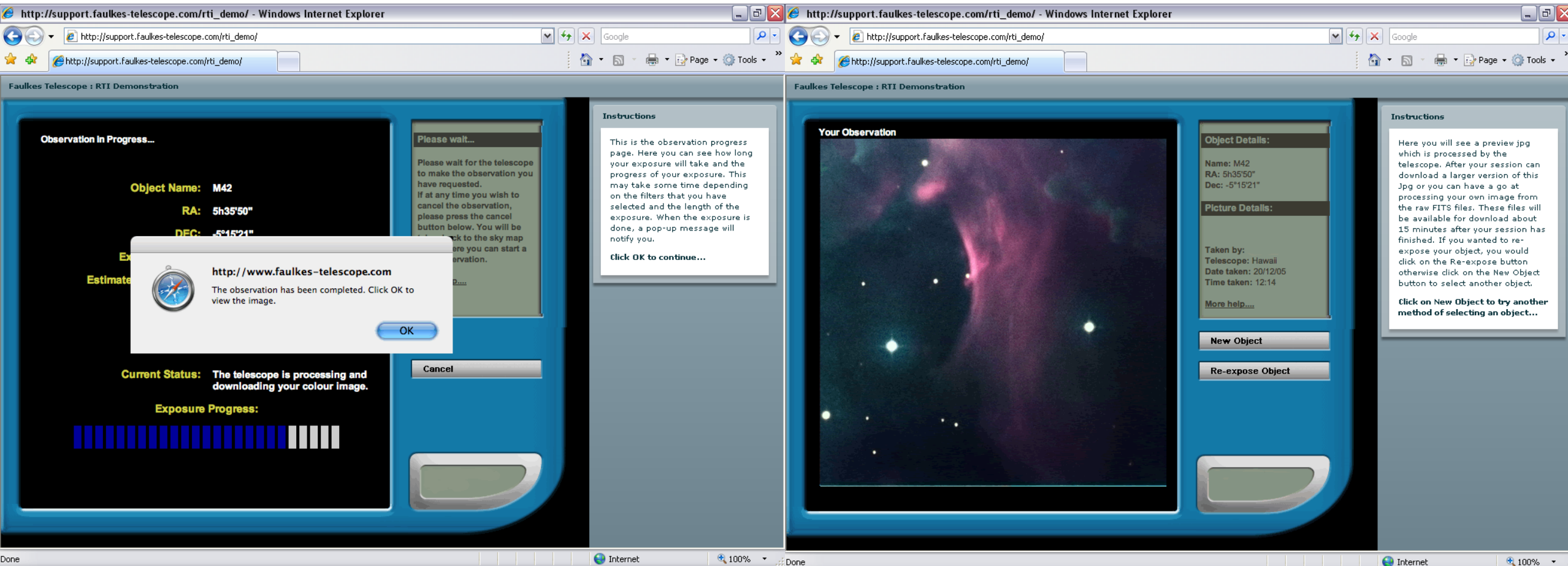
Creating Effective Links between Schools and the Research Community





Providing access to
advanced research
infrastructures

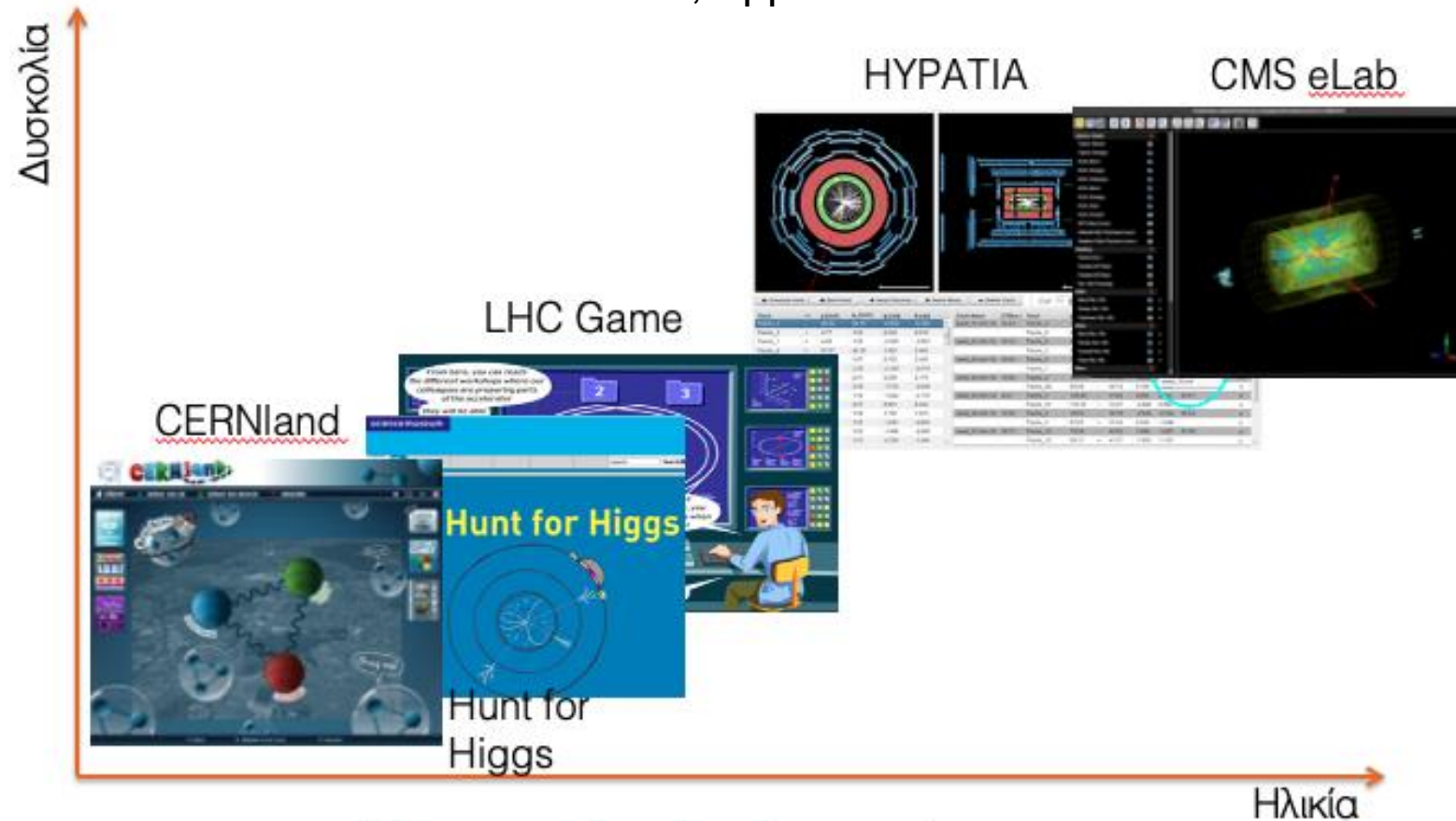
The Faulkes Telescope Project provides free access to a global network of robotic telescopes for education through our partnership with Las Cumbres Observatory. We also offer free teacher CPD, classroom resources and advice and support on all aspects of using astronomy in your classroom.



Providing access to
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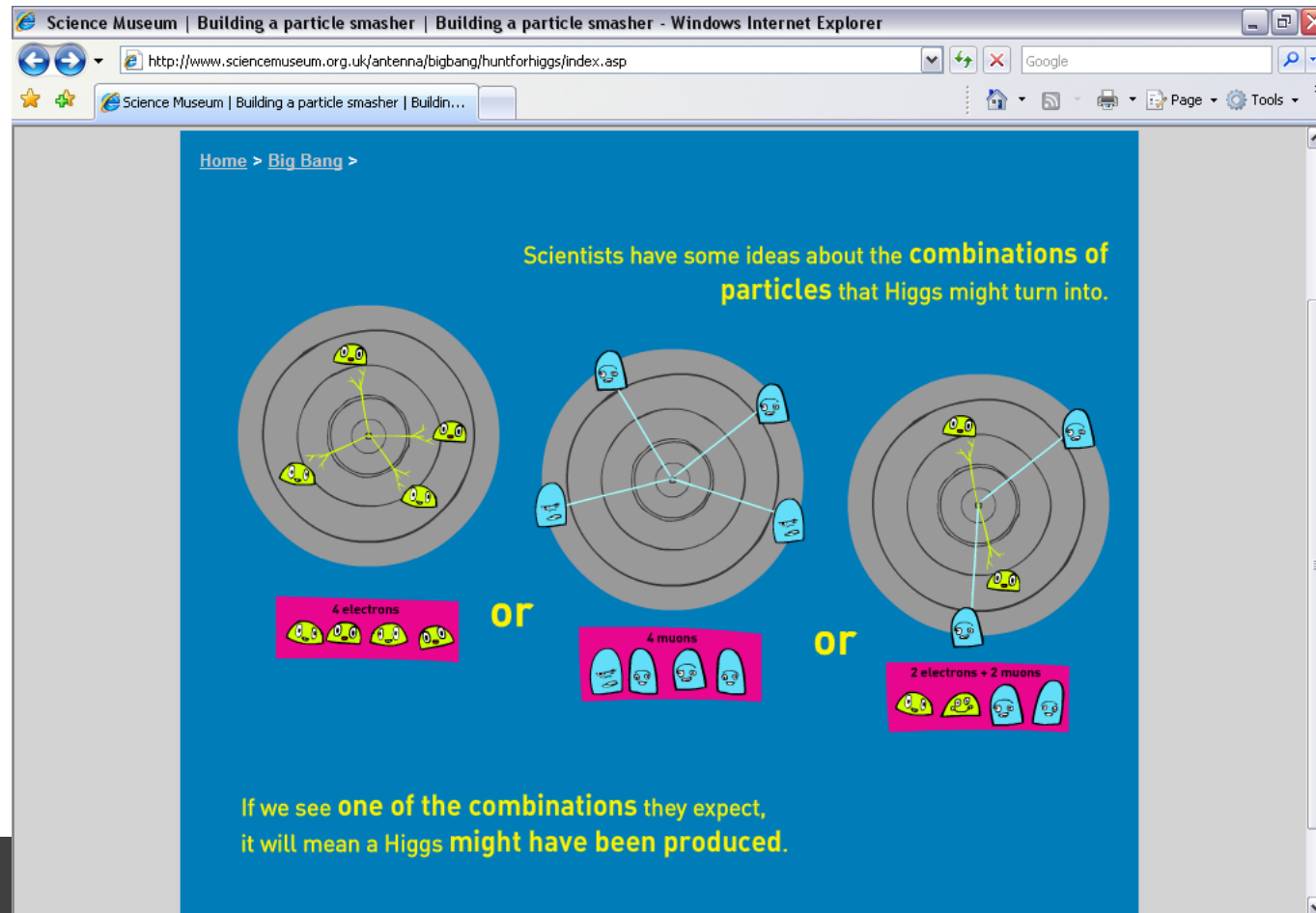
Virtual Labs, Apps and Games



