

Open Schools for Open Societies

Open School for Open Societies Conference 2016

Open Schools for Open Societies

UDLnet
Universal Design for Learning

N°. 528005-LLP-1-2012-1-GR-COMENIUS-CMP - UDLnet

The Pathway to Universal Design for Learning
(UDLnet_WP6_D6.4_Proceedings_of_European_Conference)

UDLnet Consortium

Ellinogermaniki Agogi	Greece
Universal Learning Systems	Ireland
National and Kapodistrian University of Athens	Greece
Angalia Elpidas	Cyprus
NHL University of Applied Sciences	Netherlands
Confederación Española de Centros de Enseñanza	Spain
Centrum für angewandte Systemlösungen e.V.	Germany
Enable Ireland Disability Services Ltd	Ireland
The Finnish Association on Intellectual and Developmental Disabilities	Finland

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The UDLnet project is co-funded by the Lifelong Learning programme of the European Union.

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Using the UDLnet services and tools to prepare learning experiences
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Introduction

The aim of the conference is to introduce and discuss the notion of the "Open School". A school that effectively introduces innovations in education is an engaging environment not only for the students and teachers. It re-designs learning to accommodate and include difference and brings together families, community groups, local businesses, experts, universities, and others into an innovation ecosystem.

Working with more than 5,000 schools across Europe in the framework of numerous European initiatives and Policy Support Actions (e.g. **Inspiring Science Education, Go-Lab, Pathway, Ark of Inquiry, RRI Tools, UDLnet**) over the last five years has proven that a school that effectively introduces innovations in education is an engaging environment not only for the students and teachers. Progressively it brings families, community groups, local businesses, international experts, universities, and other stakeholders into what we term an "Open School".

An Open School culture imports external ideas that challenge internal views and beliefs and, in turn, exports its students – and their assets – to the community it serves. Such an engaging environment makes a vital contribution to its community: student projects meet real needs in the community outside of school, they are presented publicly, and draw upon local expertise and experience. The school environment fosters learner independence – and interdependence – through collaboration, mentoring, and through providing opportunities for learners to understand and interrogate their place in the world. An Open School Culture recognises the important part that students can play as peer enquirers / researchers, and welcomes their active involvement.

There are, however, no quick fixes in the world of education. Instead, education policy makers must support and commit to the laborious task of incrementally improving the competences of the teachers we train and the environment in which they teach, whilst providing teachers with a respect and trust commensurate according their critical societal roles. In this evolutionary context, the consolidation of "good practice" looks for a bottom-up approach to setting the grassroots for new school learning innovations and, at the same time, for an effective approach to holistic policy-making, in order to reach the right balance with top-down planning, thus meeting the challenges for emerging paradigms concerning access to learning, the ***creation and sharing of knowledge and the building of competences in learning communities***. According to the "Science Education for Responsible Citizenship" Report (EC, 2015) there are a series of ways in which science education can help European countries to equip citizens, enterprise and industry with the skills and competences needed to provide sustainable and competitive solutions to the current and future challenges.

Programme


EDEN
ΙΕΠ
ΙΝΣΤΙΤΟΥΤΟ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΠΟΛΙΤΙΚΗΣ
ELLINOGERMANIKI AGOGI
Open Schools for Open Societies
EDEN Open Classroom 2016
04-06.11.16
CONFERENCE PROGRAMME

Programme

FRIDAY 04.11.2016

16:00 - 17:30 Conference Registration

17:30 - 20:00 Opening Session: "From Open Classrooms to Open Schools"

CONFERENCE HALL Conference Welcome

Dr. Andras Szucs, *Secretary General, EDEN European Distance and E-Learning Network*

Dr. Nelly Arvaniti, *PE School Advisor Eastern Attica Directorate of Secondary Education*

Chair: Dr. Sofoklis Sotiriou, *Ellinogermaniki Agogi, Greece*

Universal Design and Development of Accessible Educational and Teaching Aids for Students with Disability:
Effective Policy or Utopia during the financial crisis
Dr. Vassilis Kourbetis, *Head of the Office of European and International Educational Policy, Institute of Educational Policy, Greece*

Sustainable Citizenship through Open Schools
Prof. Franz Bogner, *University of Bayreuth, Germany*

A science capital perspective for open schools
Dr. Effrosyni Nomikou, *Kings College University, London, UK*

The science of sound in the open classroom of tomorrow
Vassilis Katsouros, *Institute for Language and Speech Processing, Athena Research and Innovation Center, Greece*

Teaching Spatial Thinking in an Open and Inclusive Classroom
Prof. Marinos Kavouras, *School of Rural and Surveying Engineering, National Technical University of Athens, Greece*

20.00 - 20.30 Ellinogermaniki Agogi recognises the contribution of professor Costas Tsolakidis, University of Aegean in developing applications and methods for supporting rural schools

"School Gardens" schools Awards

20:30 - 21:30 Dinner (School Restaurant)

21:30 - Schools serving their communities: Observation Night at the School Observatory

SATURDAY 05.11.2016

10:00 - 11:30 Morning session

CONFERENCE HALL

Universal Design for Learning (UDL): re-designing learning to accommodate and include difference

Chair: Nikos Zygouritsas, *Ellinogermaniki Agogi*

Is Content Accessibility in Online/Technology Enhanced Learning UDL Compliant? An American Perspective
Dr. Barbara Schwartz-Bechet, *Associate Dean, College of Education and Rehabilitation, Professor Salus University, Philadelphia, USA*

Selected Universally Designed Educational Material for Students with Disability
Maria Gelastopoulou, Spyridoula Karipi, Dr. Vassilis Kourbetis, *Institute of Educational Policy, Greece*

Applying UDL with children in transition
Ms. Imelda Graham, *Consultant, Universal Learning Systems, Ireland*

SEMINAR ROOM A

Developing an Open Culture in Schools Introduction

Chair: Dr. Sofoklis Sotiriou, *Ellinogermaniki Agogi, Greece*

Science Education for Responsible Citizenship
Dr. Angelos Lazoudis, *Ellinogermaniki Agogi*

Trends, challenges, and responsible research in a new era of technology: Quantum physics coming to application
Prof. Georgios Neofotistos, *Center for Quantum Complexity and Nanotechnology, Physics Department, University of Crete*

Mixing Science and the Arts: Fading Fad or Growing Opportunity?
Dr. Angelos Alexopoulos, *CERN*

Responsible research and innovation in the formal education context
Aliki Giannakopoulou, *Ellinogermaniki Agogi*

11:30 - 12:00 Coffee break

Programme

SUNDAY 06.11.2016

10:00 - 14:00

CONFERENCE HALL
Learning Science Through Theatre

Introduction to the Learning Science Through Theatre Initiative (Art and Science in the Open School)
Pedagogical Approach of the Initiative, Practice (Creativity and Inquiry Science Education)
Pedagogical guidelines for the implementation of the initiative
Menelaos Sotiriou, *ScienceView*
Assoc. Prof. Zacharoula Smyrnaiou, *National and Kapodistrian University of Athens*

Art guidelines (warm ups, script writing, directing, music, choreography) for the implementation of the initiative
Menelaos Sotiriou, *ScienceView*
Petros Stergiopoulos, *Ellinogermaniki Agogi*
Spiros Kouvaras, *Choreographer*
Vassilis Papadopoulos, *Director*
Planning the realisation of the Initiative by Schools
Presentation of the Web based communities of practice for the Initiative
Discussion

SEMINAR ROOM A
Developing an Open Culture in Schools that accommodates and includes difference

Open school synergies around Europe with Erasmus KA1
Sofoklis Sotiriou, Stephanos Cherouvis, Nikos Zygouritsas, *Ellinogermaniki Agogi*

Open school synergies around Europe with Erasmus KA2
Sofoklis Sotiriou, Stephanos Cherouvis, Nikos Zygouritsas, *Ellinogermaniki Agogi*

Open Schools in action: Innovative school projects and project ideas
Chair: Nikos Zygouritsas, *Ellinogermaniki Agogi*
Motivating young learners
Georgia Karountzou, *Director of Scientific and Pedagogical Guidance in Primary Education, Peloponnese, region of Peloponnese*
The case of the primary school of Giannitsochori
Kyriaki Maria Karaggeli, *Primary school of Giannitsochori*
"The garden of our dreams" - An interdisciplinary approach for the development of environmental awareness of children
Kelly Stathi, Maria Aggelakou, Giota Natsikou, Aggelika Tsoutsia, Karolina Kalkantara, *Ellinogermaniki Agogi*
Fieldwork in Byzantine churches
Geramani A., Vavoureki A., *Ellinogermaniki Agogi*
Discovering the Minoan and Mycenaean cultures
Rodi K., Repanti D., Daliani G., *Ellinogermaniki Agogi*
Studying the river Erasinos in the wetland of Vravrona
Tsaknia T., Koskes S., Rallis S., *Ellinogermaniki Agogi*

14:00 - 15:00

MAIN ENTRANCE HALL
Poster Sessions
Teachers sharing their experiences

14:00 - 15:00

Lunch

15:00 - 19:00

CONFERENCE HALL
"Astronomy Festival – presentations and awards" in collaboration with the Hellenic Physical Society

PARALLEL EVENTS

SATURDAY 05.11.2016

12:00 - 13:30

SEMINAR ROOM A
Playing with Protons follow up meeting
Closed event by invitation only
Tina Nantsou, *PwP, Hill Memorial School*
Dr. Angelos Alexopoulos, *CERN*
Stephanos Cherouvis, *Ellinogermaniki Agogi*

14:30 - 16:30

SEMINAR ROOM B
School Innovation Ambassadors Meeting
Closed event by invitation only
Stephanos Cherouvis, *Ellinogermaniki Agogi*

14.30 - 18.00

MUSIC ROOM
Vibrating Physics
Petros Stregiopoulos, *Ellinogermaniki Agogi*
Giannis Alexopoulos, *Ellinogermaniki Agogi*

SUNDAY 06.11.2016

10:00 - 13:00

ART ROOM
Creativity in early years science teacher training event
Closed event by invitation only
Dr. Fani Stylianidou, *Ellinogermaniki Agogi*

11:00 - 12:00

SEMINAR ROOM B
Introducing the use of micro-MOOCs in the science classroom
Eleftheria Tsourlidaki, *Ellinogermaniki Agogi*

The Open Schools for Open Societies Conference 2016 is organised with support from the European Commission in the context of the RRI tools and UDLnet projects.

Programme

SATURDAY 05.11.2016

12:00 - 13:30 Parallel sessions

CONFERENCE HALL

Universal Design for Learning: re-designing learning to accommodate and include difference

Teacher Networking forum: sharing good practices of UDL from teachers around Europe
Chair: Nikos Zygouritsas, *Ellinogermaniki Agogi*

The role of Assistive Technology in UDL
Mr. Karl O'Keefe, *Enable Ireland Disability Services Ltd*

UDL in practice: the case of a school in Greece
Nikos Nerantzis, *Greece*

UDL in practice: the case of a school in Cyprus
Maria Konomia, *Cyprus*

COMPUTER LAB

Developing an Open Culture in Schools Workshop

Moderator: Aliki Giannakopoulou, *Ellinogermaniki Agogi*

With this practical workshop, following the introduction to the notion of responsible research and innovation, participants will have the opportunity to learn how to use a number of resources in their schools related to RRI through exploring the RRI Toolkit.

SEMINAR ROOM A

Open Schools in action: Innovative school projects and project ideas

Chair: Dr. Angelos Lazoudis, *Ellinogermaniki Agogi, Greece*

The E-LIOS project: A school alliance for Good Practices
Chiotelis Giannis

Little gardeners in action
Tsakanika D., Smyrniotaki E., Vavouraki A., *Ellinogermaniki Agogi*

Researching our dietary habits Series of actions and life choices
Ioannou G., Trigka V., *Ellinogermaniki Agogi*

Preparing the colonization of Mars. Design, construction and testing of a shelter
Tsaknia T., *Ellinogermaniki Agogi*

Traveling to the past by playing and creating stories
Daliani E., Sarra K., Stouraitis E., *Ellinogermaniki Agogi*

Schools: Future labs. Connecting science and foreign language education
Anna Slavi, *Goethe-Institut Athen*

13:30 - 14:30 Lunch

14:30 - 16:00 Parallel sessions

CONFERENCE HALL - WORKSHOP

Innovation labs as flexible classrooms
Moderators:
Drs. Roelien Bos-Wierda, *NHL University of Applied Sciences, The Netherlands*
Ron Barendsen, *NHL University of Applied Sciences, The Netherlands*

COMPUTER LAB - WORKSHOP

Open and innovative STEM practices in Schools
Moderators:
Dr. Angelos Lazoudis, Dr. Georgios Mavromanolakis, *Ellinogermaniki Agogi*

ART ROOM - WORKSHOP

The nature of creativity in early years science (Part 1)
Moderator:
Dr. Fani Stylianidou, *Ellinogermaniki Agogi*

16:00 - 16:30 Coffee break

16:30 - 18:00 Parallel sessions

CONFERENCE HALL - WORKSHOP

Using the UDLnet services and tools to prepare learning experiences
Moderators:
Pr. George Kouroupetroglou, *National and Kapodistrian University of Athens, Greece*
Dr. Gabi Lau, *Centrum für Angewandte Systemlösungen e. V. Germany*
Stephanie Cloonan, *Enable Ireland*

COMPUTER LAB - WORKSHOP

Bringing Nobel prize research in the classroom
Moderators:
Georgios Vassileiades, *National and Kapodistrian University of Athens, Greece*
Stelios Vourakis, *National and Kapodistrian University of Athens, Greece*

SEMINAR ROOM - WORKSHOP

Promoting prosocial skills through games
Moderator:
Dr. Lilia Dimaraki, *Ellinogermaniki Agogi*

ART ROOM - WORKSHOP

The nature of creativity in early years science (Part 2)
Moderator:
Dr. Fani Stylianidou, *Ellinogermaniki Agogi*

18:00 - 19:30
CONFERENCE HALL

Keynote talk. Bringing Nobel prize research in the classroom
Prof. Christine Kourkoumelis, *National and Kapodistrian University of Athens, Greece*

Round table: New technologies and open and distance learning in an Open School. How can they re-design learning to accommodate and include difference?
Dr. Alan Bruce, *Universal Learning Systems, Ireland*
Prof. George Kouroupetroglou, *National and Kapodistrian University of Athens, Greece*
Prof. Costas Tsolakidis, *University of the Aegean, Greece*
Moderator: Nikos Zygouritsas, *Ellinogermaniki Agogi*

Inspiring Science Education Schools Awards and Certification

Conference Welcome

Dr. Andras Szucs
Secretary General, EDEN European Distance and E-Learning Network





Conference Welcome

Dr. Andras Szucs
Secretary General, EDEN European Distance and E-Learning Network

ABOUT EDEN



- A membership organisation
- Varied, active, developing community
  - 195 institutional members, 1150 individuals in the Network of Academics and Professionals,
  - Altogether 56 countries
- Over 400 institutions represented in the membership
- Launched 1991 - 25 years Anniversary in 2016 !

3

Distance and e-learning: distinctive European elements



- Avoiding social exlusion, support **equal access**, fight against digital gap(s)
- Stressing the **importance of pedagogy**, educational **methodology**, instructional design
- ***Critical and responsible application of technology (ICT)***
- Linguistic and **cultural diversity**,
- Remarkable **differences in (e)-maturity** across member states
- ***With some critical questions emerging:***
  - Is 'learning society' a **credible concept?**
  - Is there **convergence or divergence** of learning systems across the expanding European Union?

4

Conference Welcome

Dr. Andras Szucs
Secretary General, EDEN European Distance and E-Learning Network





Conference Welcome

Dr. Andras Szucs
Secretary General, EDEN European Distance and E-Learning Network

Complexity is the new reality (Conole)

New technologies have a unique set of characteristics:

- dense interconnectivity,
- highly dynamic,
- open,
- non-linear,
- extraordinary behavourial diversity and
- intrinsically unpredictable.



Social and participatory media

- networked,
- distributed,
- peer reviewed and open,
- complex, dynamic and evolving,
- Your network and who you connect with defines you

New approaches to openness – beyond Open Educational Resources
Prof. Gráinne Conole, University of Leicester

7

FEW KEYWORDS...

A NEW GENERATION OF ICT ENHANCED LEARNING PRACTICE IS EMERGING

- From niche to mainstream: e-learning landscape changing rapidly, many new providers
- Scalability is getting critical
- Measuring learning in focus – big data, learning analytics
- Increased personalisation, using smart mobile devices
- New paradigm of teacher training: immersive real experiences
- The number of e-learning practitioners expanding, but massification of practice challenges the status of the "expert"

8

Conference Welcome

Dr. Andras Szucs
Secretary General, EDEN European Distance and E-Learning Network

There IS a role for expertise and mission for the experts !