Providing access to
advanced research
infrastructures

Bringing CERN to your school classroom

For K-6 students



Providing access to
advanced research
infrastructures

Bringing CERN to your school classroom



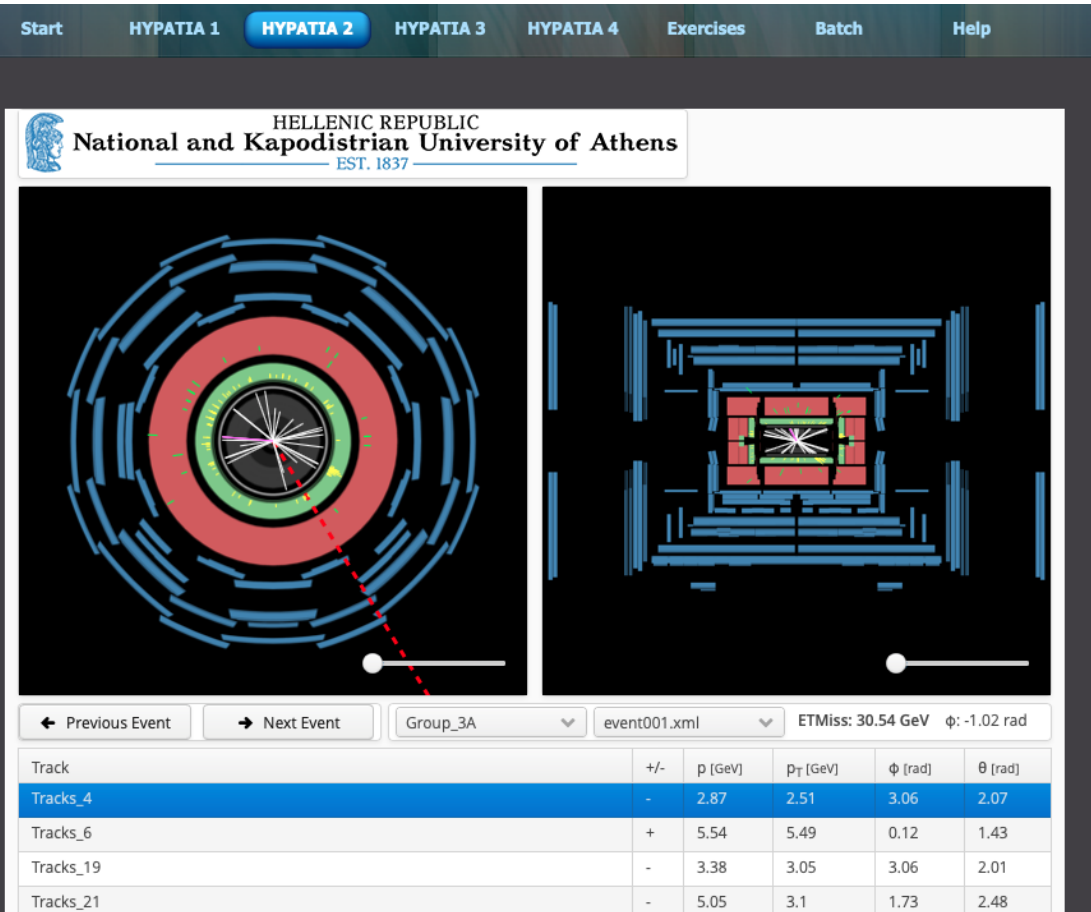
For K-6 students



Providing access to advanced research infrastructures

Bringing CERN to your school classroom

Particle Physics Masterclasses for High-schoolers



Providing access to
advanced research
infrastructures

Bringing CERN to your school classroom

Virtual Visits to the LHC Experiments at CERN



ATLAS Virtual Visits

High Schools from Greece & Cyprus

Share on       

Greece & Cyprus

11 March 2014 - 10:30 CET (11:30 local time)

The subatomic journey to Nobel Prize experiments at CERN continues - this time in Greece and Cyprus. More than 600 high-schoolers from 12 schools in seven different locations across the two countries will have the unique opportunity to visit the control room of the ATLAS experiment to interact live with a Greek scientist involved in the search for the Higgs Boson and learn what it takes for CERN scientists to keep pushing the boundaries of our understanding of the origins of the Universe at the world's largest particle physics laboratory. This international-level virtual visit has been supported by the [Open Discovery Space](#) and [Inspiring Science Education](#) EU projects that aim to help science teachers find innovative ways to make their teaching of physics and science more inspirational, attractive and relevant to students' lives.

[Map with the names of schools and their locations.](#) [Web article of a major newspaper "Ta Nea".](#)



Angelos Alexopoulos and Konstantinos Nikolopoulos in the ATLAS Control Room and more than 600 high-schoolers from 12 schools in seven different locations across Greece and Cyprus.

Students visit the heart of the CMS detector

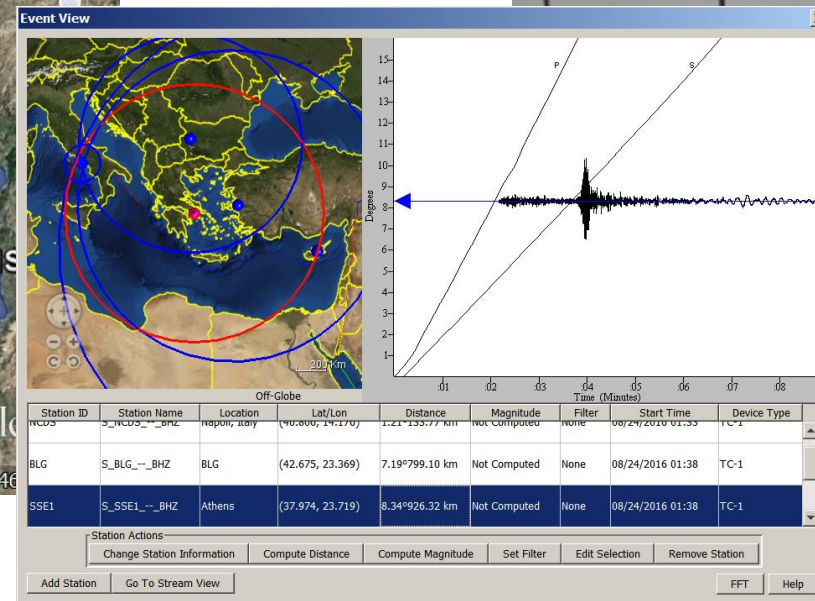
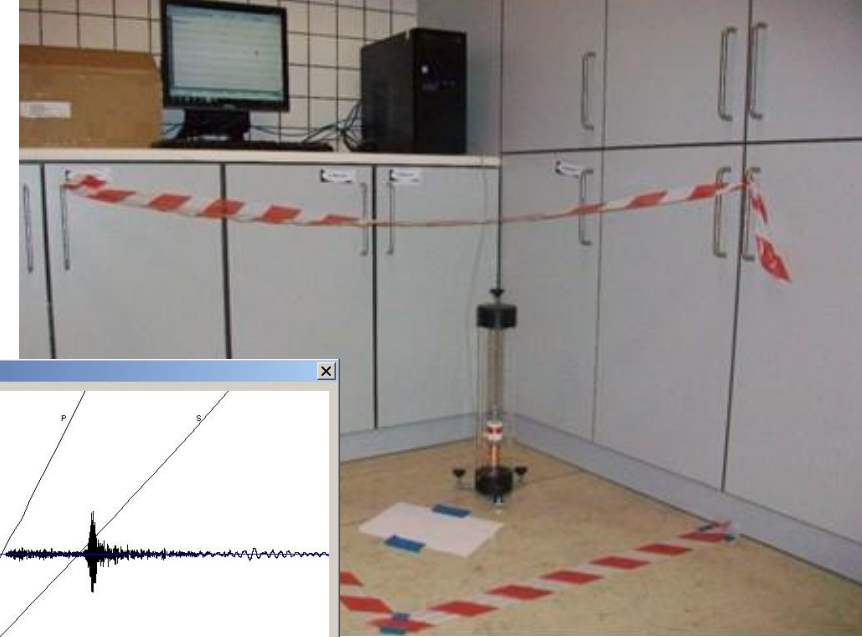