The EDEN Fellows, Dublin, 2011

9

THE NEW GENERATION OF PRACTICE IMPLIES
A NEW EDEN AGENDA

- Complex and changing field of practice and community:
  calls for a holistic approach.
- Assure the cross-generational continuity of the European open-distance learning legacy !
- Globalize activities and impact with partner organisations through alliances and open collaboration.

10

Conference Welcome

Dr. Andras Szucs
Secretary General, EDEN European Distance and E-Learning Network

Thank you !

- Thanks to Ellinogermaniki Agogi, the organisers and all conference delegates!
- EDEN is here to serve you!
- Have a great conference!



11

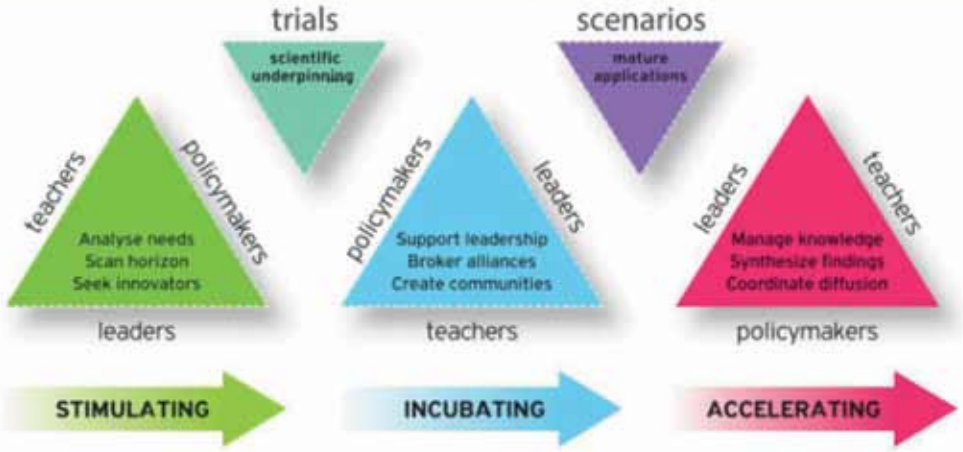
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Ellinogermaniki Agogi, Greece





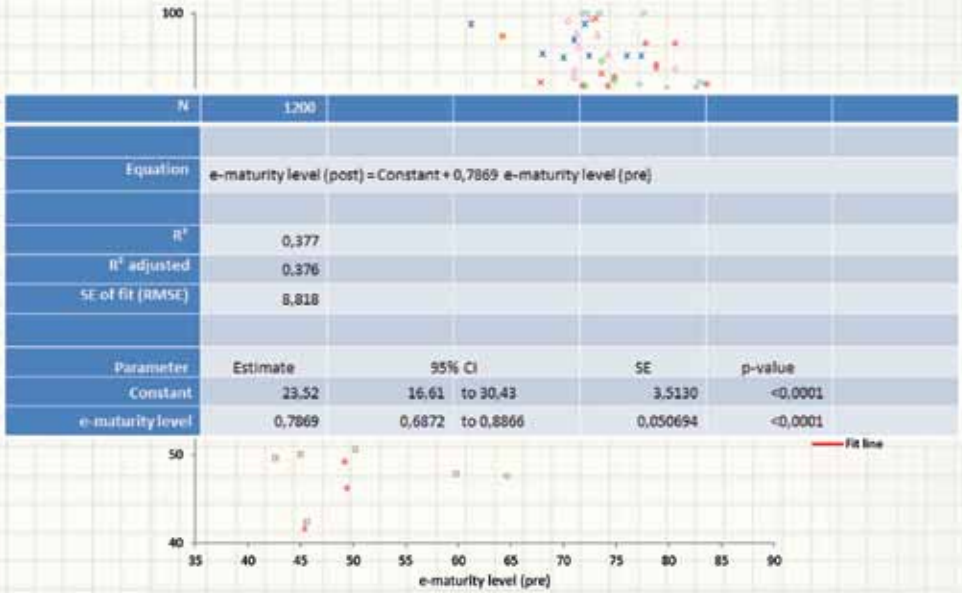
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Ellinogermaniki Agogi, Greece

School Innovation Model



Data from 1200 schools

(International Journal of Science Education and Technology, 2016)



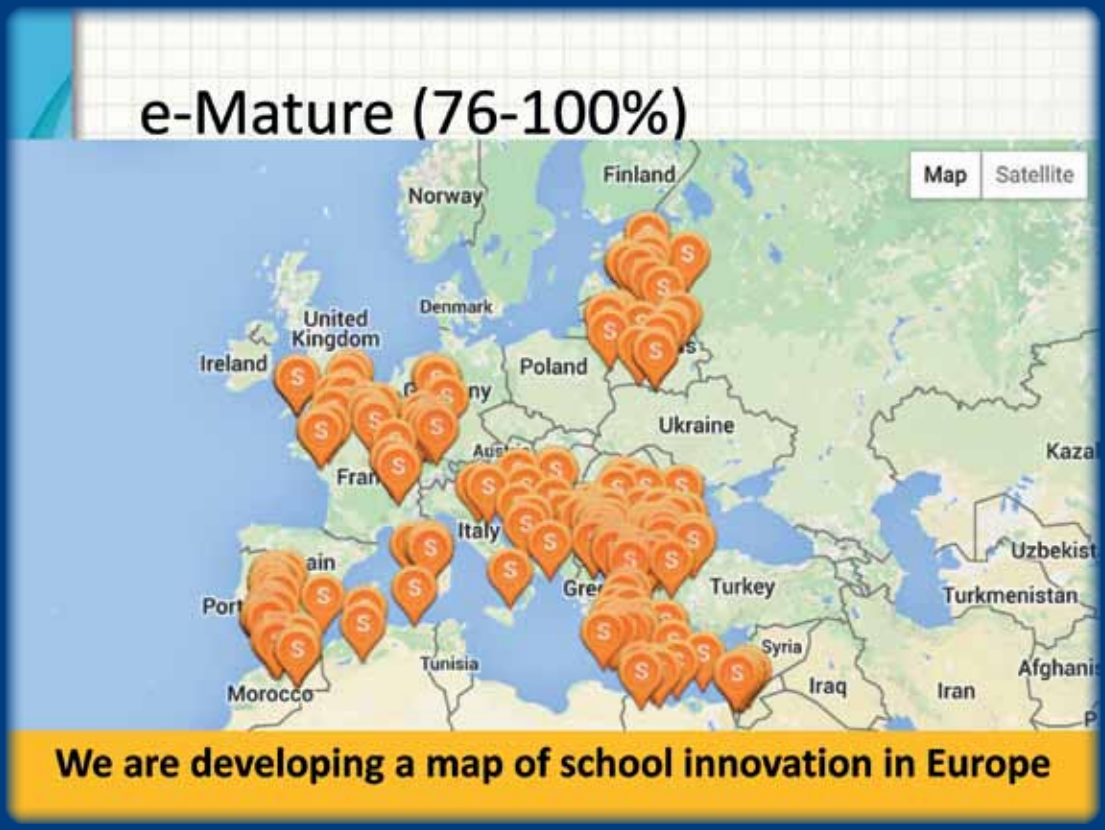
N	1200				
Equation	e-maturity level (post) = Constant + 0,7869 e-maturity level (pre)				
R^2	0,377				
R^2 adjusted	0,376				
SE of fit (RMSE)	8,818				
Parameter	Estimate	95% CI		SE	p-value
Constant	23,52	16,61	to 30,43	3,5130	<0,0001
e-maturity level	0,7869	0,6872	to 0,8866	0,050694	<0,0001

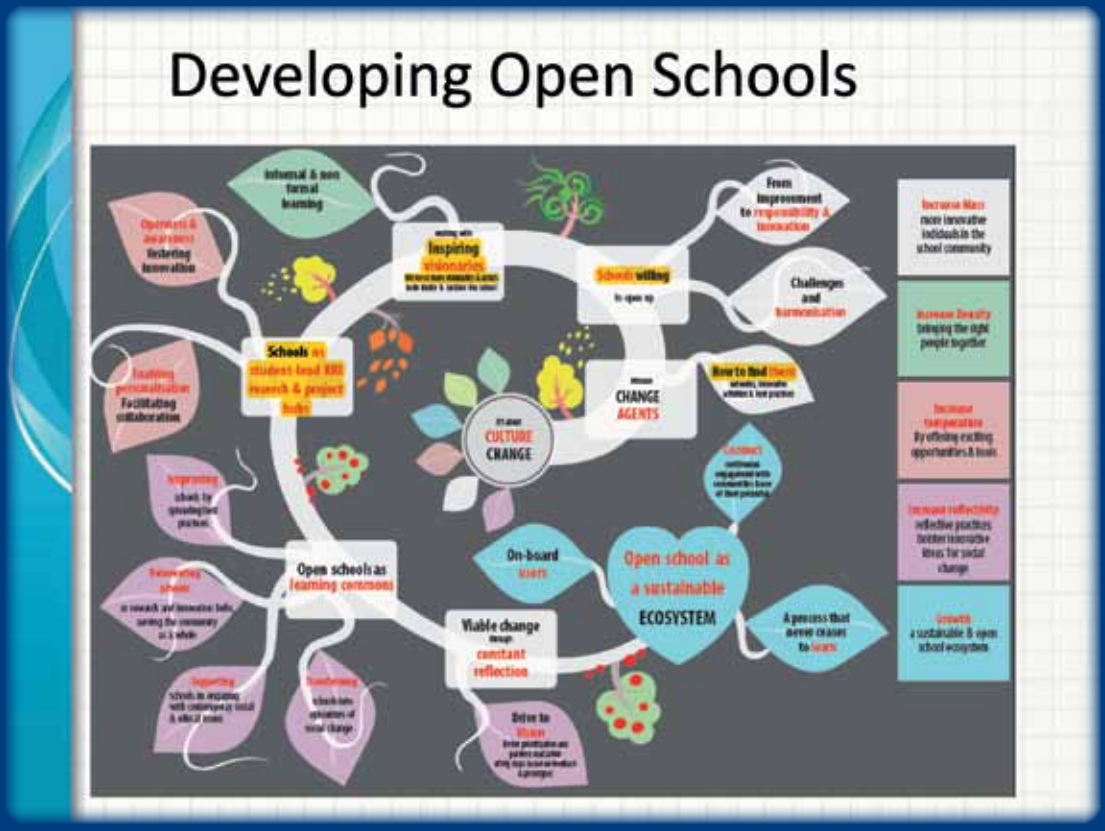
Chair: Dr. Sofoklis Sotiriou
Ellinogermaniki Agogi, Greece





Chair: Dr. Sofoklis Sotiriou
Ellinogermaniki Agogi, Greece





Universal Design and Development of Accessible Educational and Teaching Aids for Students with Disability: Effective Policy or Utopia during the financial crisis

Dr. Vassilis Kourbetis
Head of the Office of European and International Educational Policy, Institute of Educational Policy, Greece

Universal Design and Development of Accessible Educational and Teaching Aids for Students with Disability

Effective Policy or Utopia during the financial crisis?

Vassilis Kourbetis, Ph.D.
vk@iep.edu.gr

ATHENS

Open Schools for Open Societies

04-06.11.16

MINISTRY OF EDUCATION, RESEARCH AND RELIGIOUS AFFAIRS
INSTITUTE OF EDUCATIONAL POLICY

ΕΣΠΑ 2014-2020
ανάπτυξη - εργασία - αλληλεγγύη

Lifelong Dilemmas?



- Special Education?
- General Public Schools and Special Education Schools?
- Is there an antiphrasis ???
- The answer is NO

Universal Design and Development of Accessible Educational and Teaching Aids for Students with Disability: Effective Policy or Utopia during the financial crisis

Dr. Vassilis Kourbetis

Head of the Office of European and International Educational Policy, Institute of Educational Policy, Greece



"Design and Development of Accessible Educational and Instructional Materials for Students with Disabilities"

- **Period of implementation :**





2020

Universal Design and Development of Accessible Educational and Teaching Aids for Students with Disability: Effective Policy or Utopia during the financial crisis

Dr. Vassilis Kourbetis
Head of the Office of European and International Educational Policy, Institute of Educational Policy, Greece

Action Objectives



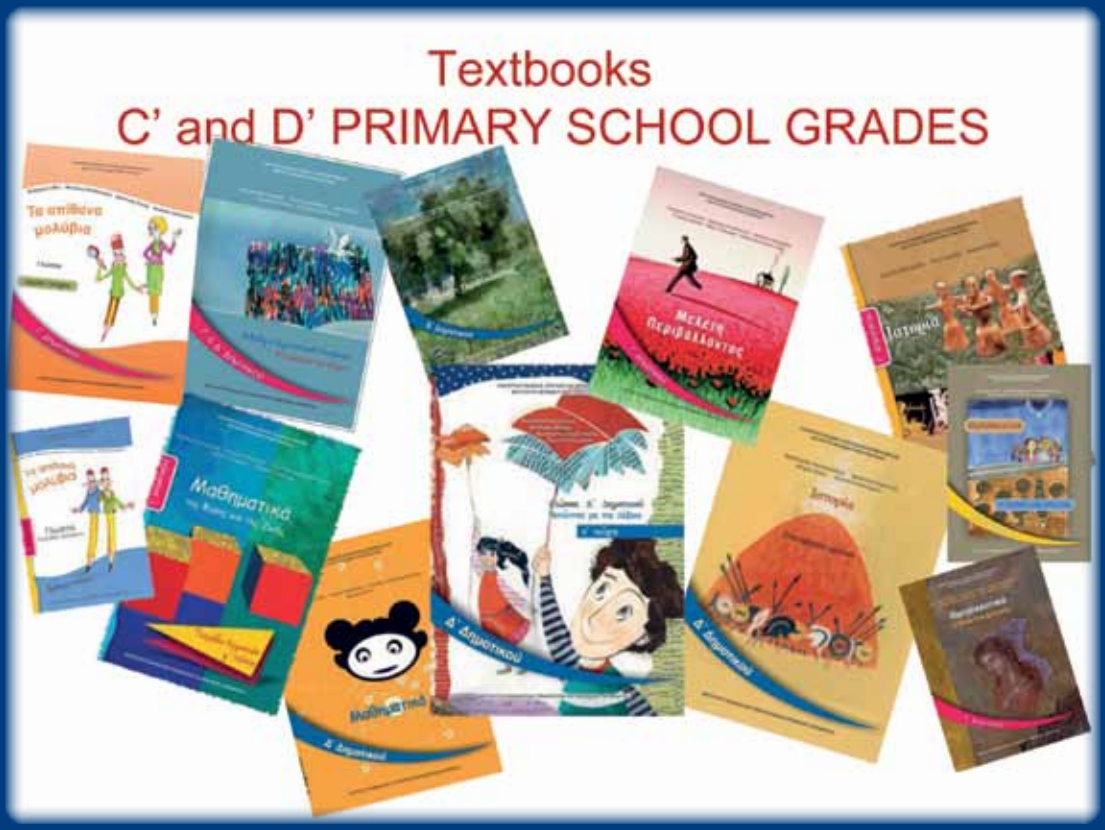
Textbooks
A' and B' PRIMARY SCHOOL GRADES



Universal Design and Development of Accessible Educational and Teaching Aids for Students with Disability: Effective Policy or Utopia during the financial crisis

Dr. Vassilis Kourbetis

Head of the Office of European and International Educational Policy, Institute of Educational Policy, Greece

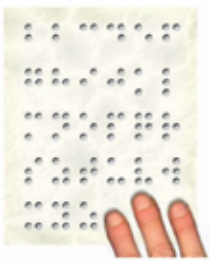


- **Adaptation**

both in printed and digital format, fully accessible for students with:

- Visual Impairment
- Hearing Impairment
- Physical (motor) disability
- Mild mental disability
- Autism
- Attention deficit disorder (ADD)











Universal Design and Development of Accessible Educational and Teaching Aids for Students with Disability: Effective Policy or Utopia during the financial crisis

Dr. Vassilis Kourbetis
Head of the Office of European and International Educational Policy, Institute of Educational Policy, Greece



- **Provision** of special software
- **Archive** of previously developed educational material



- **Standards** for material development
- **Teacher Training Courses**





Platforms for "digital content accessibility" for students with disabilities
http://www.prosvasimo.gr









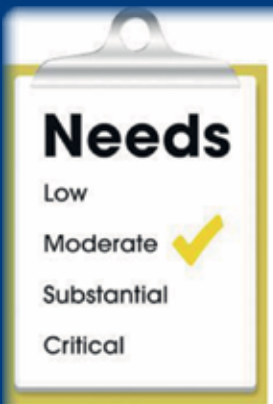
Universal Design and Development of Accessible Educational and Teaching Aids for Students with Disability: Effective Policy or Utopia during the financial crisis

Dr. Vassilis Kourbetis

Head of the Office of European and International Educational Policy, Institute of Educational Policy, Greece

Special Education & Universal Design







- Special education Professionals in "Evaluation and Support Services"
- Special education School Counselors
- Teachers in "Special education schools"
- Special education Teachers in "General education schools"
- Over **3500** teachers
- "In-service" teacher training

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Individualized measures to support students with disabilities, in order to maximize academic and social development by using New Technologies and digital educational material





•*We aim at*



A) modernization and strengthening education of students with disabilities and/or special education needs

B) restructuring the role of special school units and inclusion classes using existing accessible educational material in digital format so that education meets all students' needs without any discrimination



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- **Material from "Digital School"** http://dschool.edu.gr/
- **Accessible and editable educational material**
- **Accessible software for Special Education**
- **Special software developed by co-funded projects of the Ministry of Education**
- **Accessible educational material that is being developed at IEP**
- **Special software developed at Universities** http://www.prosvasimo.gr/



E- Platform

for distance support

All education material created are hosted on IEP's website, which through open source platforms and appropriate interface is accessible to all users

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Development of Support Structures for Integration and Inclusion in Education of Students with Disabilities or Special Educational Needs - Conversion of Special School into Support Center in Special Education Training





Action Objectives

3550 SE teachers, School Psychologists, Social Workers







- Strengthening general school so as to operate for all students
  - without discriminations,
  - facilitate access and participation and
  - prevent academic failure and school dropout.

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Converting the special school into a center of an early support for general schools, their students and families too.



Bringing a paradigm shift through training courses on human rights and good practices in educating students with disabilities

Ensuring adequate staffing for special educational evaluation committees aiming at a more effective interdisciplinary support for students with disabilities.

Effective Policy or Utopia during the financial crisis?



Universal Design and Development of Accessible Educational and Teaching Aids for Students with Disability: Effective Policy or Utopia during the financial crisis

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Sustainable Citizenship through Open Schools

Prof. Franz Bogner
University of Bayreuth, Germany

Sustainable Citizenship

Competences in Knowledge, Attitudes and Behaviour



Franz X. Bogner

University of Bayreuth (DE)

CITZENSHIP: the character of an individual viewed as a member of society; behaviour in terms of the duties, obligations, and functions of a citizen: an award for good citizenship.

SUSTAINABLE CITZENSHIP: Like all citizenship models it includes normative claims. Its general claim is that good citizenship requires that people assume non-reciprocal responsibility for a series of spatial, temporal, and material relationships involved in sustainable development. The normative claim of non-reciprocity, which involves several different dimensions of understandings and practices, generally calls on citizens to give more weight to universal principles and the global commons than to their private desires.

http://www.sustainablecitizen.org

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Sustainable Citizenship and the New Politics of Consumption
The Annals of the American Academy of Political and Social Science. 644, 88-120 (2012)

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Sustainable citizenship as a methodology for engagement: navigating environmental, economic, and technological rationalities.
Journal of Environmental Studies and Sciences, 6/3, 617–630

Hidden Agenda: Sustainable Citizenship

PRESERVATION:
ecocentrism, stewardship with nature & environment, balance of nature, enjoyment with nature, …





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Pestalozzi: 3H = Head, Hand, Heart

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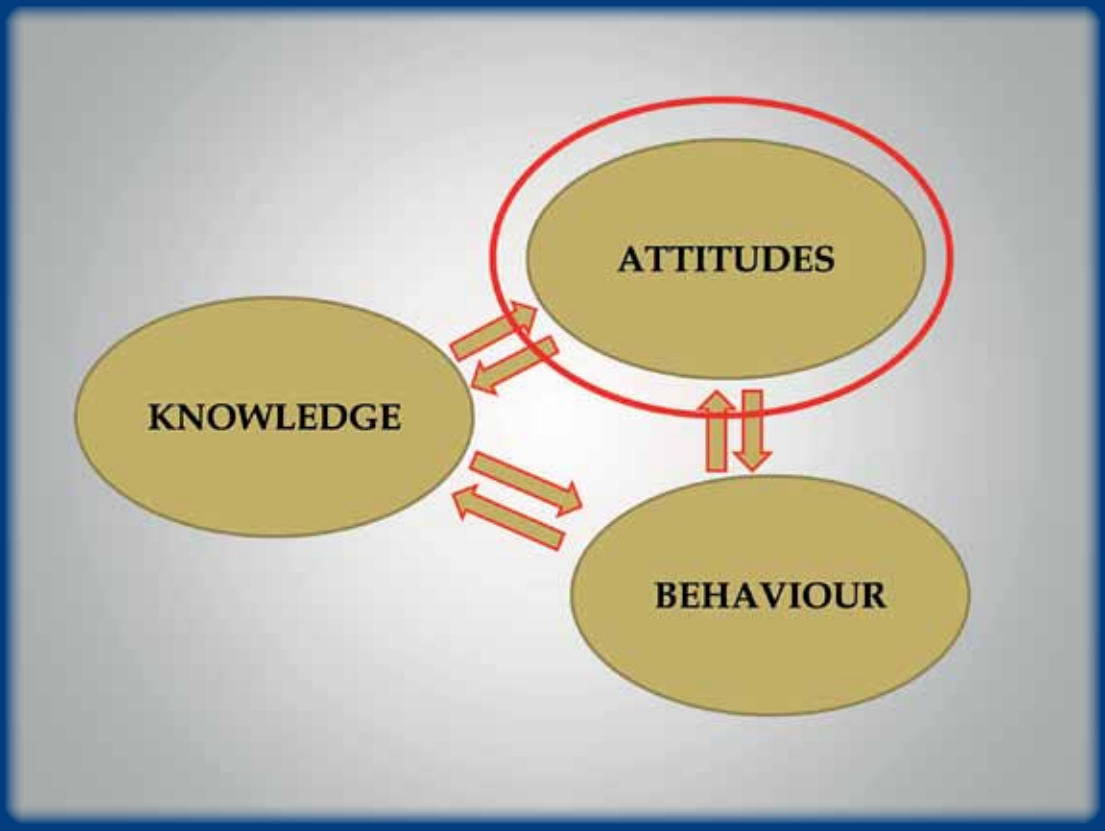




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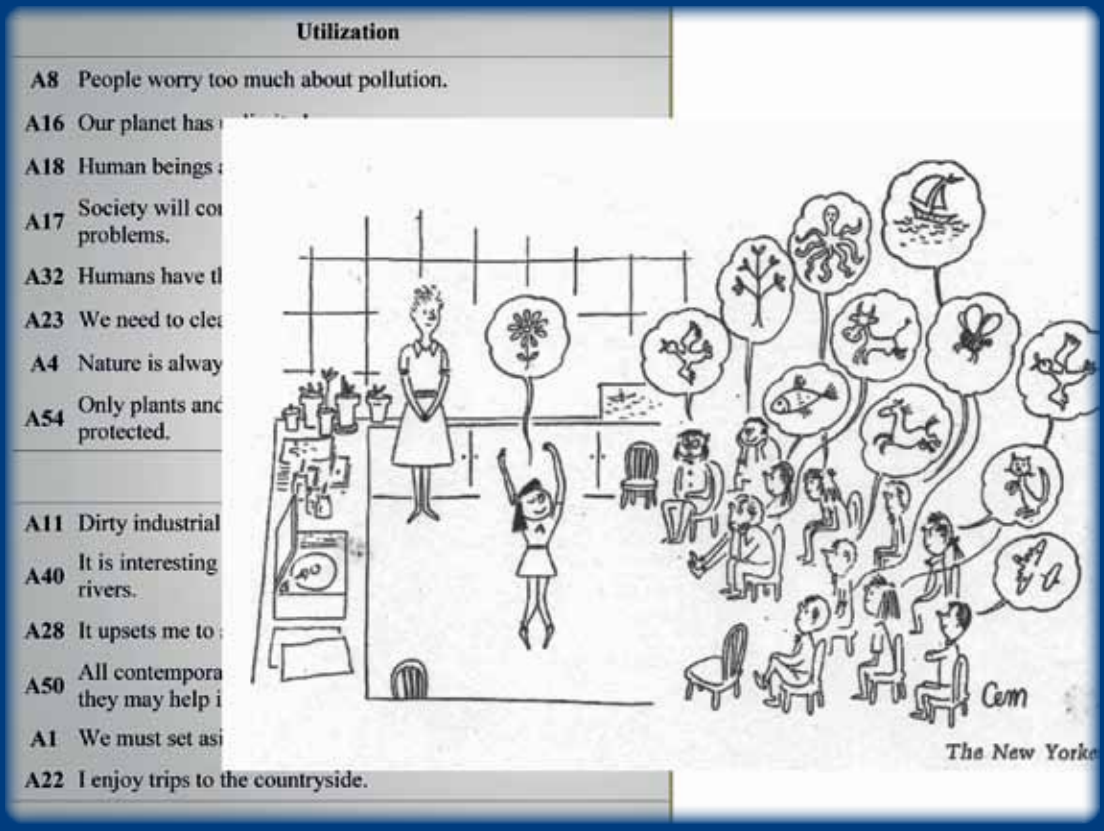




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	Utilization	C1	C2	*h*	*M (SD)*
A8	People worry too much about pollution.	.77		.61	2.13 (1.27)
A16	Our planet has unlimited resources.	.74		.59	1.89 (1.24)
A18	Human beings are more important than other creatures.	.60		.37	2.22 (1.21)
A17	Society will continue to solve even the biggest environmental problems.	.56		.32	2.39 (1.13)
A32	Humans have the right to change nature as they see fit.	.48		.27	1.42 (0.84)
A23	We need to clear forests in order to grow crops.	.39		.22	1.44 (0.79)
A4	Nature is always able to restore itself.	.37		.15	2.35 (1.10)
A54	Only plants and animals of economical importance need to be protected.	.36		.20	1.25 (0.64)
	Preservation	**F1**	**F2**	***h***	***M (SD)***
A11	Dirty industrial smoke from chimneys makes me angry.		.52	.30	3.29 (0.93)
A40	It is interesting to know what kinds of animals live in ponds or rivers.		.50	.27	3.62 (0.69)
A28	It upsets me to see the countryside taken over by building sites.		.50	.27	3.35 (0.97)
A50	All contemporary plant species should be preserved because they may help in the discovery of new medicines.		.49	.27	3.47 (0.82)
A1	We must set aside areas to protect endangered species.		.45	.20	3.84 (0.46)
A22	I enjoy trips to the countryside.		.43	.19	3.80 (0.56)

2-MEV-model: Bogner & Wiseman 1999

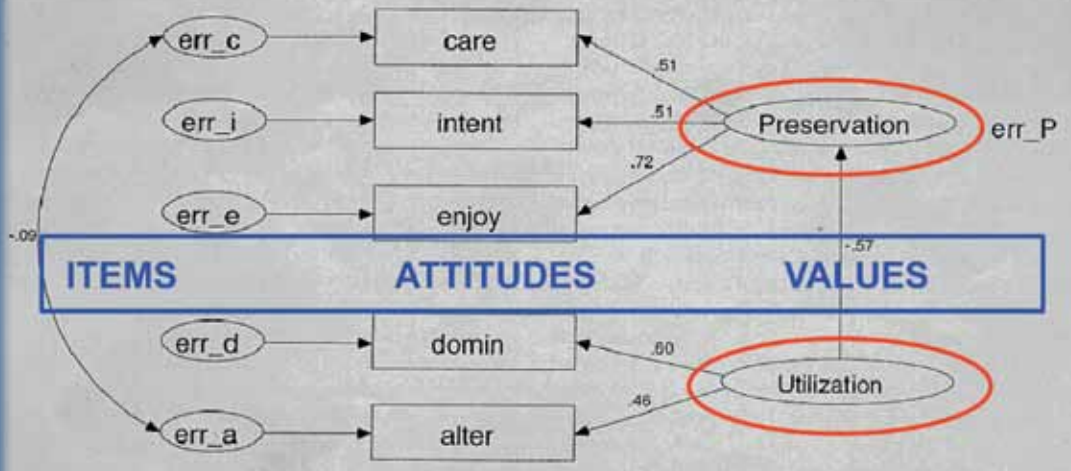


Figure 2
Our final model and the standardized estimates of the various coefficients, including correlations between specific (error) terms. $\chi^2 = 2.80$, df = 3, $p = .42$.

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European Psychologist, Vol. 4, No. 3, September 1999, pp. 139–151
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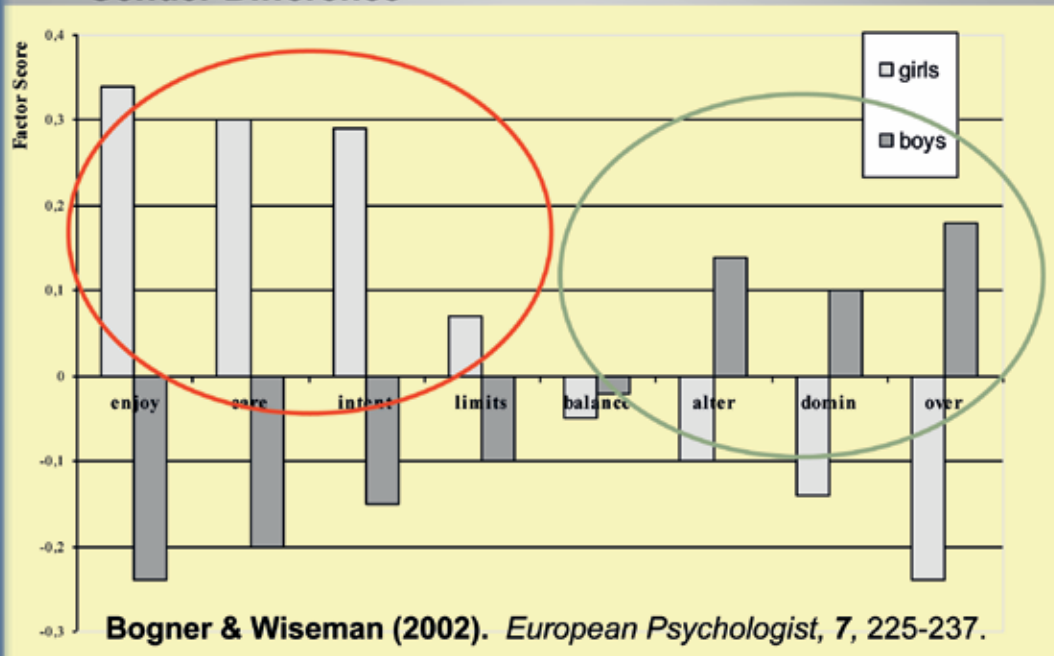
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PRESERVATION:
ecocentrism, stewardship with nature & environment, balance of nature, enjoyment with nature, …

UTILIZATION:
anthropocentrism, exploitation, man over nature, human dominance, altering nature, …

Gender Difference



Bogner & Wiseman (2002). *European Psychologist, 7*, 225-237.