Providing access to
advanced research
infrastructures

Bringing CERN to your school classroom

ΕΥΤΥΧΙΣΜΟΣ άφρο κατό 41% επιμ-
ωσαν οι πωλόμε αυτοκινήτων τον
Ιούλιο, συνεκρίφοντας τις πωλόμε επι-
δόσεις της αγοράς από τον παρόμοιο
Περίοδο. Το πρώτο εξαμηνίο, οι
πωλόμε άφρο αυξήθηκαν 23,4%.
Η ανάκαμψη της αγοράς οφείλεται
κυρίως στην αύξηση του όγκου των
πωλήσεων από τον Ιούλιο, καθώς
και στο ότι άφρο οι πωλόμε άφρο

Bringing CERN to your school classroom



Schools as Research Labs

School Network of Seismometers



ΦΤΙΑΞΕ ΤΟΝ ΔΙΚΟ ΣΟΥ
ΣΕΙΣΜΟΓΡΑΦΟ

Ο ΔΙΑΓΩΝΙΣΜΟΣ | Η ΕΠΙΤΡΟΠΗ | ΣΗΜΑΝΤΙΚΕΣ ΗΜΕΡΟΜΗΝΙΕΣ | ΕΡΓΑΣΙΕΣ | ΕΡΕΥΝΑ | ΕΚΔΗΛΩΣΗ | ΣΤΙΓΜΙΟΤΥΠΑ

ΚΑΛΩΣ ΗΡΘΑΤΕ ΣΤΟΝ ΔΙΑΓΩΝΙΣΜΟ

ΦΤΙΑΞΕ ΤΟΝ ΔΙΚΟ ΣΟΥ ΨΗΦΙΑΚΟ ΣΕΙΣΜΟΓΡΑΦΟ

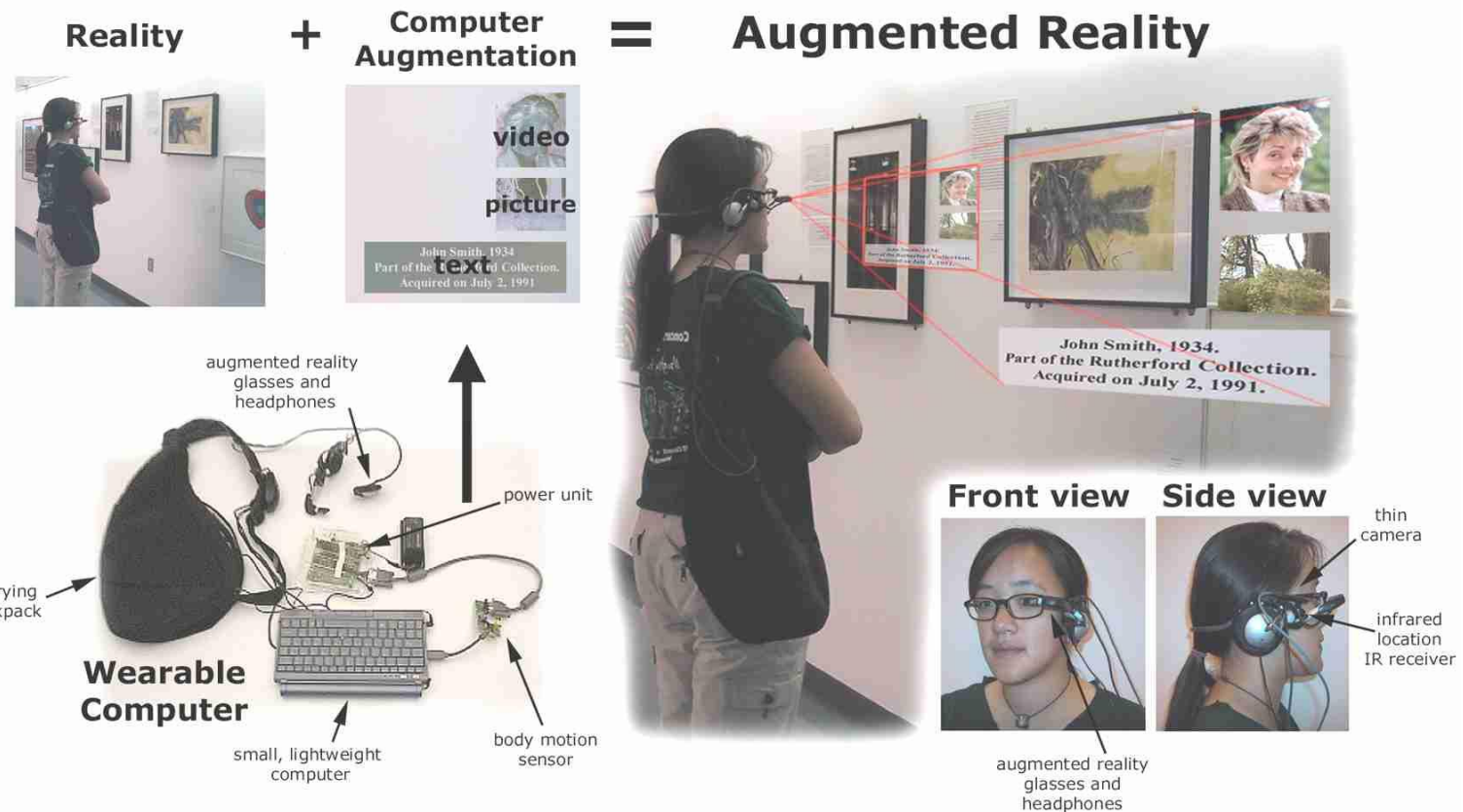


Ο διαγωνισμός είναι ξανά εδώ!

Φέτος φτιάξε τον δικό σου **ψηφιακό** σεισμογράφο!