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2-MEV scale

about 15.000 students

Bogner & Wilhelm (1996) *The Environmentalist*, **16**, 96-110.
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independent cross-testing & challenging:

ELSEVIER

Journal of Environmental Psychology 24 (2004) 289–303

Journal of ENVIRONMENTAL PSYCHOLOGY

www.elsevier.com/locate/yjevp

The structure of environmental attitudes: A first- and second-order confirmatory factor analysis

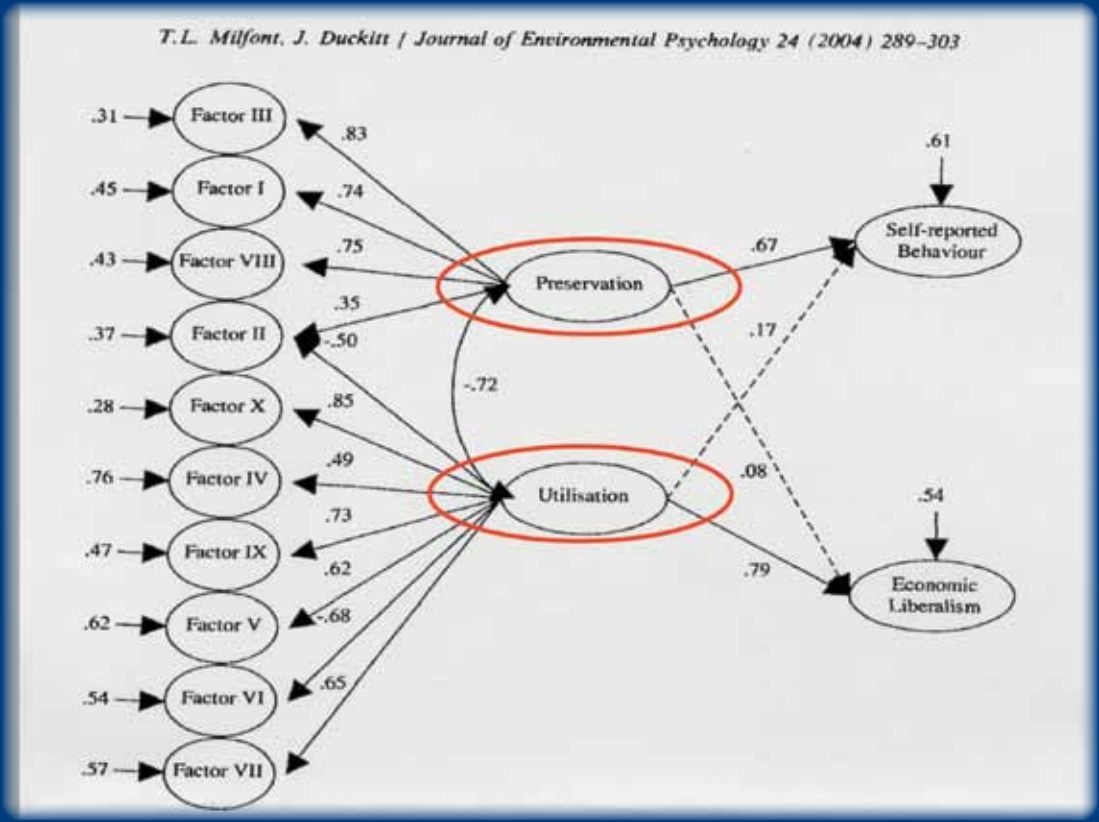
Taciano L. Milfont[a,b,*], John Duckitt[a]

[a]*Department of Psychology, University of Auckland, Human Sciences Building, 10 Symonds Street, Office 632, Auckland, New Zealand*
[b]*Department of Psychology, Federal University of Alagoas, Brazil*

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Routledge
Taylor & Francis Group

The 2-MEV Scale in the United States: A Measure of Children's Environmental Attitudes Based on the Theory of Ecological Attitude

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The University of Arizona, Tucson, Arizona, USA

Constantinos C. Manoli
The University of Cyprus, Nicosia, Cyprus

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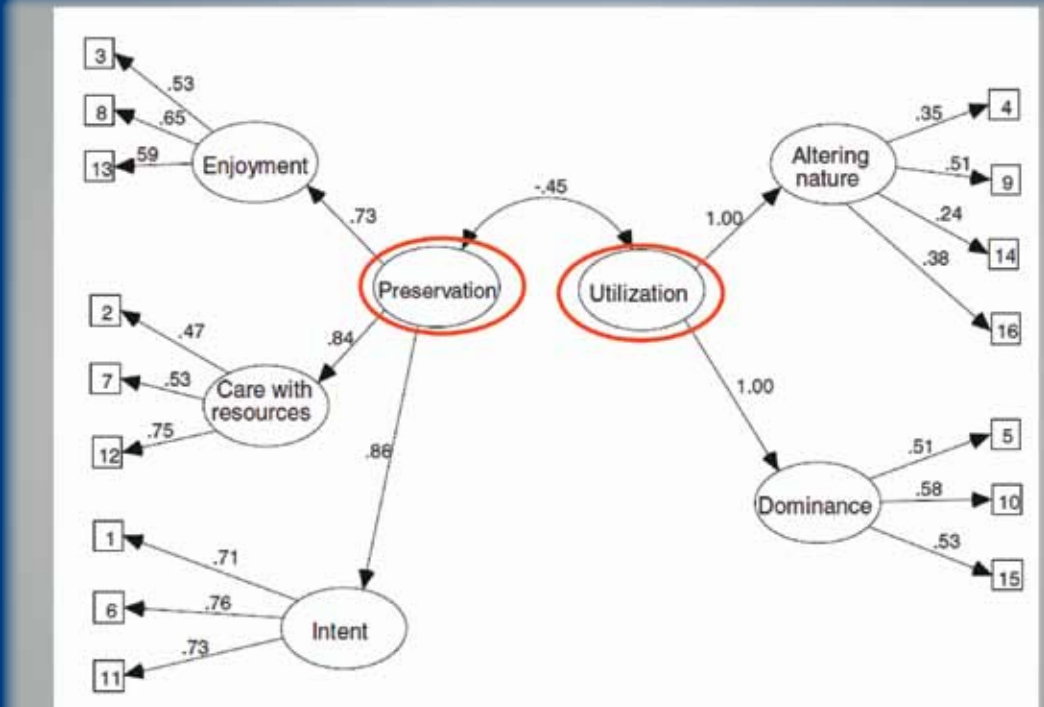


FIGURE 1 Year two confirmatory factor analysis model.

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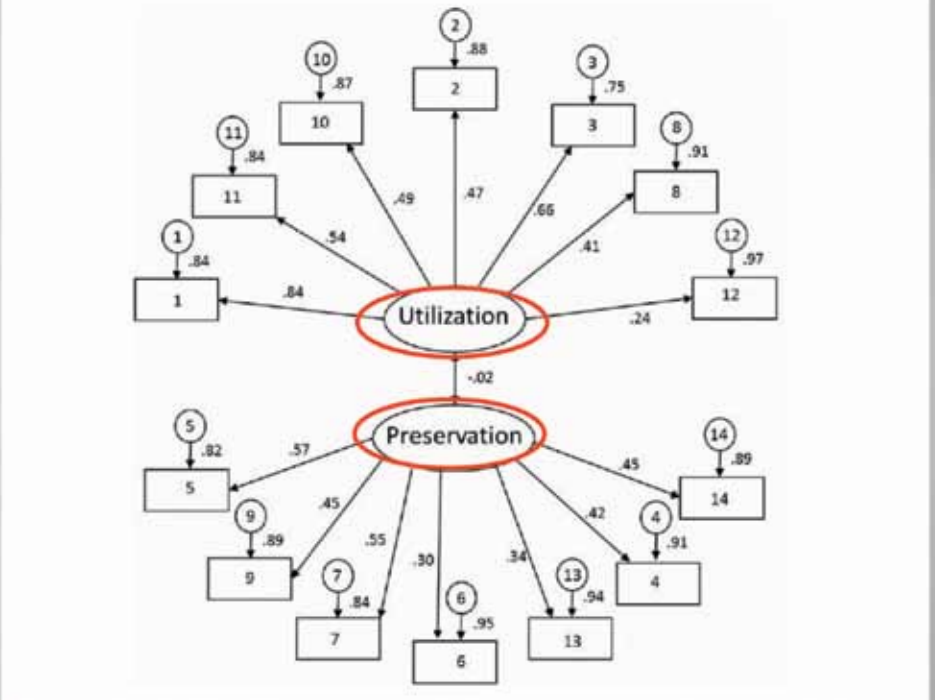


Figure 3. Results of the CFA. Items and their loadings (regression weights) onto the utilization and

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2-MEV-model: Bogner & Wiseman 1999, 2002, 2004, 2006

Factor-analytically extracted scales for environmental perception monitoring (second-order structure)

Model independently confirmed
Milfont & Duckitt 2004, 2006, 2009 (NZ)
Johnson & Manoli 2008, 2010 (US)
Boeve-de Pauw &Van Petegem 2010, 2011 (BE)
Borchers, Boesch, Riedel, Guilahoux, Ouattara & Randler (2013) (IC)

PRESERVATION: ecocentrism, stewardship with nature & environment, balance of nature, enjoyment with nature, …

UTILIZATION: anthropocentrism, exploitation, man over nature, human dominance, altering nature, …

Up to now: available in at least 27 languages

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Bogner & Wiseman (2006) 2-MEV: Constructie van de Nederlandstalige versie

1. Het stoort me om te zien hoe het platte land wordt ingenomen door bouwzones.
2. Zich zorgen maken over het milieu zorgt vaak voor vertragingen bij ontwikkelingsprojecten.
3. Ik geniet van uitstapjes naar het platte land.
4. We moeten bossen kappen zodat we gewassen kunnen telen.
5. De mensheid zal uitsterven als we niet in harmonie met de natuur leven.
6. Onze planeet heeft ongelimiteerde grondstoffen.
7. De maatschappij zal zelfs de grootste milieuproblemen blijven oplossen.
8. De natuur is altijd in staat om zichzelf te herstellen.
9. Het is fijn om aan de kant van een vijver te zitten en naar rondvliegende libellen te kijken.
10. We moeten meer wegen bouwen, zodat mensen naar het platteland kunnen reizen.
11. Ik bespaar water door een douche te nemen in plaats van een bad.
12. Enkel de dieren en planten die van belang zijn voor de economie moeten beschermd worden.
13. Ik doe het licht altijd uit als ik het niet nodig heb.
14. Mensen hebben het recht de natuur naar eigen goeddunken aan te passen.
15. We moeten stukken natuur voorbehouden om bedreigde dier- en plantensoorten te bescherme
16. Mensen maken zich te veel zorgen over vervuiling.
17. Het is interessant om te weten welke dieren er in vijvers en rivieren leven.
18. Mensen zijn belangrijker dan andere wezens.
19. Vuile industriële rook uit schoorstenen maakt me boos.
20. We moeten onkruid verwijderen uit de tuin zodat mooie bloemen kunnen groeien.

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2-MEV量表中文翻译

- 田野变成盖满房子的地方，我不喜欢。
- 野草与好看的花一样重要。
- 为了省水，我愿意淋浴而不是泡澡。
- 地球的资源是用不完的。
- 把土地留给可能灭绝的物种，这种保护没有必要。
- 担心环境不是影响经济建设的理由。
- 如果不能与自然和谐相处，人类将会灭亡。
- 我们要建造更多的道路，方便人们到田野中去旅行。
- 我总是随手关灯。
- 人类没有权利按自己的愿望改变自然。
- 坐在池塘边观看蜻蜓飞舞让我感到厌烦。
- 自然受到损害后总是能够自己恢复。
- 肮脏的工业烟灰让我感到愤怒。
- 为了种植农业作物，我们可以砍伐森林来获得土地。
- 不论环境问题多大，人类都可以解决。
- 人类并不比其他生物更重要。
- 我很好奇池塘或河流里生活着哪些生物。
- 人们对污染过分担心。
- 我不喜欢乡村，因为那里不热闹。
- 我们不应该只保护经济性的植物和动物。

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Συμφωνείτε ή διαφωνείτε πως:	Συμφωνώ Απόλυτα	Συμφωνώ	Δεν είμαι σίγουρος	Διαφωνώ	Διαφωνώ απόλυτα
1. Συνεισφέρω σε περιβαλλοντικό οργανισμό, ή θα το έκανα αν είχα περισσότερα χρήματα.	O	O	O	O	O
2. Το χειμώνα βεβαιώνομαι ότι η θέρμανσης στο σπίτι μου δεν είναι πολύ ψηλά έτσι ώστε να εξοικονομώ ενέργεια.	O	O	O	O	O
3. Απολαμβάνω να κάθομαι στις όχθες μιας λίμνης και να παρακολουθώ τα έντομα που πετούν.	O	O	O	O	O
4. Οι άνθρωποι έχουν το δικαίωμα να αλλάζουν το φυσικό περιβάλλον για να εξυπηρετεί τις ανάγκες τους.	O	O	O	O	O
5. Η κατασκευή αυτοκινητόδρομων είναι τόσο σημαντική που δικαιολογεί την καταστροφή δασών και θαμνότοπων.	O	O	O	O	O
6. Φυτά και ζώα έχουν τα ίδια δικαιώματα με τον άνθρωπο.	O	O	O	O	O
7. Κοντεύουμε στο όριο του αριθμού των ανθρώπων που μπορεί να στηρίξει η γη (τροφή & πρώτες ύλες).	O	O	O	O	O
8. Η προστασία του περιβάλλοντος κοστίζει αρκετά χρήματα. Είμαι διατεθειμένος να βοηθήσω στη συλλογή χρημάτων γι' αυτόν το	O	O	O	O	O

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Essential to the 2-MEV is that it doesn‘t imply a conflict between assigning importance to preserving the environment and the need to make use of natural resources.

Thus, the 2-MEV framework and the NEP one are essentially different : endorsing P does not imply rejecting U, whereas endorsing the NEP does not imply rejecting the DSP.

2-MEV provides multiple benefits:
- **offering a fix dimensional structure**
- **allowing inter-study comparisons**
- **fitting well with the current psychology of sustainable development**

Boeve-de Pauw & Van Petegem 2011, Boeve-de Pauw 2011

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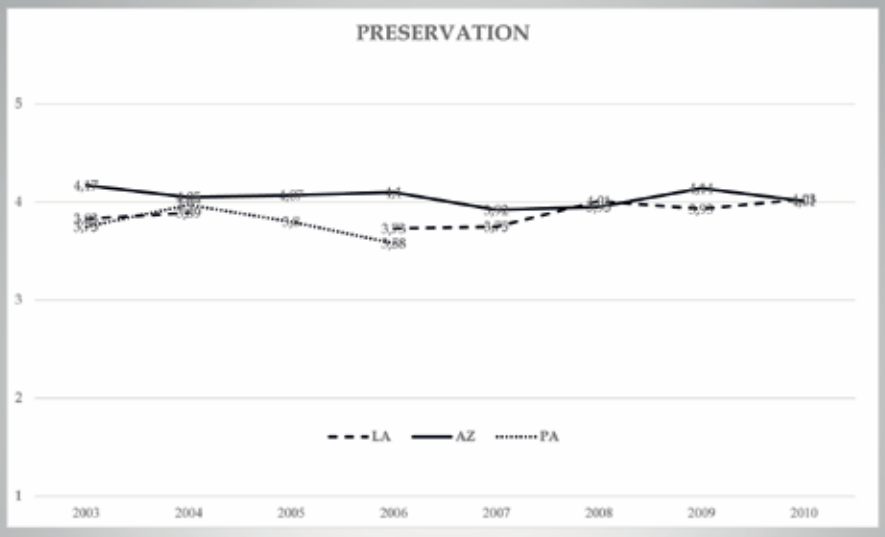
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Table 3. Factor structure of the total sample (n=10676) as well as of the state subsamples: Arizona (n=1395), Louisiana (n=5565), Pennsylvania (n=3716). All scores below 0.3 are suppressed.

TOTAL		ARIZONA		LOUISIANA		PENNSYLVANIA	
PRE	UTL	PRE	UTL	PRE	UTL	PRE	UTL
.612		.610		.570		.628	
.533		.516		.484		.588	
.571		.589		.579		.551	
.648		.620		.633		.646	
.554		.506		.493		.636	
.509		.469		.549		.531	
.676		.647		.649		.679	
.693		.631		.686		.704	
.508		.591		.499		.509	
	.685		.609		.685		.653
	.461		.471		.485		.449
	.424		.513		.430		.455
	.515		.515		.537		.523
	.628		.620		.642		.577
	.522		.614		.513		.497
	.386		.384				.547

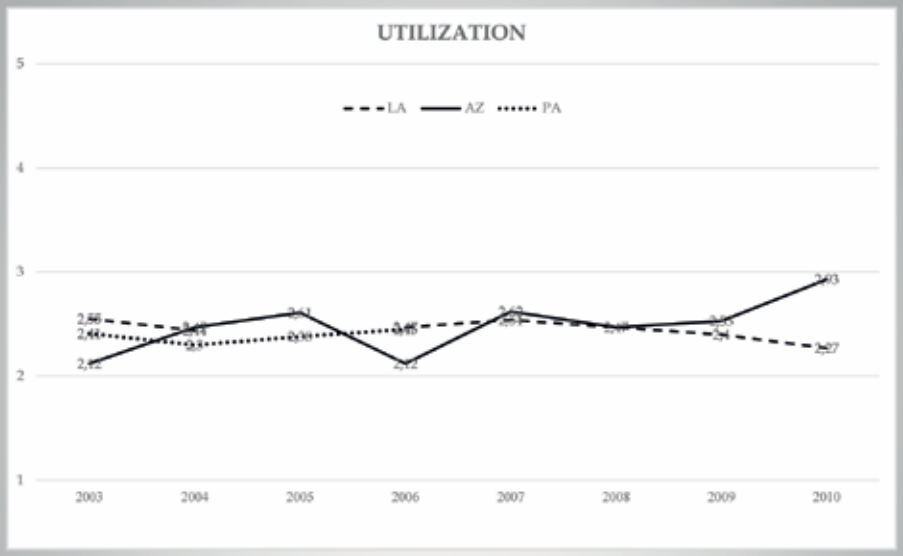
Bogner, FX; Johnson, B; Buxner, S. Felix, L. (2015)



Bogner, FX; Johnson, B; Buxner, S. Felix, L. (2015).
The 2-MEV-Model: Constancy of Adolescent Environmental Values within an Eight Year Time Frame.
***International Journal of Science Education*, 37 (11-12), 1938-1952.**

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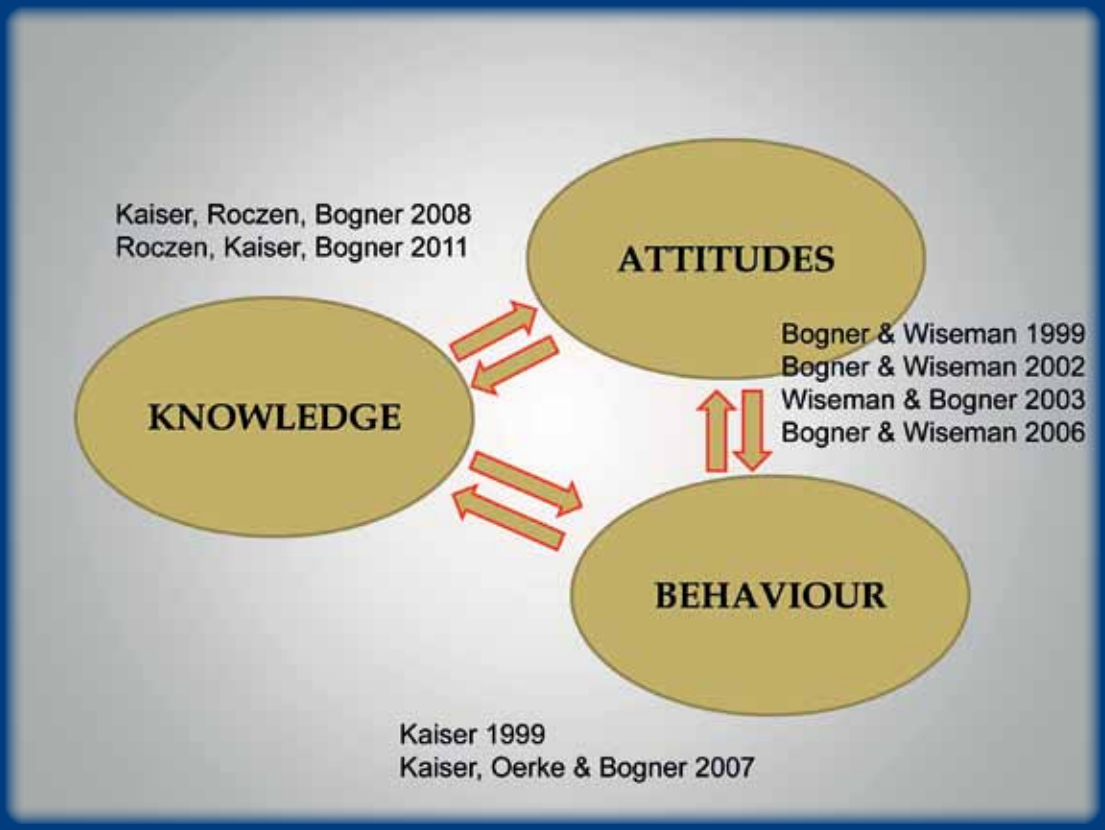
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The 2-MEV-Model: Constancy of Adolescent Environmental Values within an Eight Year Time Frame.
***International Journal of Science Education*, 37 (11-12), 1938-1952.**

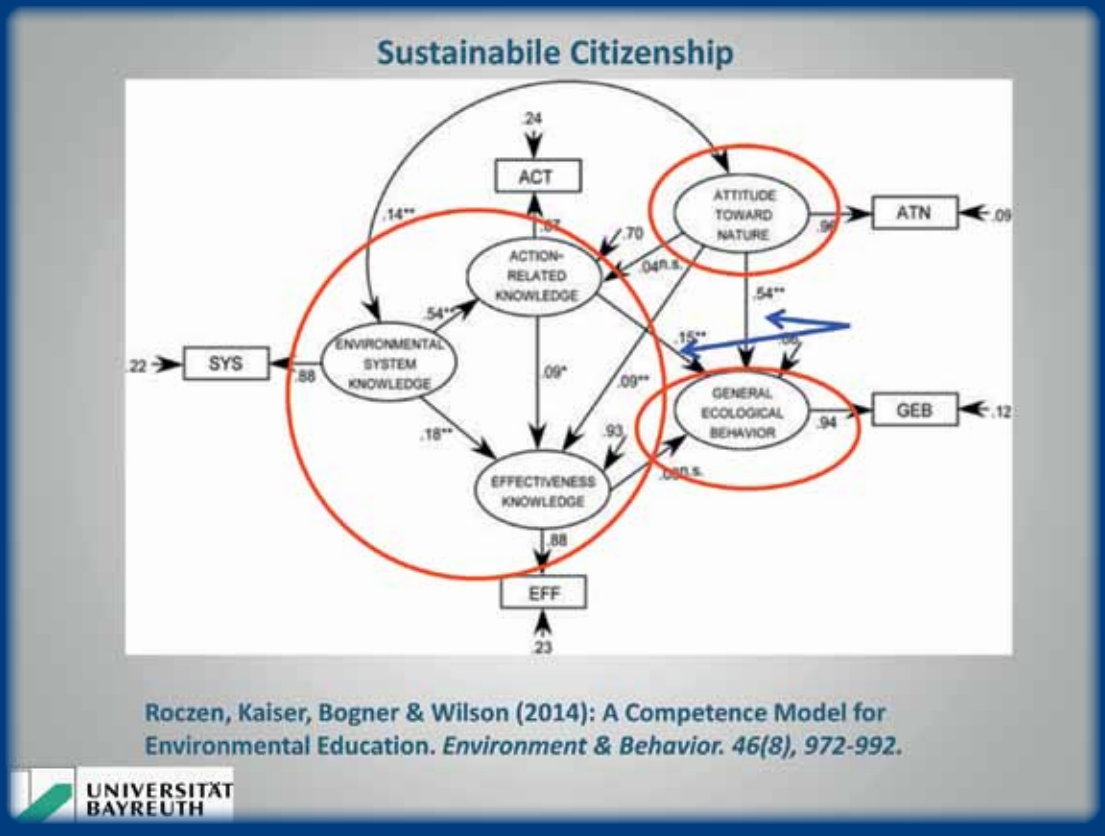
Citations: 3380
h-index: 30
i10-index: 68

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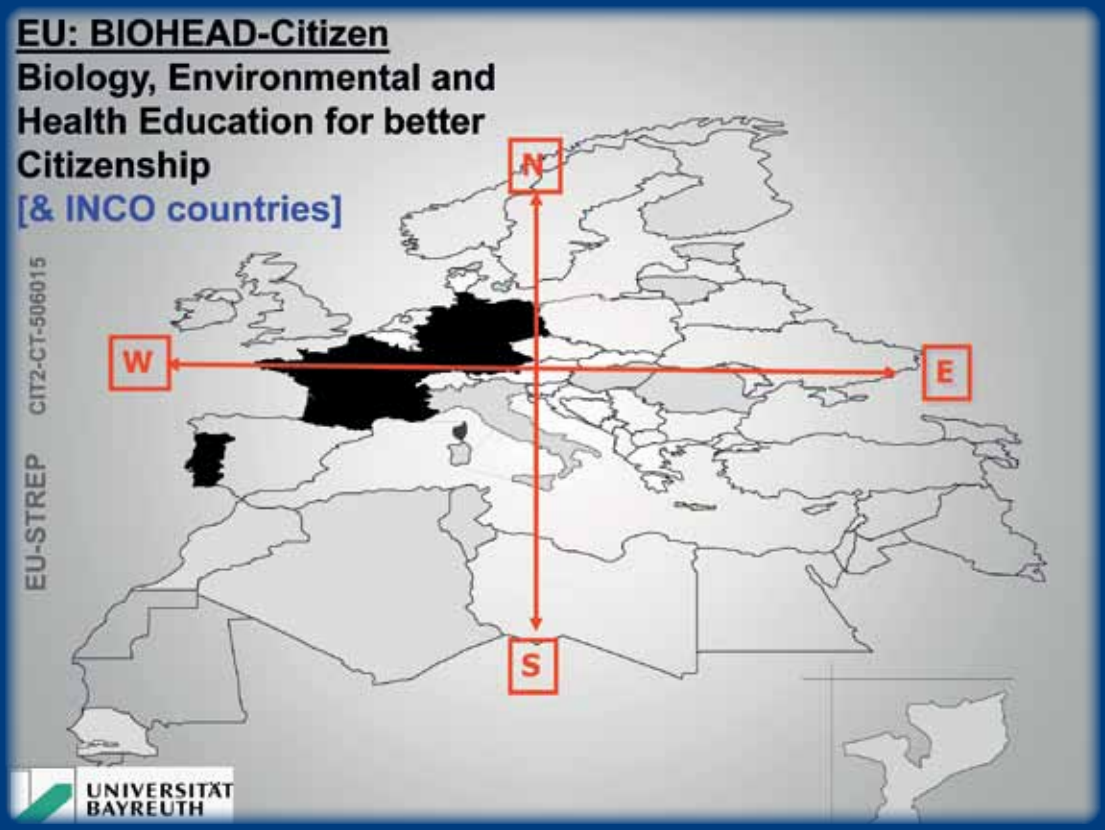
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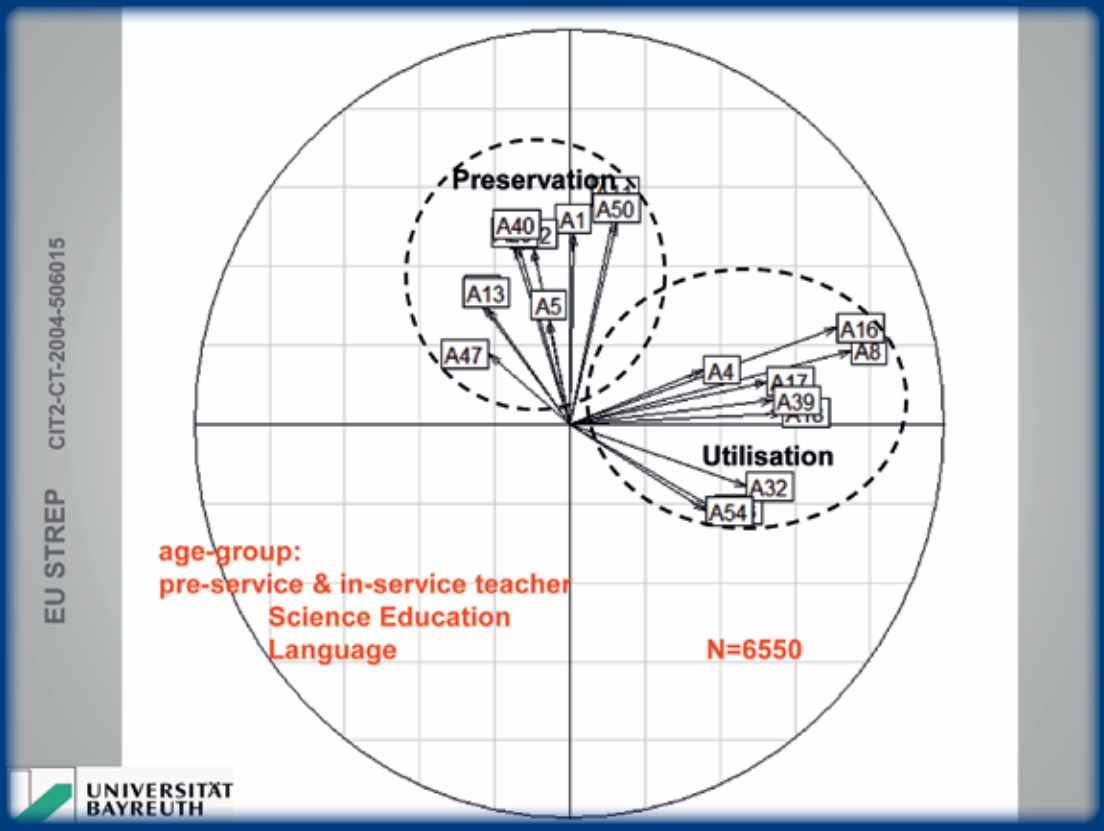




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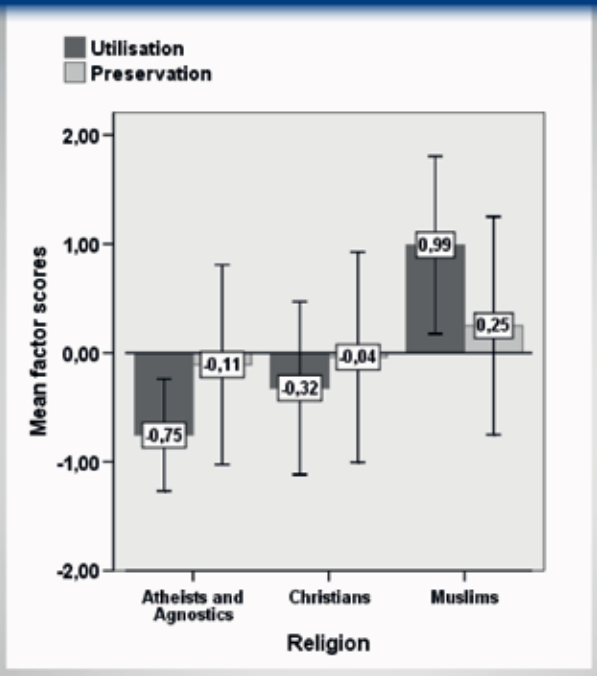
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Munoz, F; Bogner, FX; Clement, P; Carvalho, GS (2009): Teachers' conceptions of nature and environment in 16 countries. *Journal of Environmental Psychology (29)*, 407-413.