Schools as Research
Labs

School Network of Seismometers



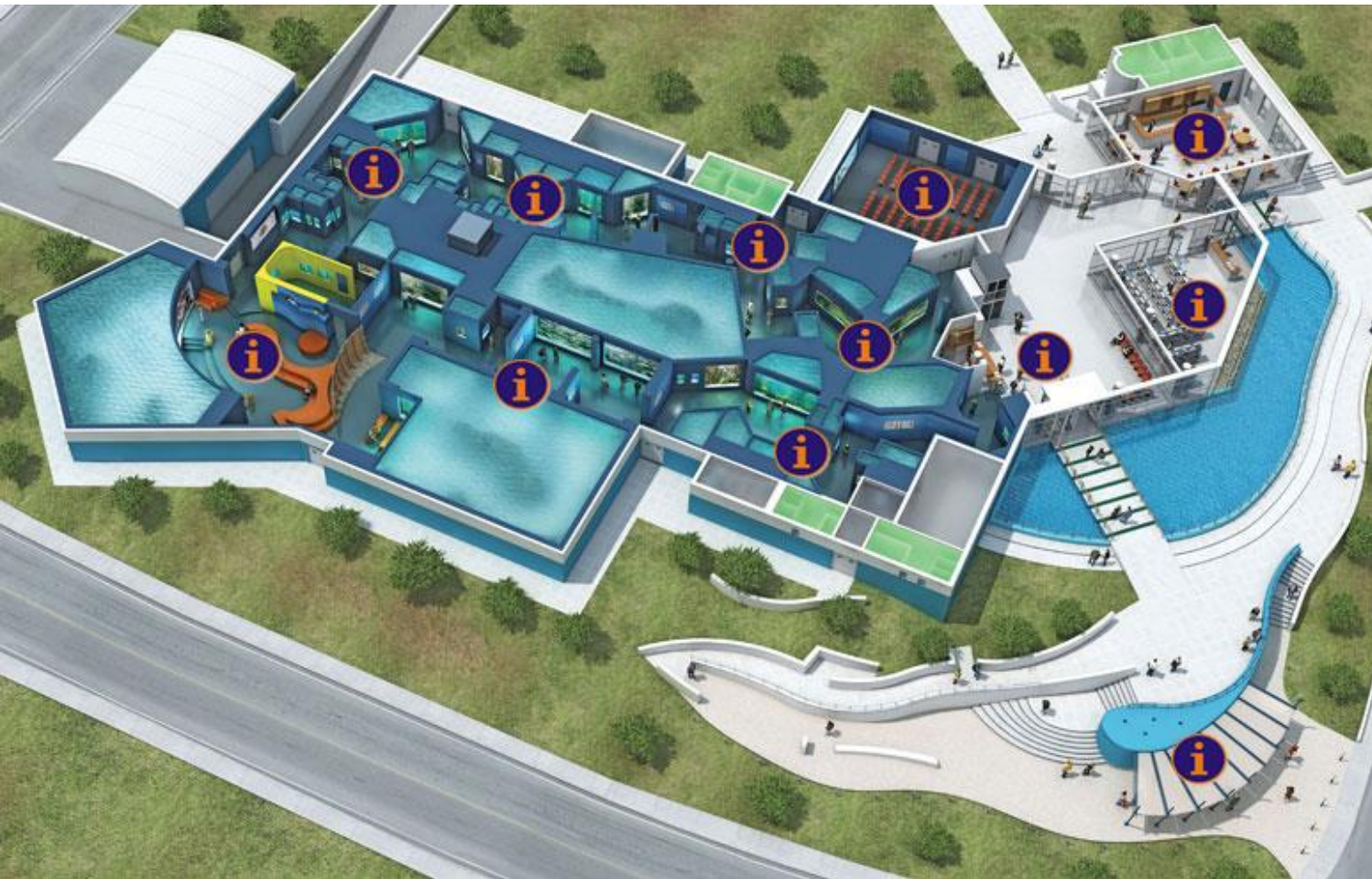
Informal Learning
Experiences

Virtual visits and field trips to museums and science centres



Informal Learning
Experiences

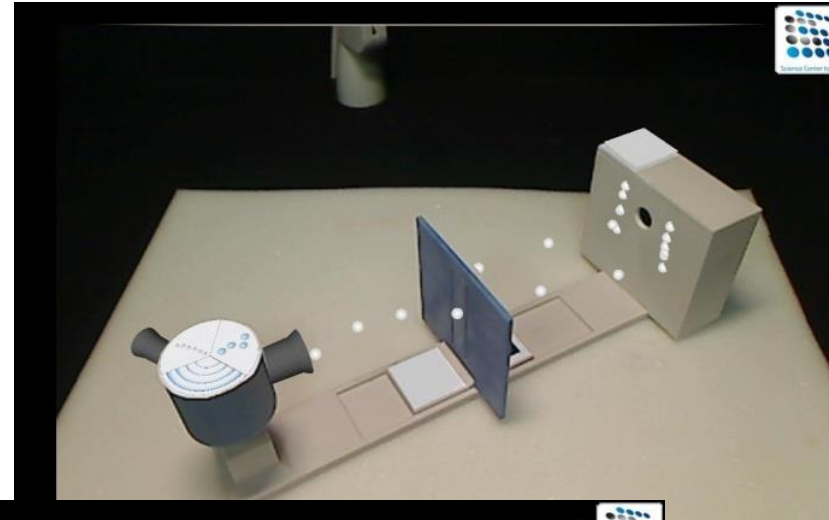
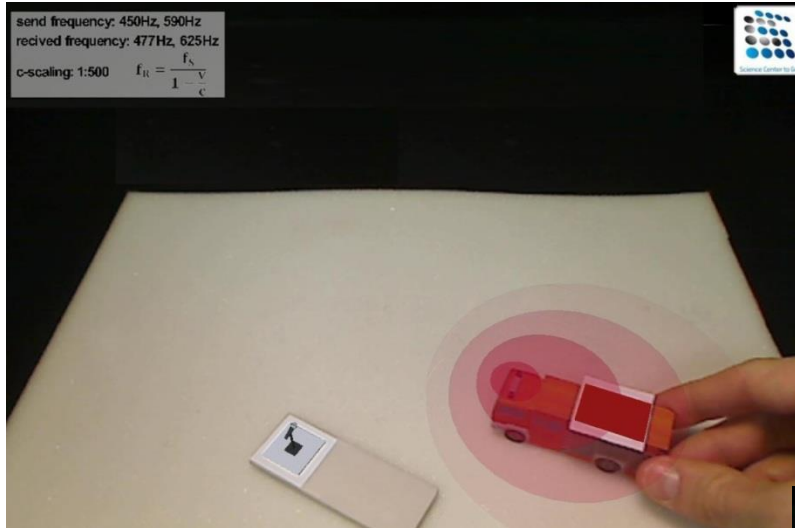
Virtual visits and field trips to museums and science centres



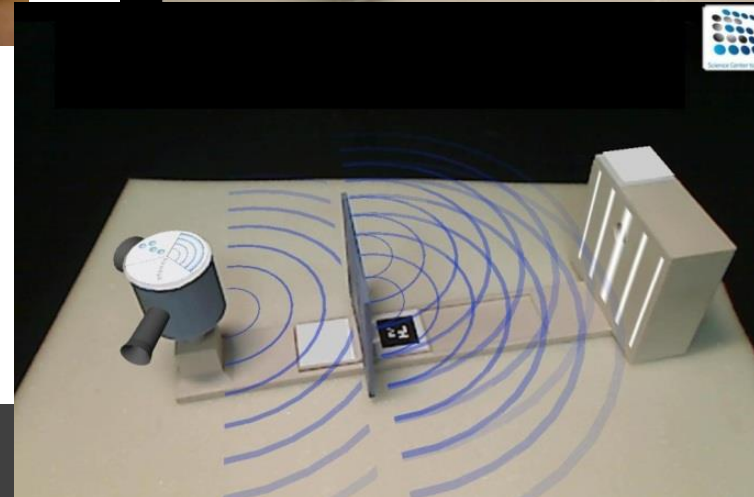
Informal Learning Experiences

Virtual visits and field trips to museums and science centres

Wave propagation- *Doppler Effect*



Quantum Physics – *Young's Double Slit Experiment*



Informal Learning
Experiences

Visualizing the invisible: Science Centre to Go

Organise educational digital resources...

Pre-Visit - Teaching Phase 1: Guided Eliciting Activities - DEFINE QUESTIONS FROM CURRENT KNOWLEDGE

► How can we tell that the Earth is moving?
Are there any direct indications?

Pre-Visit - Teaching Phase 1: Guided Eliciting Activities - DEFINE QUESTIONS FROM CURRENT KNOWLEDGE

► Can we design an experiment to prove the Earth's rotation around its axis?

► What's a pendulum anyway?

► How does it work?

1.2 Define questions from current knowledge

Promotes the conceptually oriented activities that the teacher will present to the students to provide their engagement in thinking about the target subject matter based on their existing knowledge. These three questions elicits students' and adults' beliefs, e.g. by integrating them in the materials described in the previous slide.

Description

► How can we tell that the Earth is moving?
Are there any direct indications?

- The succession of day and night
- The apparent movement of stars

► Can we design an experiment that can prove the Earth's rotation around its axis?

► What's a pendulum anyway?

► How does it work?

Foucault's pendulum

Please click on a phase to view related activities:

Introduce pre-Visit Post-Visit

pre-Visit > Question Eliciting Activities

Define questions from current knowledge

This is a sample list of questions used to attract the students' attention and test their existing knowledge. Each question is accompanied with respective material.

- How can we tell that the Earth is moving?
Are there any direct indications?
- The succession of day and night
- The apparent movement of stars

- Can we design an experiment that can prove the Earth's rotation around its axis?

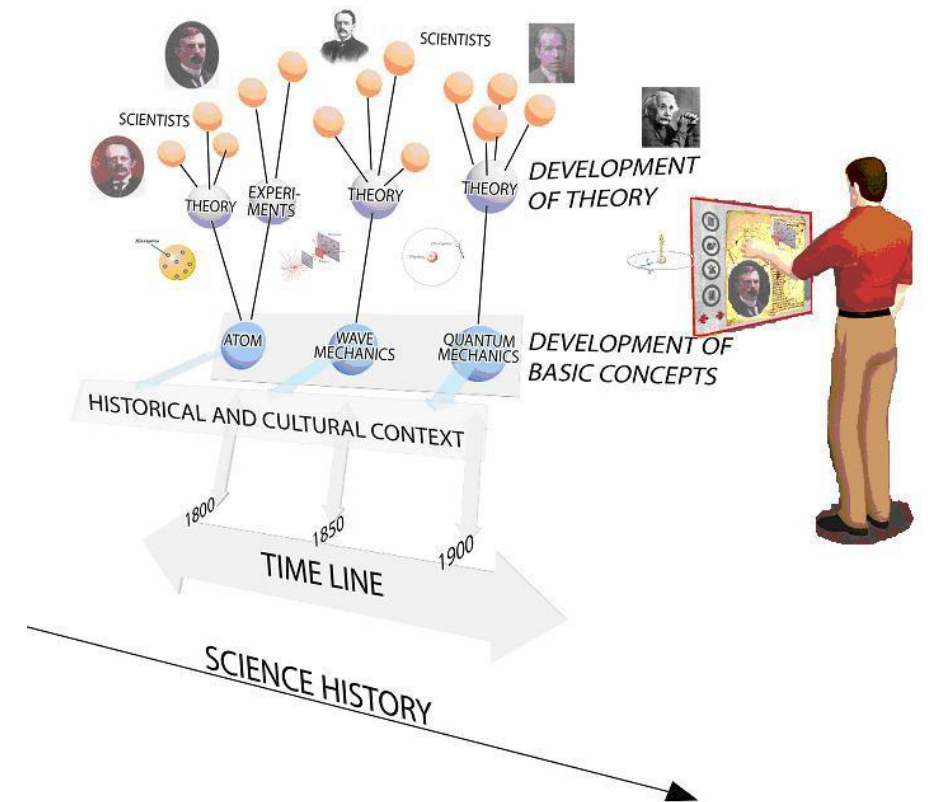
At this point the teacher introduces the idea of a swinging pendulum.

- What's a pendulum anyway?
- How does it work?

Supporting Material

in meaningful activities...

to share with
the community of users.