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Week-long Programme National Park Bavarian Forest

MON	Original encounter with nature
	Wood and forest
	Multisensoric ecounter
TUE	Task and problems within the NP
	Learning about trees
	Typical animals in a forest
	Necessity of biotope protection
WED	Knowledge about trees and plants
	Problems of forest management
	Actual threatening by humanbeings
	Simple ecological networks
THU	Predator-Prey relationships
	Simple simulation games
	Hands-on Science
FRI	Conclusion and reflection

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Prof. Franz Bogner
University of Bayreuth, Germany

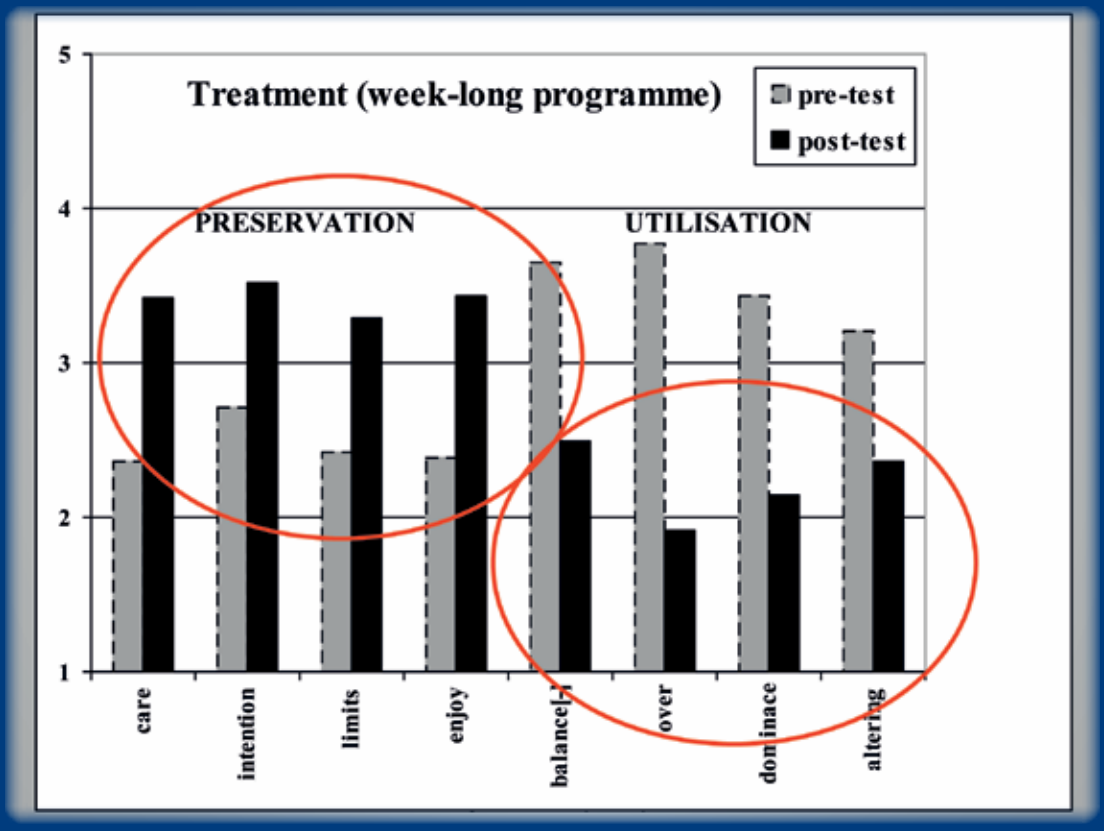




Sustainable Citizenship through Open Schools

Prof. Franz Bogner
University of Bayreuth, Germany





Sustainable Citizenship through Open Schools

Prof. Franz Bogner
University of Bayreuth, Germany

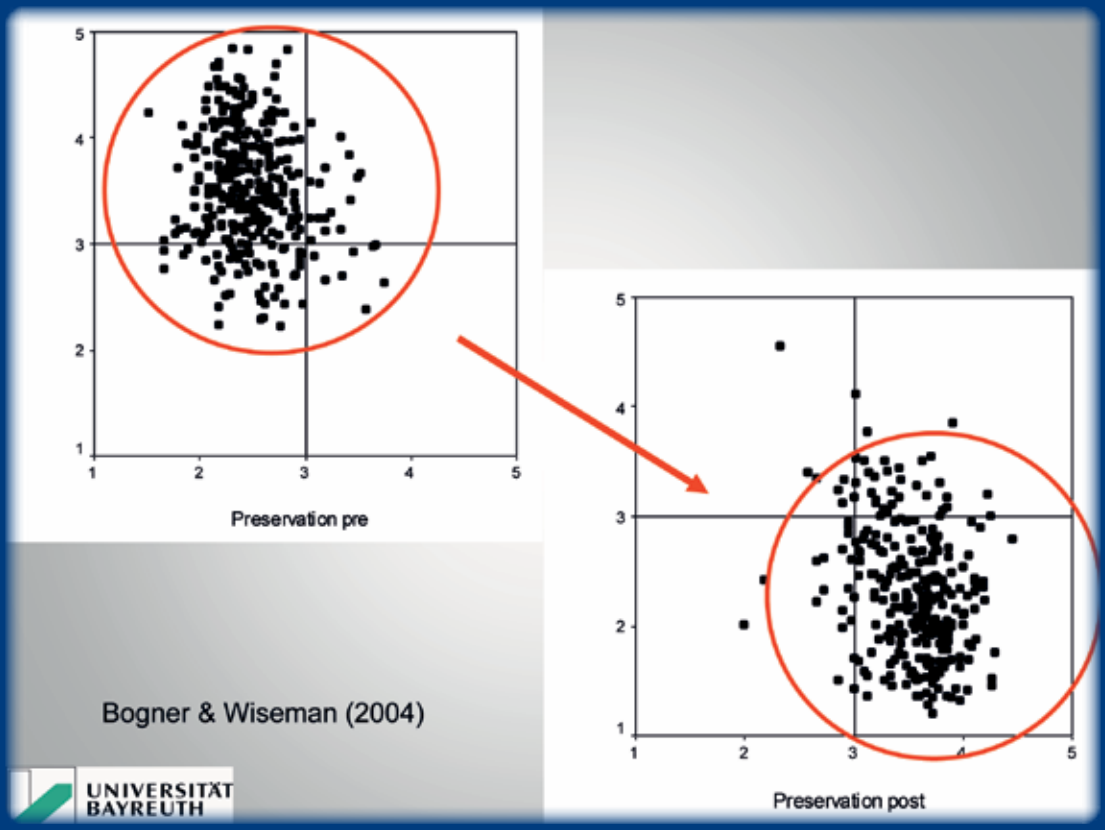


Table 2: *Correlations between factor score of preservation and utilization and sum score of cognitive knowledge*

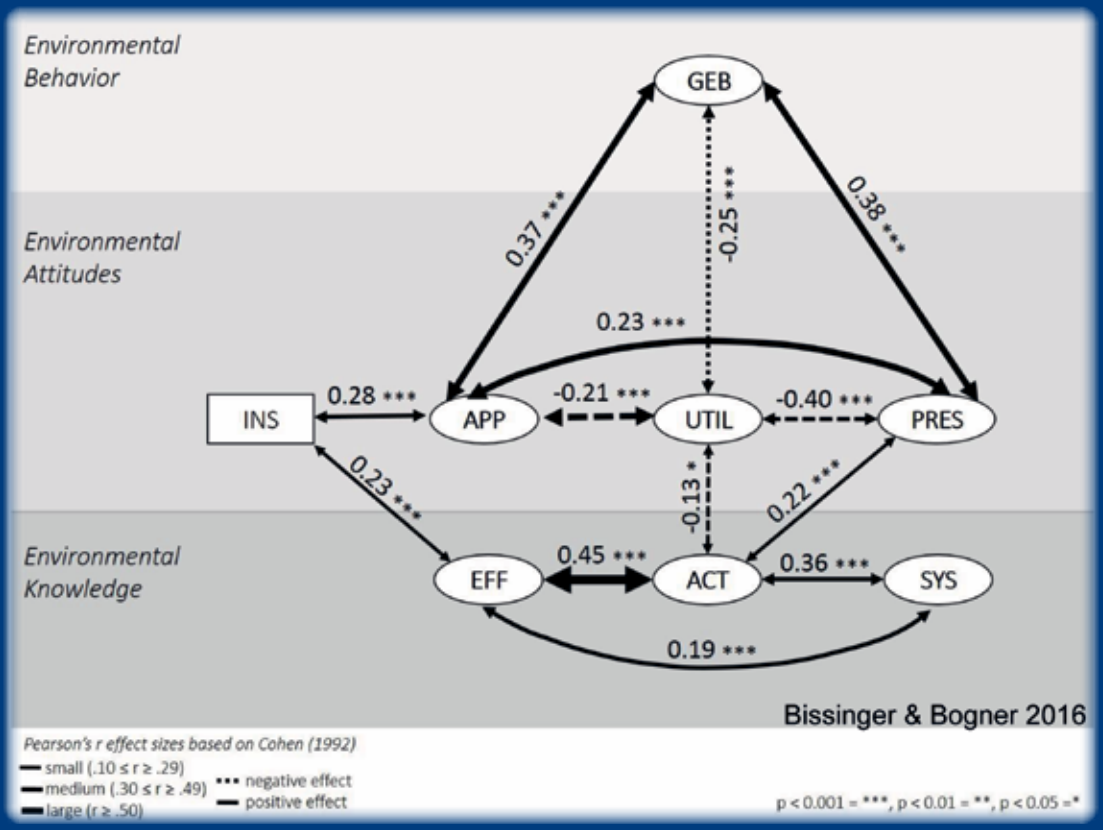
		2- MEV		knowledge test		
		PRE	UTIL	KN0	KN1	KN2
PRE	correlation coefficient	/	n. s.	n. s.	,235	,189
	significance				,005	,026
UTIL	correlation coefficient	n. s.	/	n. s.	n. s.	n. s.
	significance					

Table 2 details significant correlation levels between Preservation and the newly acquired knowledge for both testing cycles, KN1 and KN2. Utilization scores had no effect on the knowledge. This is also the case for both preferences with regard to the pre-knowledge (KN0).

*Fremerey, C; Bogner, FX: Cognitive learning in authentic environments in relation to green attitude preferences, Studies in Educational Evaluation, **44**, 9-15 (2015)*

Sustainable Citizenship through Open Schools

Prof. Franz Bogner
University of Bayreuth, Germany





www.bayceer.uni-bayreuth.de/didaktik-bio/
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A science capital perspective for open schools

Dr. Effrosyni Nomikou
Kings College University, London, UK

KING'S College LONDON

Open Schools for Open Societies
Ellinogermaniki Agogi
Friday 4 November 2016



A Science Capital Perspective for Open Schools

Επιστημονικό Κεφάλαιο & Ανοιχτό Σχολείο

Effrosyni Nomikou
School of Education, Communication & Society

KING'S College LONDON



Presentation outline

- Introduction to Science Capital
- Science Capital teaching approach examples from ongoing research at King's
- Reflect on potential to facilitate an open school culture

- Επιστημονικό κεφάλαιο: μια εισαγωγή
- Έρευνα σε εξέλιξη: ανάπτυξη μιας διδακτικής προσέγγισης με βάση το επιστημονικό κεφάλαιο
- Συνεισφορά στη δημιουργία της κουλτούρας του ανοιχτού σχολείου

A science capital perspective for open schools

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Kings College University, London, UK





A science capital perspective for open schools

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Kings College University, London, UK

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Science Capital is like a 'holdall' containing all the science-related knowledge, attitudes, experiences and resources that you acquire through life

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Το επιστημονικό κεφάλαιο μπορεί να παρομοιαστεί με μια αποσκευή με πολλές θήκες στις οποίες περιλαμβάνονται όλες οι γνώσεις, αντιλήψεις, εμπειρίες, κοινωνικές συναναστροφές και πόροι που σχετίζονται με τις θετικές & φυσικές επιστήμες και αποκτώνται δια βίου

A science capital perspective for open schools

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Kings College University, London, UK

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Science Capital dimensions

Science literacy (science knowledge and understanding)

Science-related attitudes and values

a) Seeing science as everywhere in daily life;

b) Understanding the wide value and uses of science – e.g. seeing science qualifications as useful for a wide range of non-science, as well as science, jobs



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Science Capital dimensions

Out of school science behaviours

a) Reading and engaging with science through the media (books, magazines, TV, internet etc) in your spare time;

b) Going to science museums, centres, talks, events

c) How often talk to other people about science in everyday life



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Science Capital dimensions

Science at home

a) Family science qualifications, knowledge and skills

b) Knowing people in science-related jobs

c) Encouragement from others to continue with science post-16

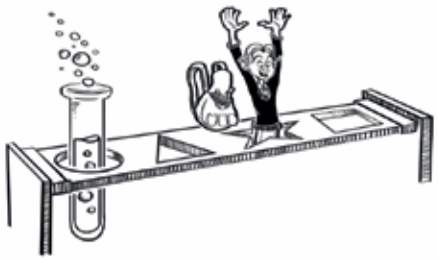


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Why does it matter?

A young person with high science capital is *significantly* more likely to plan to continue with science after the age of 16

'Science is for me!'



A tool that helps us understand the inequalities in science participation, and to provide a vehicle for restructuring power relations

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Χρησιμότητα του όρου



Ένα παιδί με υψηλό επιστημονικό κεφάλαιο είναι *πολύ πιο πιθανό* να ακολουθήσει να αναπτύξει επιστημονική ταυτότητα και μια να ακολουθήσει αντίστοιχη εκπαιδευτική/επαγγελματική πορεία.

Εργαλείο που μας βοηθά να κατανοήσουμε τις κοινωνικές ανισότητες που ενέχει και αναπαράγει η ενασχόληση με τις θετικές επιστήμες. Προσφέρει επίσης ένα πλαίσιο αναδιανομής ισχύος στο πεδίο

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A science capital teaching approach

Enterprising Science
Inspiring science learning with teachers, students and families







A science capital perspective for open schools

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A science capital teaching approach

Start with what students bring with them

E.g. link science to students' lives; value the everyday knowledge and experiences that students bring; relate science to what matters to students & their families/ communities

Σημείο εκκίνησης είναι το κάθε παιδί και ό,τι φέρνει μαζί του

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A science capital teaching approach

Develop key dimensions of science capital

E.g. understanding of science, attitudes towards science, awareness of transferability of science; everyday science engagement; family engagement with science

Πολυδιάστατο περιεχόμενο μαθήματος

A science capital perspective for open schools

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A science capital teaching approach

Challenge stereotypes

help all young people to see themselves as 'science-y' (e.g. challenge the idea that science is only for the 'brainiest'; broaden views & experiences of school science beyond test scores and getting the 'right answer')



Αμφισβήτηση στερεοτύπων

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Potential to facilitate open school culture



A science capital perspective for open schools

Dr. Effrosyni Nomikou
Kings College University, London, UK

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Thank you!

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@enterprisingsci

effrosyni.nomikou@kcl.ac.uk

bp

SCIENCE MUSEUM

KING'S College LONDON

Enterprising Science is brought to you by BP, the Science Museum and King's College London

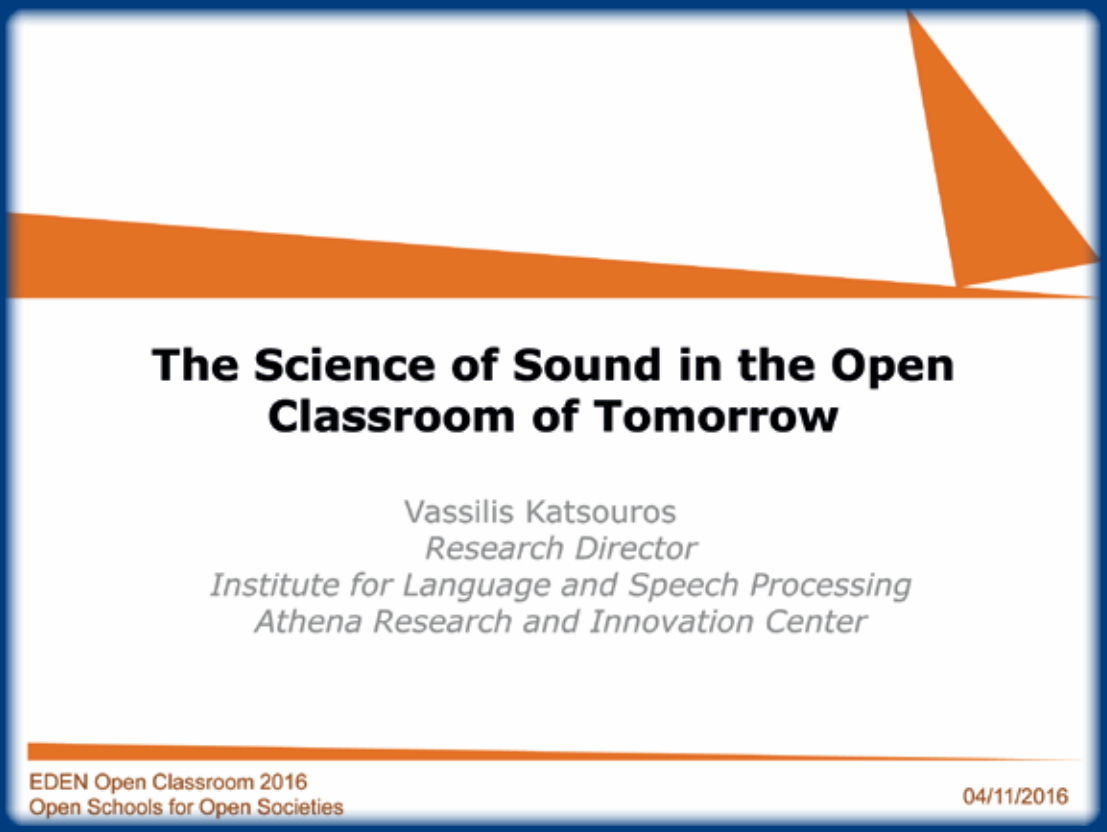
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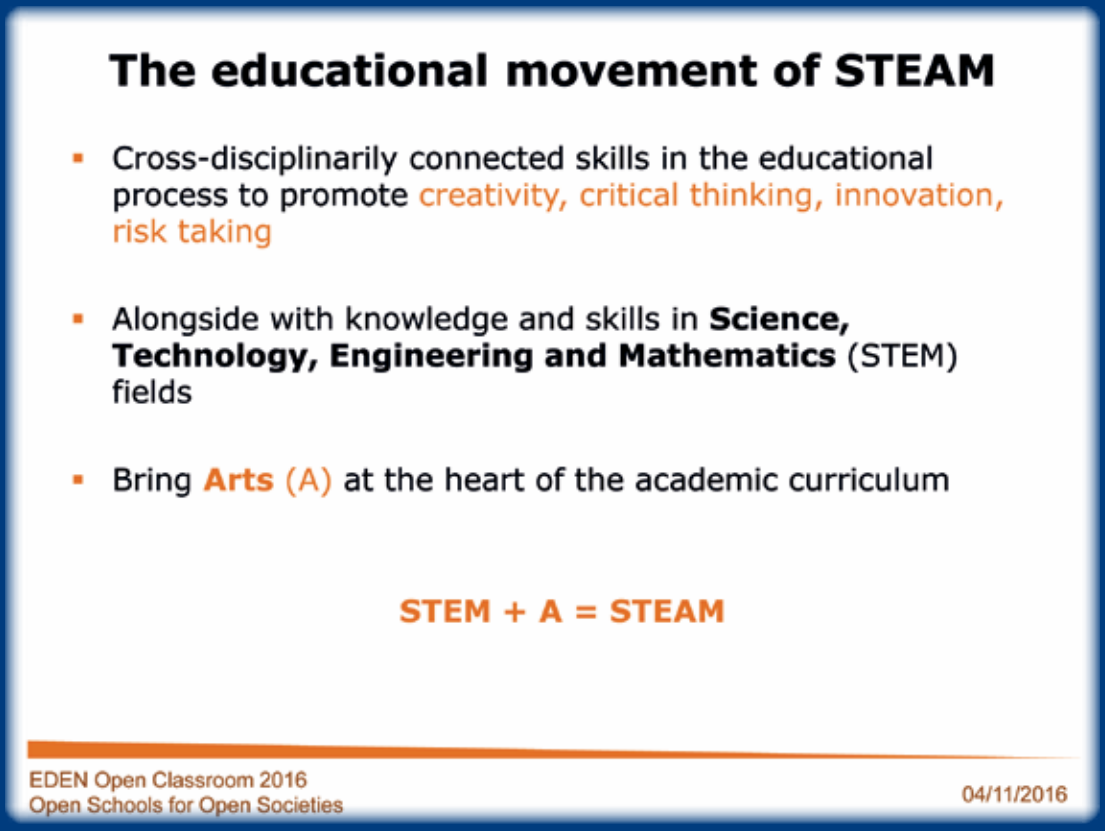
Extra slides



The science of sound in the open classroom of tomorrow

Vassilis Katsouros
Institute for Language and Speech Processing, Athena Research and Innovation Center, Greece

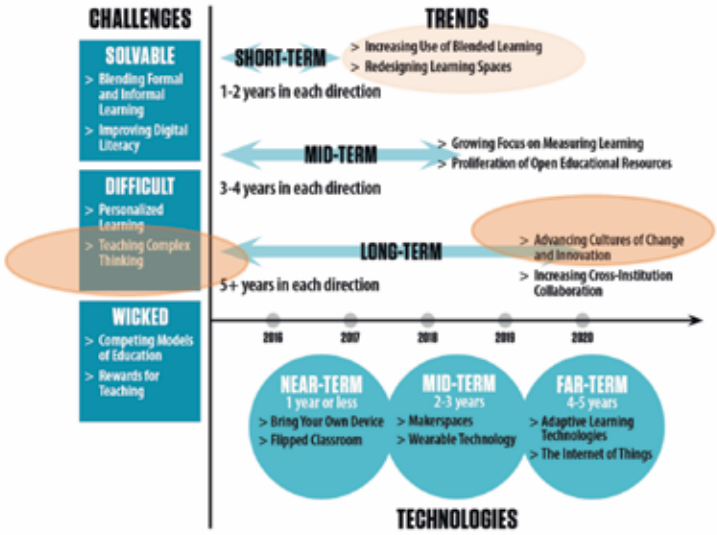




The science of sound in the open classroom of tomorrow

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Inspired by trends, challenges and technologies



Source: New Media Consortium (NMC) Horizon Report 2015

iMuSciCA

interactive **Mu**sic **Sci**ence **C**ollaborative **A**ctivities

- Design and implement a suite of software tools and services on top of new enabling technologies integrated on a platform that will deliver interactive music activities for teaching/learning STEM
- New pedagogical methodologies and innovative educational technology tools to support active, discovery-based, personalized, and more engaging learning
- Provide students and teachers with opportunities for collaboration, co-creation and collective knowledge building

The science of sound in the open classroom of tomorrow

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iMuSciCA objectives

- Develop and explore original and innovative enabling technologies to facilitate open co-creation tools incorporated in music activities to support STEAM learning
- Develop a workbench of music activities to give learners the opportunity to discover phenomena/laws of physics, geometry, mathematics and technology
- Encourage students to engage in innovative interactive music activities with advanced multimodal interfaces to discover new ways to look at science and technology to support creative and artistic interventions
- Enable teachers to design engaging project/problem based STEAM learning activities

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Open Schools for Open Societies
04/11/2016

iMuSciCA enabling technologies

Virtual 3D environments to design personalized musical instruments using geometric forms and tools



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iMuSciCA enabling technologies

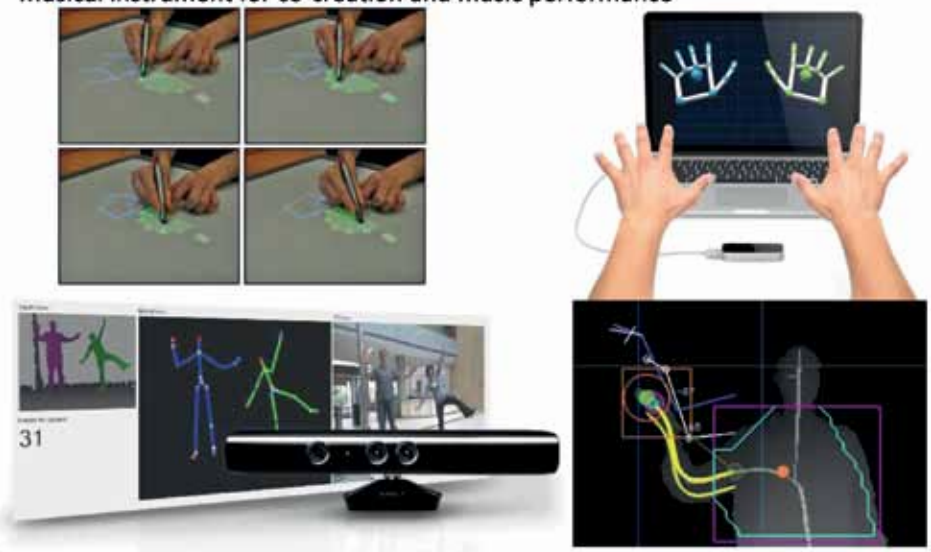
Computer generated sound produced by varying the design parameters of musical instruments with interpretations of the related physics and mathematics



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iMuSciCA enabling technologies

Gesture and pen-enabled multimodal interaction of the learners with the virtual 3D musical instrument for co-creation and music performance



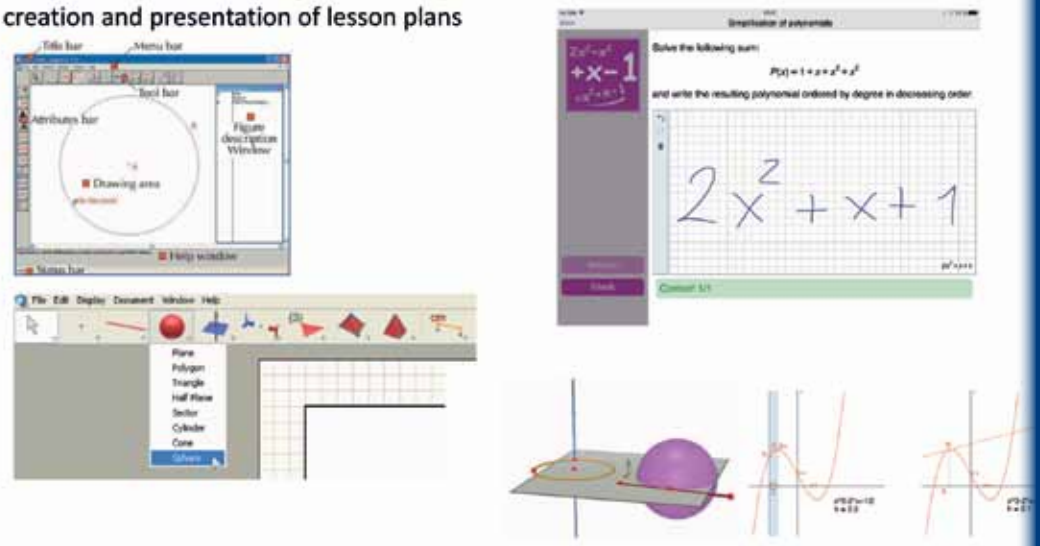
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The science of sound in the open classroom of tomorrow

Vassilis Katsouros
Institute for Language and Speech Processing, Athena Research and Innovation Center, Greece

iMuSciCA enabling technologies

Interactive STEM authoring and learning environments with advanced tools for the creation and presentation of lesson plans



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iMuSciCA enabling technologies

Deployment of 3D printing technology for realizing the physical musical instrument as a tangible physical object



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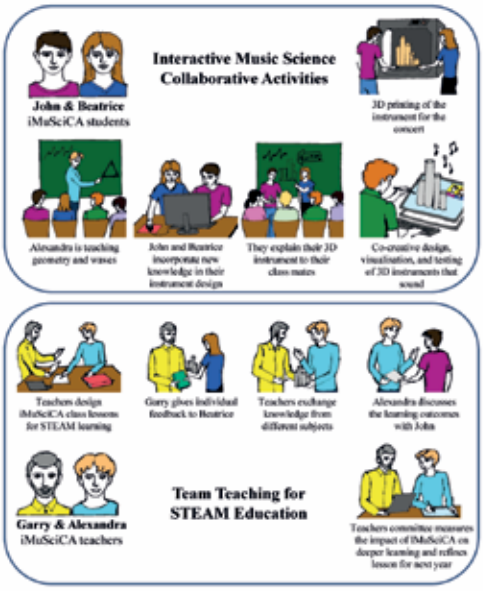
Vassilis Katsouros
Institute for Language and Speech Processing, Athena Research and Innovation Center, Greece

iMuSciCA main outcomes

- Workbench of Music Activities containing methodological and advocacy tools of advanced enabling technologies to assist learners in developing co-creative processes for STEAM learning
- Cross-disciplinary lesson plans for secondary education to teach physics, geometry, mathematics and technology combined with creative music activities
- Professional development material for teachers and educators for adopting innovative STEAM teaching methodology

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Use Case Scenario





Logo Design & sketches by Andrin Hubacher



Every year a new stage is organized. In each stage an instrument will be designed with the final goal of playing a concert. However, the three iterations differ in their level of deeper concepts to be taught.
1. Sound & tone generation, 3D instrument design
2. Timbre & harmonics, deeper mathematics & physics
3. Consonance & dissonance, solid knowledge and understanding in a variety of curriculum subjects (physics, mathematics, geometry, informatics, engineering, technology, music, design, and history of arts.

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Evaluation of deeper learning with iMuSciCA

- Formative evaluation
  - Pilots in Greece, Belgium and France (~30 students and ~6 teachers)
- Summative evaluation
  - Pilots in Greece, Belgium and France (~300 students and ~50 teachers)
- Qualitative and Quantitative methods and instruments
  - Surveys, questionnaires (teachers and learners)
  - Pre & post tests (learners)
  - Tracking learner's activity (mouse clicks, response times, frequency of hints, etc.)
  - Tracking learner's behaviour

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Advanced monitoring tools for tracking learner's behaviour

- Eye tracking
- Facial expressions analysis
- Galvanic Skin Response (GSR) sensors
- Electroencephalography (EEG)

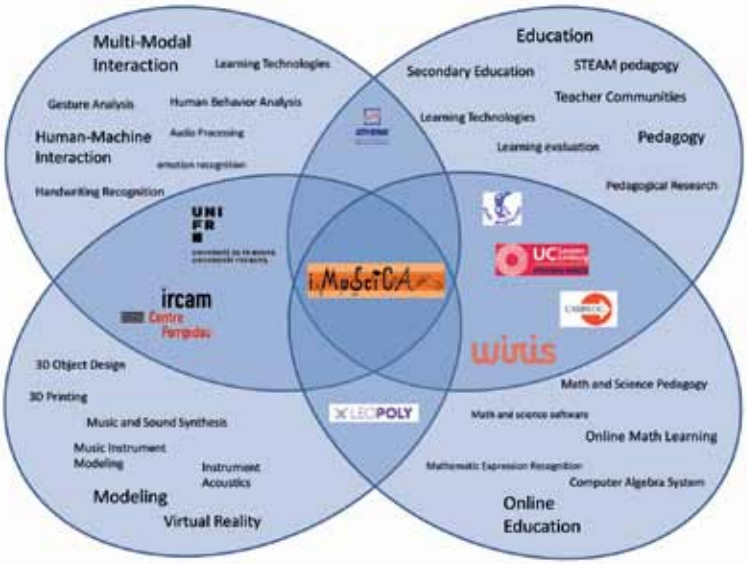


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iMuSciCA partners - competencies



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iMuSciCA
GRANT AGREEMENT - 731861
1 Jan 2017 – 30 June 2019

Thank you!



EUROPEAN COMMISSION
Communications Networks, Content and Technology
Learning, Multilingualism and Accessibility



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Universal Design for Learning (UDL): re-designing learning to accommodate and include difference

Nikos Zygouritsas
Ellinogermaniki Agogi

Open Schools for Open Societies Conference

EDEN Open Classroom 2016

Universal Design for Learning and Inclusion

Nikos Zygouritsas
Ellinogermaniki Agogi, Greece

UDLnet
Universal Design for Learning

Universal Design

Originally it referred to designing buildings, products and environments that are accessible to all sections of society including the aged and those with disabilities of all kinds.

The 9 principles:

- *Equitable use*
- *Flexibility in use*
- *Simplicity*
- *Perceptible information*
- *Tolerance for error*
- *Low physical effort*
- *Accessible size and space for approach*
- *A Community of learners*
- *Instructional climate*

UDLnet
Universal Design for Learning

Universal Design for Learning (UDL): re-designing learning to accommodate and include difference

Nikos Zygouritsas
Ellinogermaniki Agogi

Universal Design for Learning

- The universal design concept was transferred to the education field and applied to the learning process and learning environment, taking the expression of **universal design for learning** (UDL)
- The *key principles* driving UDL include:
  flexibility, simple and intuitive instruction, multiple means of presentation, success oriented curriculum, appropriate level of student effort, and appropriate environment for learning.