Educational Pathway
Authoring Tools

Teachers as Content Creators and Sharers

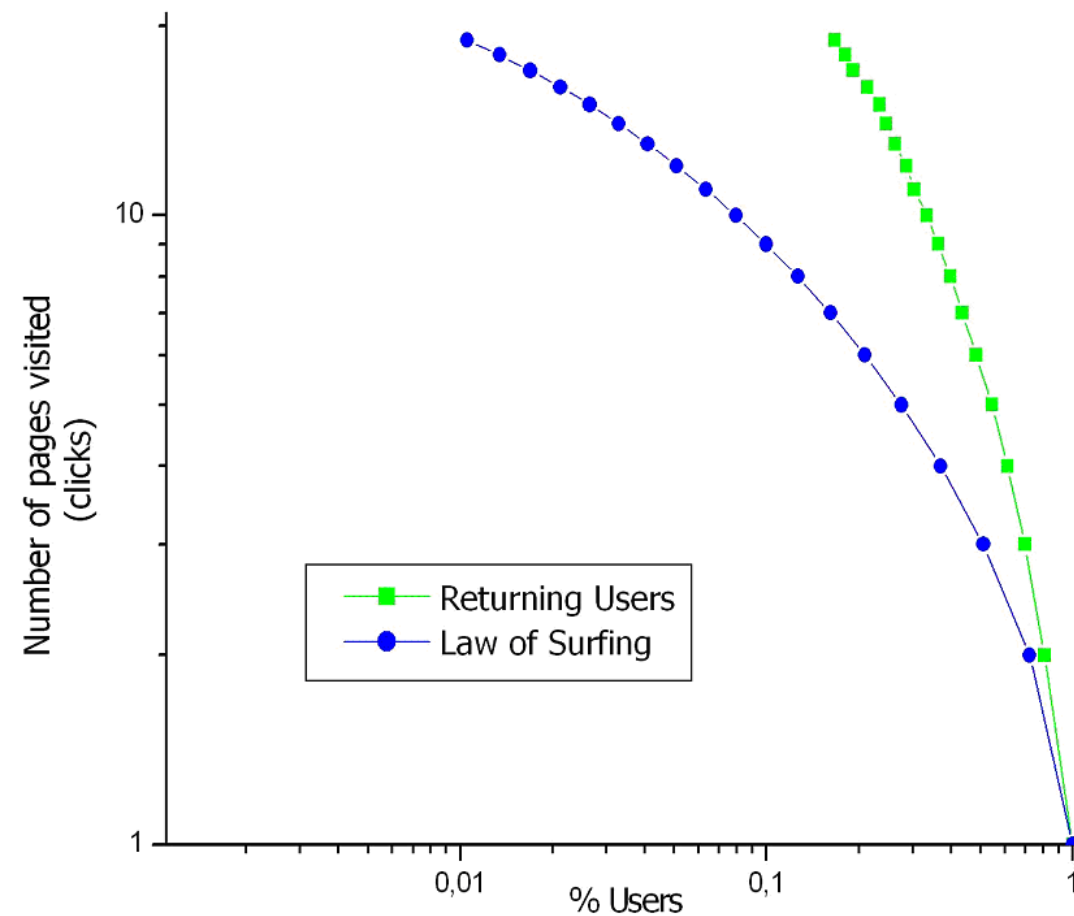
Authoring – Access – Deliver - Assess

- **Des**
and
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- **Del**
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The screenshot shows a digital learning interface for a science module titled "THE UNIVERSE". The interface is designed to be interactive, with a grid background and various icons. At the top, there's a navigation bar with tabs: QUESTION, INVESTIGATION, EXPLANATION, TRANSFER OF EXPLANATION (which is currently selected and highlighted in blue), REFLECTION, and ASSESSMENT. Below the tabs, the content is organized into steps. "STEP 1" features a video player with a green play button icon over a space-themed image. To the right of the video, the title "The Universe" is followed by a paragraph of placeholder text (Lorem Ipsum). "STEP 2" is partially visible, showing the title "The Big Bang Theory". At the bottom of the screen, there are navigation buttons: a grey "BACK" button on the left and an orange "NEXT" button on the right. The interface also includes a search bar at the top right with a magnifying glass icon and a language selector set to "ENG".

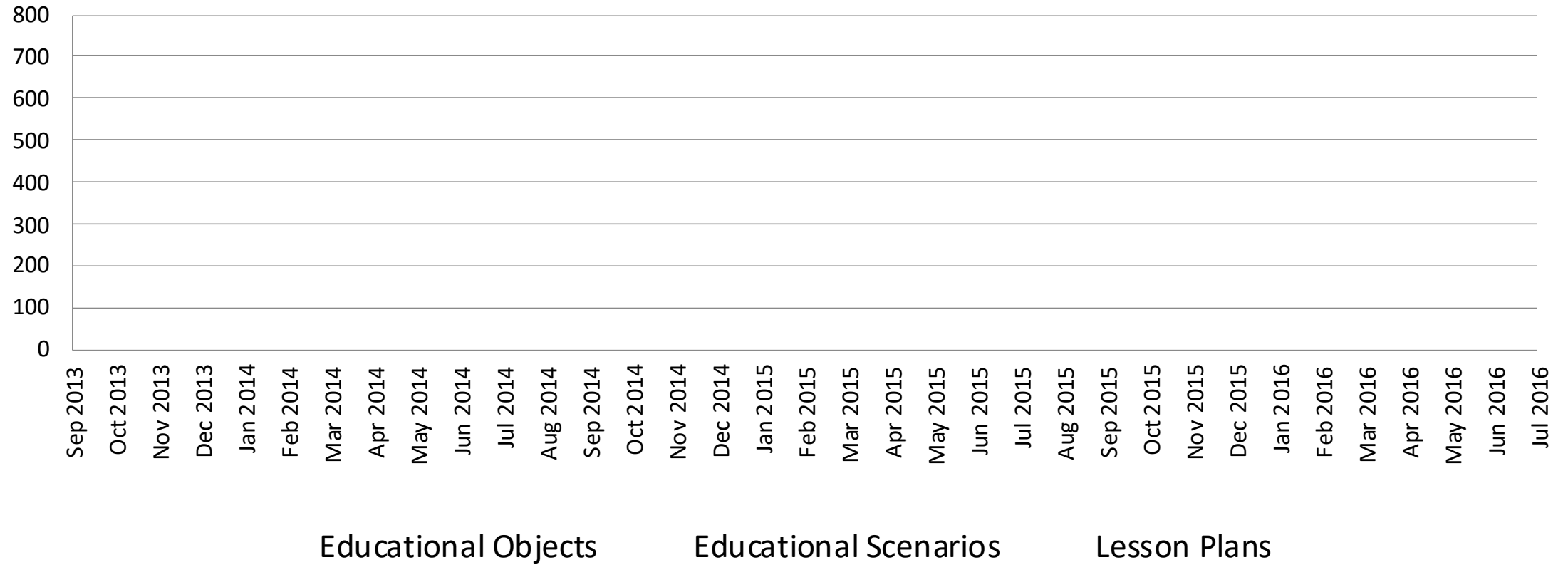
The COSMOS Portal contains user-generated resources (that are uploaded by its users). It has been designed to support a science teacher's search, retrieval and access to both, scientific and educational resources.

(Sotiriou, Bogner & Neofotistos, 2011)



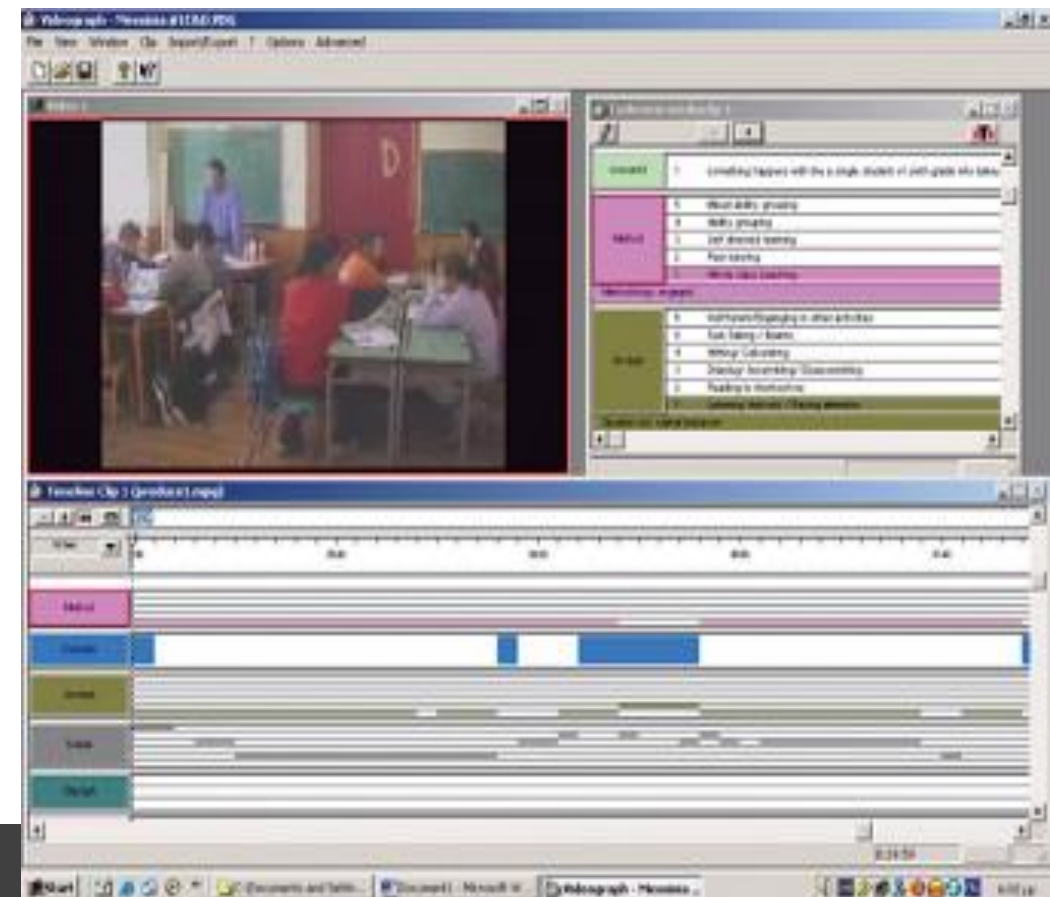
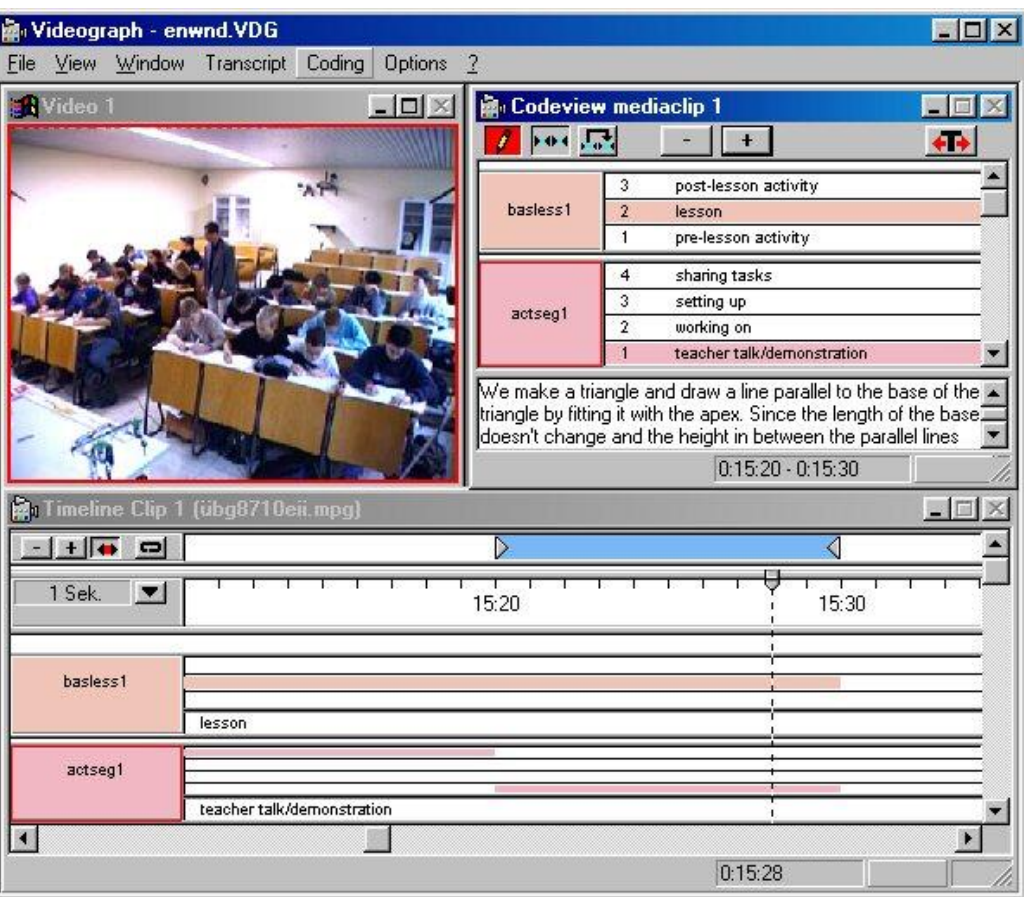
Impact Assessment

The Case of the COSMOS Portal



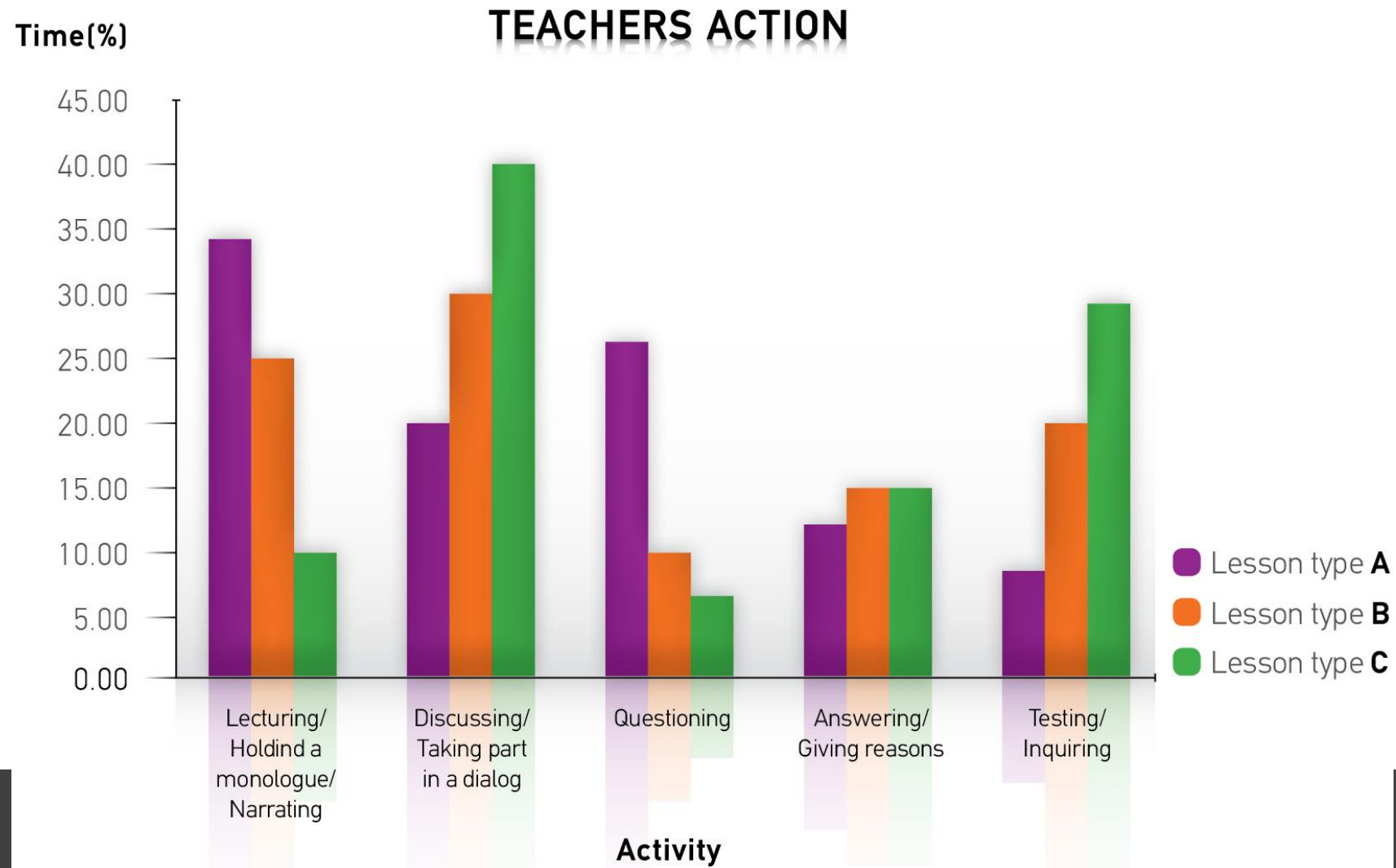
Impact Assessment

The Case of the ISE Community Portal



Impact Assessment

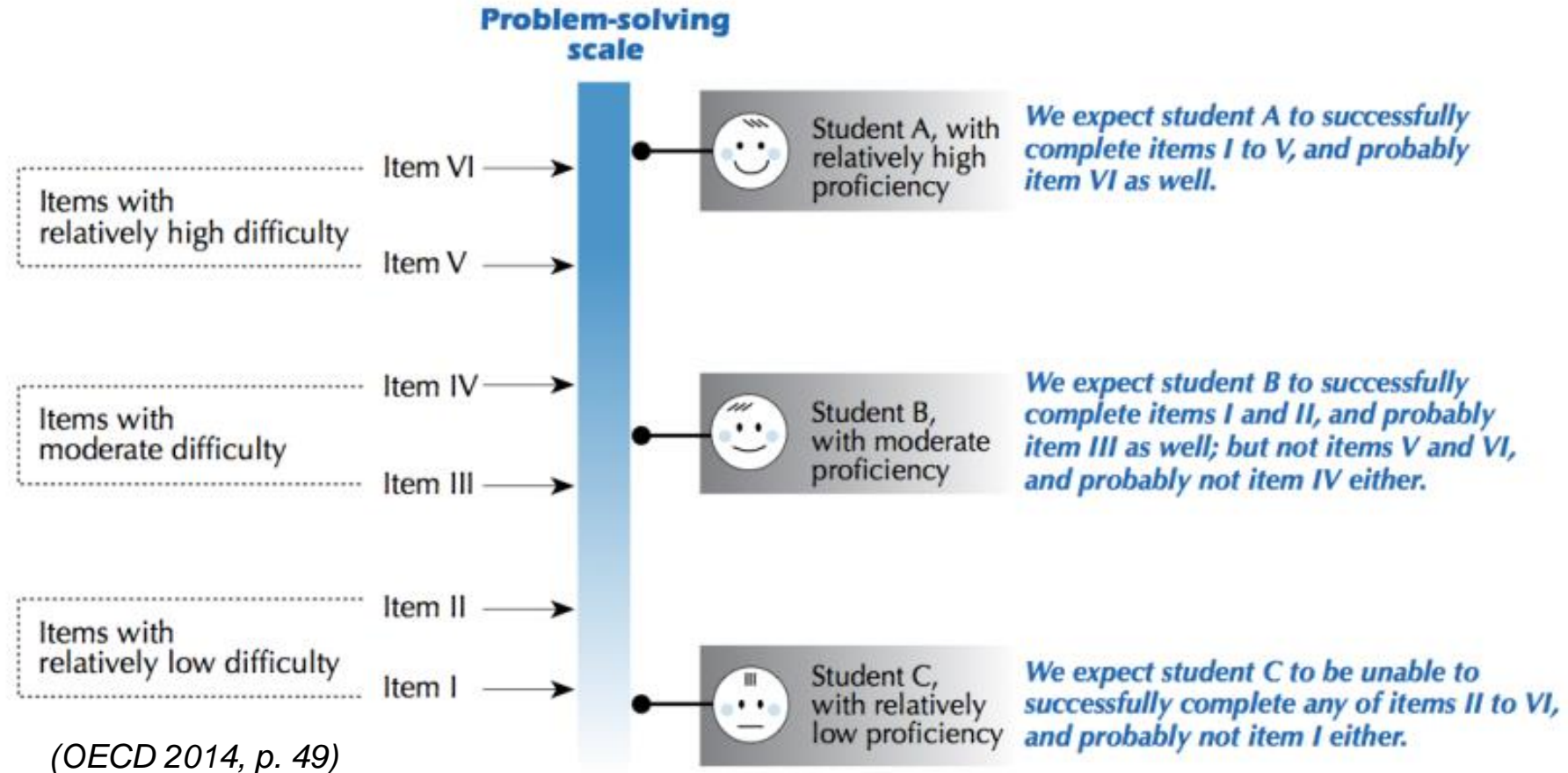
IBSE in Teaching Practice: The Case of the Pathway Project



Impact Assessment

IBSE in Teaching Practice: The Case of the Pathway Project

PISA Problem Solving Framework



Impact Assessment

Inquiry-based learning and e-learning: Evidence for improving students' problem-solving competences

Setting:

- 668 implementations in 453 schools across Europe within one school year with the participation of 12,550 students (mean age: 14.5y, gender balanced)
- Teachers were given access to innovative e-learning tools (e.g. virtual labs & games, simulations, AR applications)
- Teachers could use a platform with digital resources tools and were encouraged to adopt the five phases of the inquiry cycle: orientation, hypothesizing, planning, analysis, and conclusion
- An integrated interface for lesson implementation tracked each student's problem-solving competence culminating in about 12,000 datasets
- Every user generated an average of 22 digital inquiry-based digital scenarios, each of which required approximately 50.14 min for completion.

[*Lazoudis, Sotiriou & Bogner, 2020*](#)

Impact Assessment

Inquiry-based learning and e-learning: Evidence for improving students' problem-solving competences

Profile of problem-solving competence for all implementations

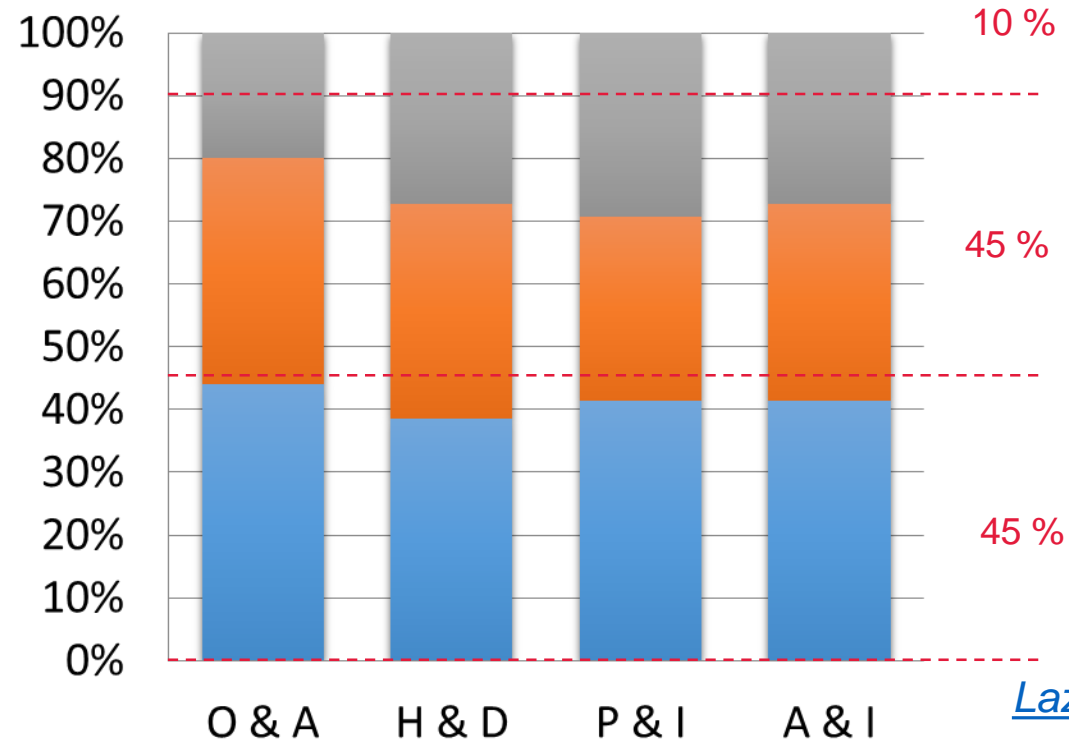
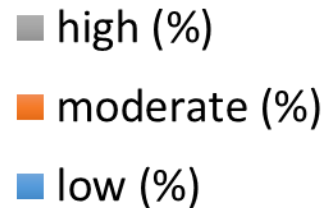
O&A: Orienting & Asking Questions

H&D: Hypothesis Generation & Design

P&I: Planning & Investigation

A&I: Analysis & Interpretation

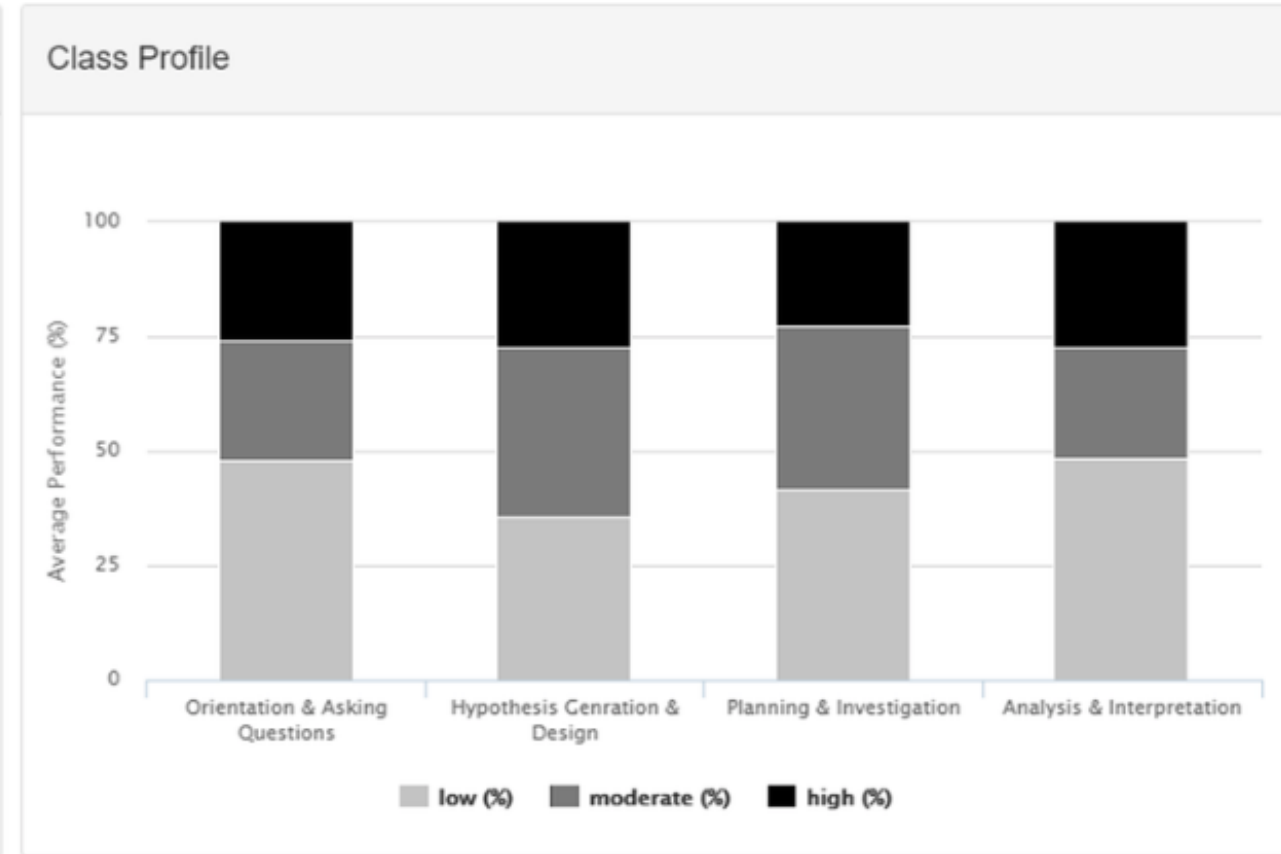
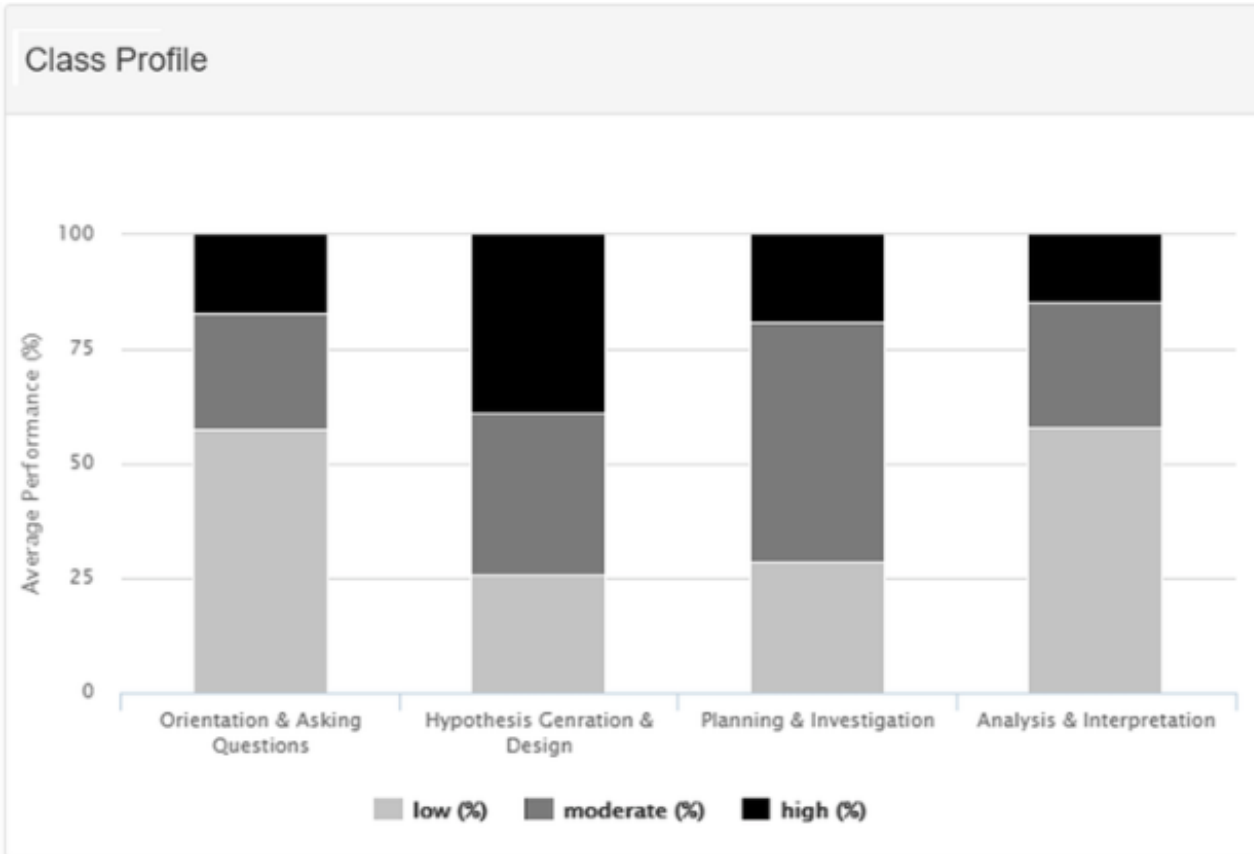
Note: The last lesson phase (conclusion & interpretation) is not included as those tasks did not involve problem-solving competence



[Lazoudis, Sotiriou & Bogner, 2020](#)

Impact Assessment

Inquiry-based learning and e-learning: Evidence for improving students' problem-solving competence

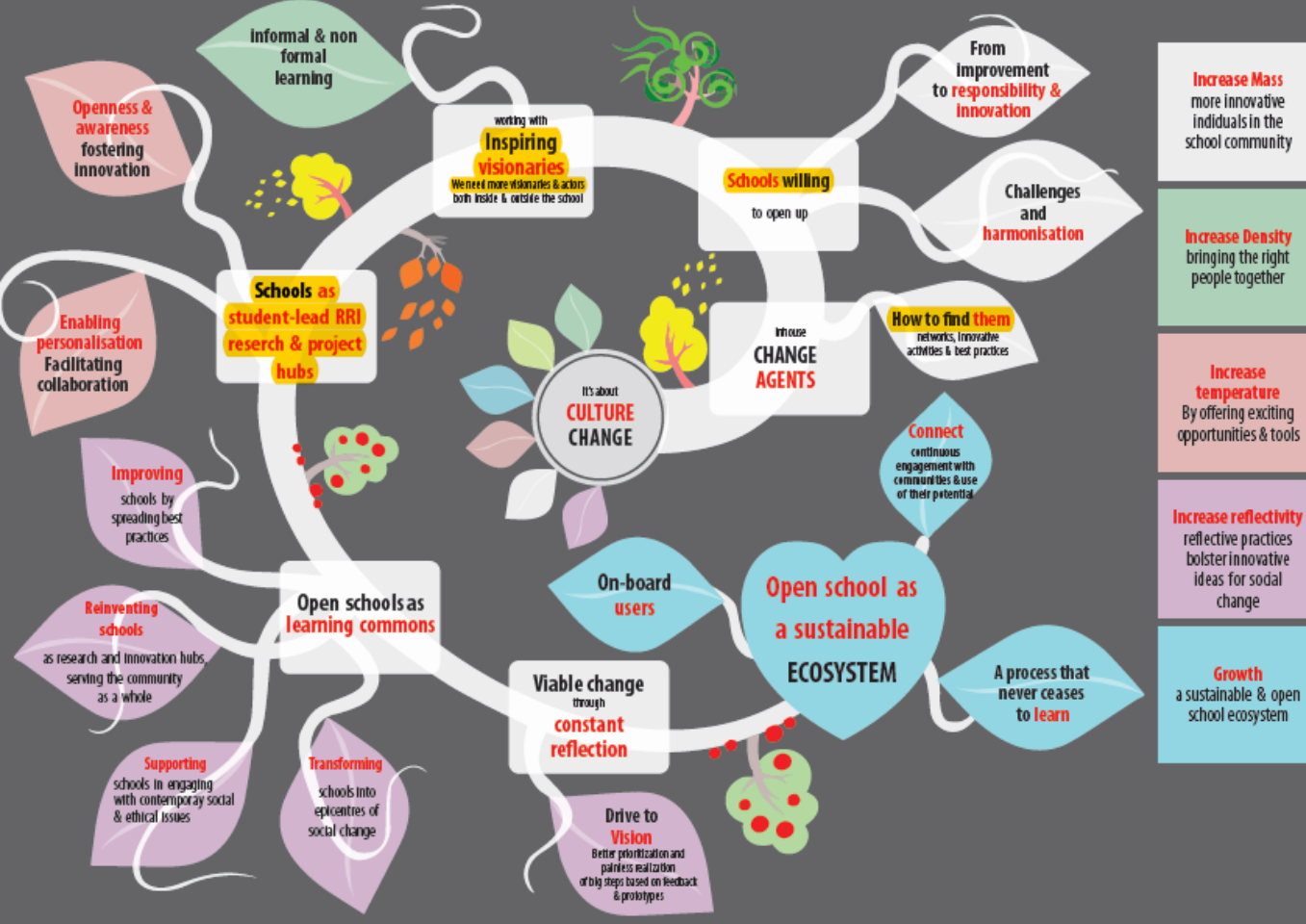


The partial ability achievement rating for different labs demonstrates the sensitivity of the approach on the complexity of the tasks. The students' scores (510 students involved) per phase are presented for a demanding experimental activity (left graph) with high-energy physics (students groups show difficulty in the areas of orientation and analysis, achieving higher scores if involved in the experimental phase) and the comparably simpler recapitulation of the Eratosthenes Experiment (right graph) to estimate Earth's circumference. There, we achieved a more balanced distribution of the students' scores (902 students involved)

[Lazoudis, Sotiriou & Bogner, 2020](#)

Impact Assessment

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An open school is a more engaging environment for learning and makes a vital contribution to the community:

- Student projects meet real needs in the community outside school and draw upon local expertise and experience.
- Learning in and together with the real world creates more meaning and more motivation for learners and teachers.
- The school environment will foster collaboration, mentoring, and will provide opportunities for learners to understand and interrogate their place in the world.

Open Schools for Open Societies

The Open School Model provides school leaders with a powerful framework that can help them with transformation to an open school.



Σχεδιάζοντας το Σχολείο του Αύριο

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Thank you!

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