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Universal Design for Learning

UDL principles

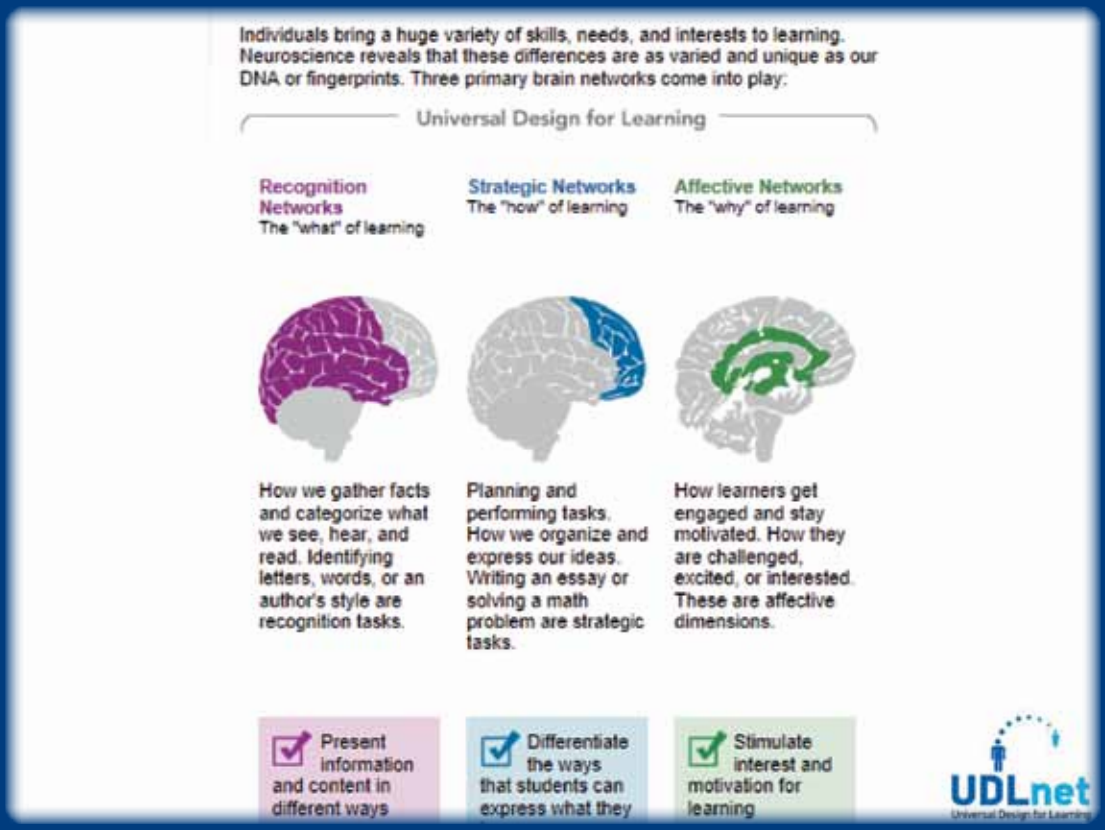
UDL framework was first defined by the US *Center for Applied Special Technology (CAST)* in the 1990s, arguing that the curriculum should fit different learners from the outset, following 3 main principles:

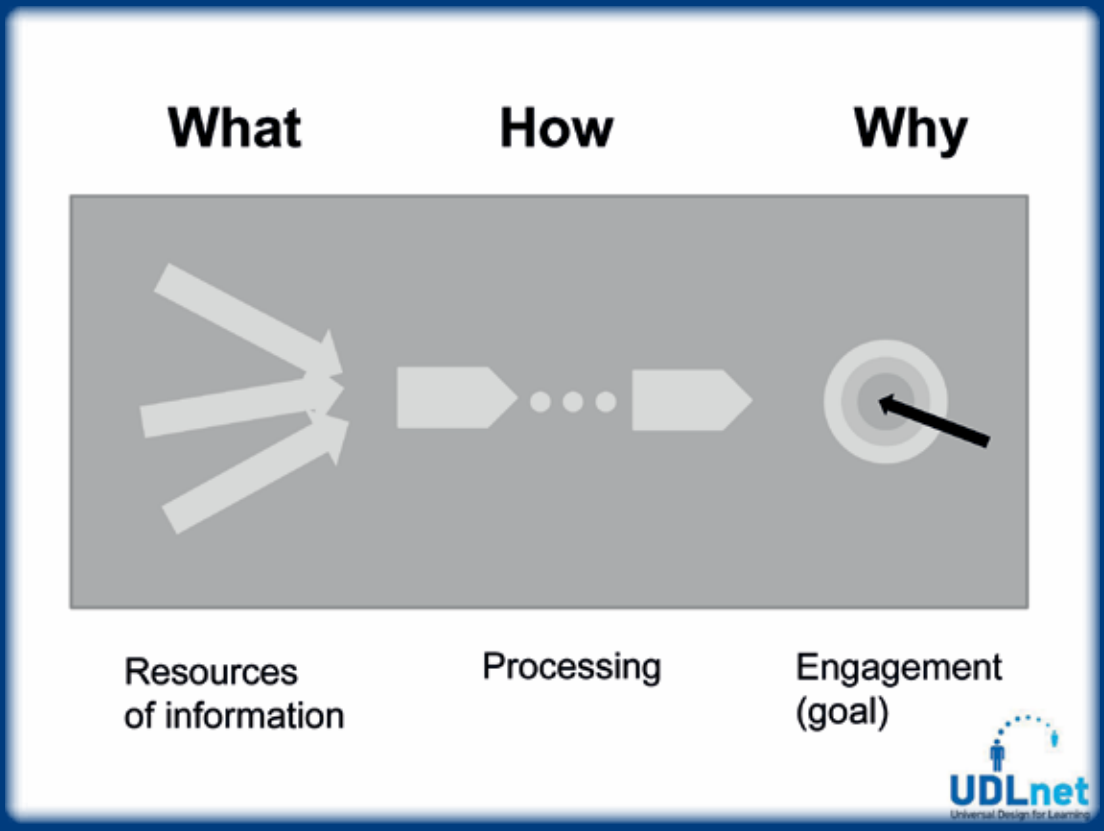
- **Multiple means of representation** to give learners various ways of acquiring information and knowledge
- **Multiple means of expression** to provide learners alternatives for demonstrating what they know, and
- **Multiple means of engagement** to tap into learners' interests, challenge them appropriately, and motivate them to learn.

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Universal Design for Learning (UDL): re-designing learning to accommodate and include difference

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Ellinogermaniki Agogi





Universal Design for Learning (UDL): re-designing learning to accommodate and include difference

Nikos Zygouritsas
Ellinogermaniki Agogi



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Recognition Networks

UDLnet



What do you see?

What do you identify?

What information did you select to process?

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Universal Design for Learning (UDL): re-designing learning to accommodate and include difference

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Strategic Networks



What intentions do you think the people have?

What do the background and the images tell you?

What interaction between people is taking place?

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Universal Design for Learning (UDL): re-designing learning to accommodate and include difference

Nikos Zygouritsas
Ellinogermaniki Agogi



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Affective Networks

UDLnet



What and why would you be interested in this picture?

Why would you spend time looking at the picture?

What emotions do you get from the picture?

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Universal Design for Learning (UDL): re-designing learning to accommodate and include difference

Nikos Zygouritsas
Ellinogermaniki Agogi

udlnet-project.eu



What is UDLnet?

A network that brings together …

- Educators
- Learners
- Stakeholders (educational managers, policy makers, parents)

A network that offers a platform for …

- Exchange Best Practices
- Sharing Resources
- Continuous Professional Development

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Universal Design for Learning

Universal Design for Learning (UDL): re-designing learning to accommodate and include difference

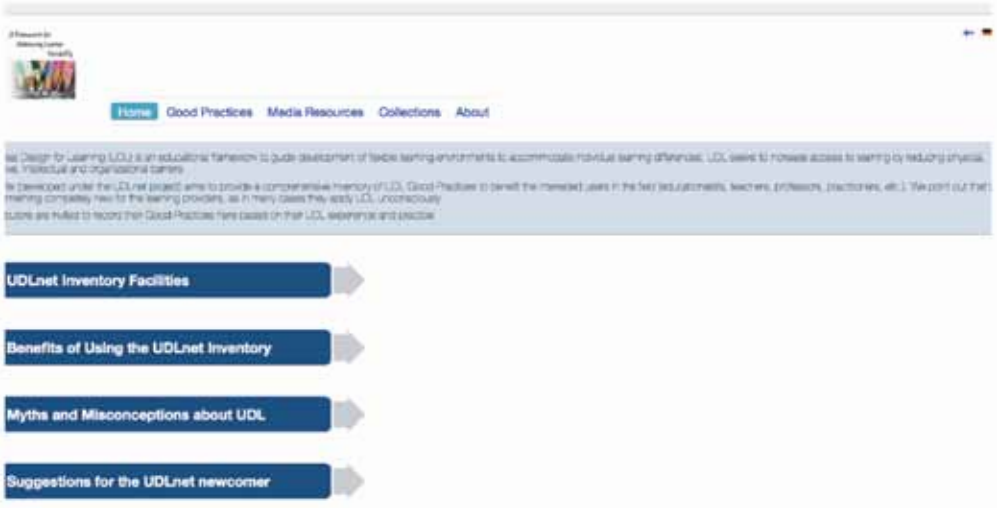
Nikos Zygouritsas
Ellinogermaniki Agogi

UDLnet Main activities

- **Good Practice Thematic Search and Organization:** good practices shall be collected in the areas of inclusive education all over Europe with emphasis in UDL
- **Pilots/implementation:** a number of events shall be organised for the exchange, validation and evaluation of the collected UDL best practices
- **Valorisation:** formation of a set of recommendations to policy makers "Pathway to Universal Design for Learning"
- **Networking** with relevant projects, networks and initiatives

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Universal Design for Learning

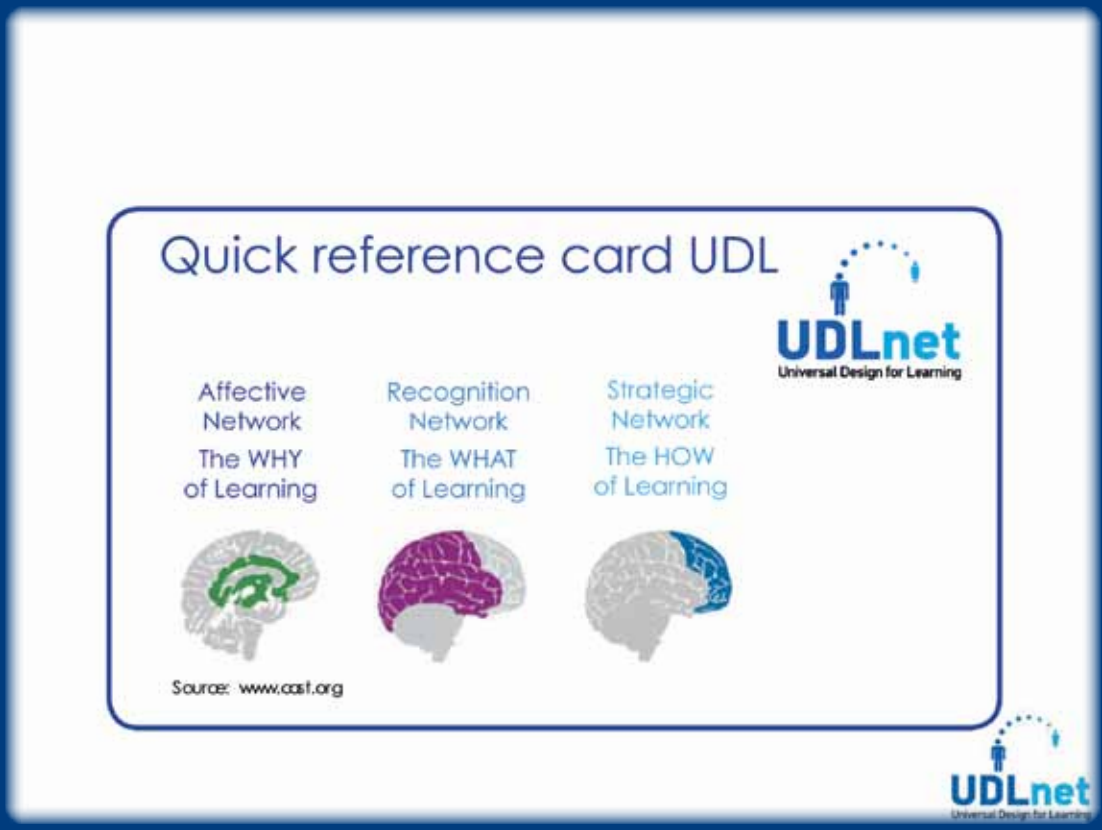
UDLnet Inventory: udlnet.di.uoa.gr



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Universal Design for Learning

Universal Design for Learning (UDL): re-designing learning to accommodate and include difference

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Ellinogermaniki Agogi





Universal Design for Learning (UDL): re-designing learning to accommodate and include difference

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Ellinogermaniki Agogi

Challenging times

- How do we include at a time of crisis and economic efficiencies?
- How do we distribute resources equitably?
- How do we alter minds, prejudices, inherited bias?
- How do we extend inclusion in an innovative manner?
- How do we establish the primacy of educational vision?

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Universal Design for Learning



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Is Content Accessibility in Online/Technology Enhanced Learning UDL Compliant? An American Perspective

Dr. Barbara Schwartz-Bechet

Associate Dean, College of Education and Rehabilitation, Professor Salus University, Philadelphia, USA





Is Content Accessibility in Online/Technology Enhanced Learning UDL Compliant? An American Perspective

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AGENDA

- ONLINE/TECHNOLOGY ENHANCED LEARNING ENVIRONMENTS DEFINED & US REGULATIONS
- EVALUATIVE TOOLS & UDL COMPLIANT FORMS TO ASCERTAIN CONTENT ACCESSIBILITY
- UDL ACCESSIBILITY TIPS FOR DEVELOPING ONLINE/TECHNOLOGY ENHANCED INSTRUCTIONAL CONTENT
- FUTURE OF UDL ACCESSIBILITY OF ONLINE LESSON PROGRAMS

THE FUTURE OF TECHNOLOGY IN EDUCATION





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POTENTIAL FOR PERSONALIZATION IN ON-DEMAND TECHNOLOGY AND EDUCATION



5

US LEGISLATION – REHABILITATION ACT

Section 508 of the Rehabilitation Act, enacted in 1998, requires that all technology used, developed, and purchased by federal agencies be accessible to people with disabilities. This includes all websites and other forms of technology.

http://www.section508.gov/



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SECTION 508 OF THE REHABILITATION ACT

Section 508 Details support for sensory & physical access and the extent to which a product:

– can be used by students with little or no vision
– can be used by students with little or no hearing
– can be used by students with no speech
– can be used by students with limited mobility





7

ACCESSIBILITY ONLINE

- WCAG 2.0 Guidelines

  http://www.w3.org/TR/WCAG20/

- The Guidelines provide principles and goals to make accessible web content, to be more usable by individuals with varied & changing abilities, and can often improve usability for all users in general.
- A prerequisite to UDL oriented curricular materials,

  –BUT…it must go beyond physical and sensory accessibility!

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ACCESSIBILITY ONLINE – CONTENT & DELIVERY



Perceivable

Operable

Understandable

Robust

http://webaim.org/

9

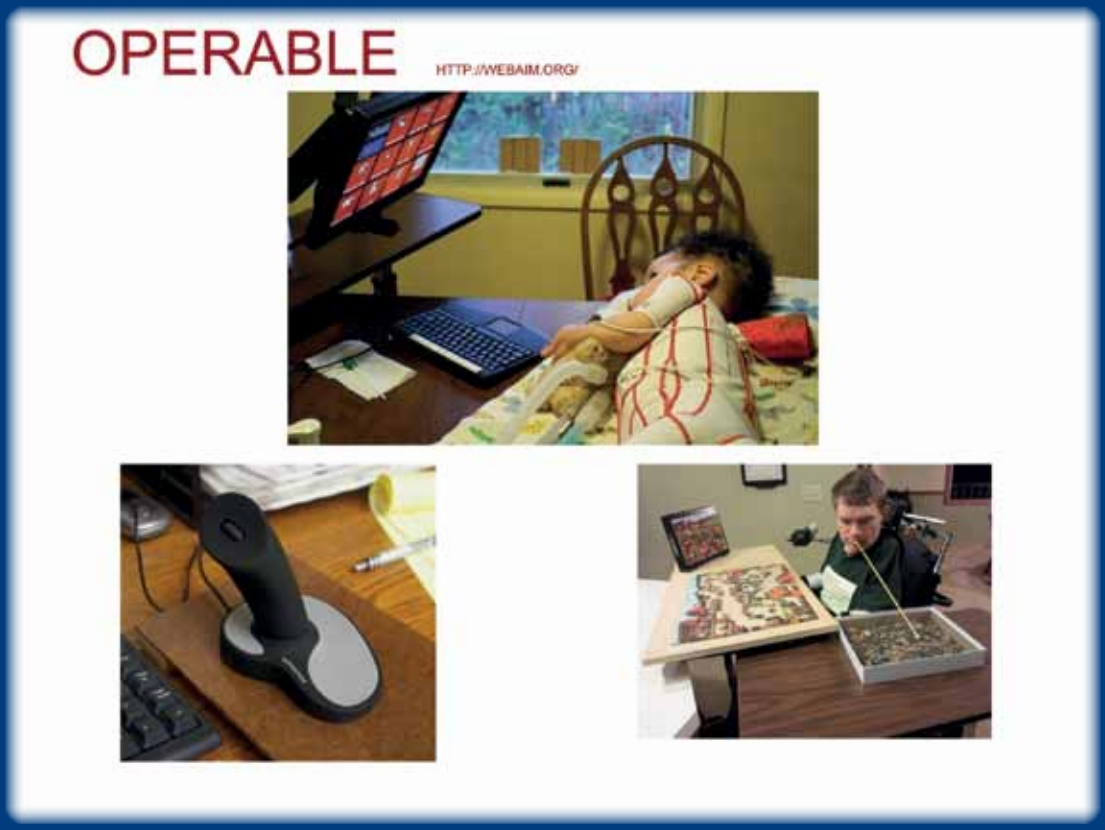
PERCEIVABLE HTTP://WEBAIM.ORG/

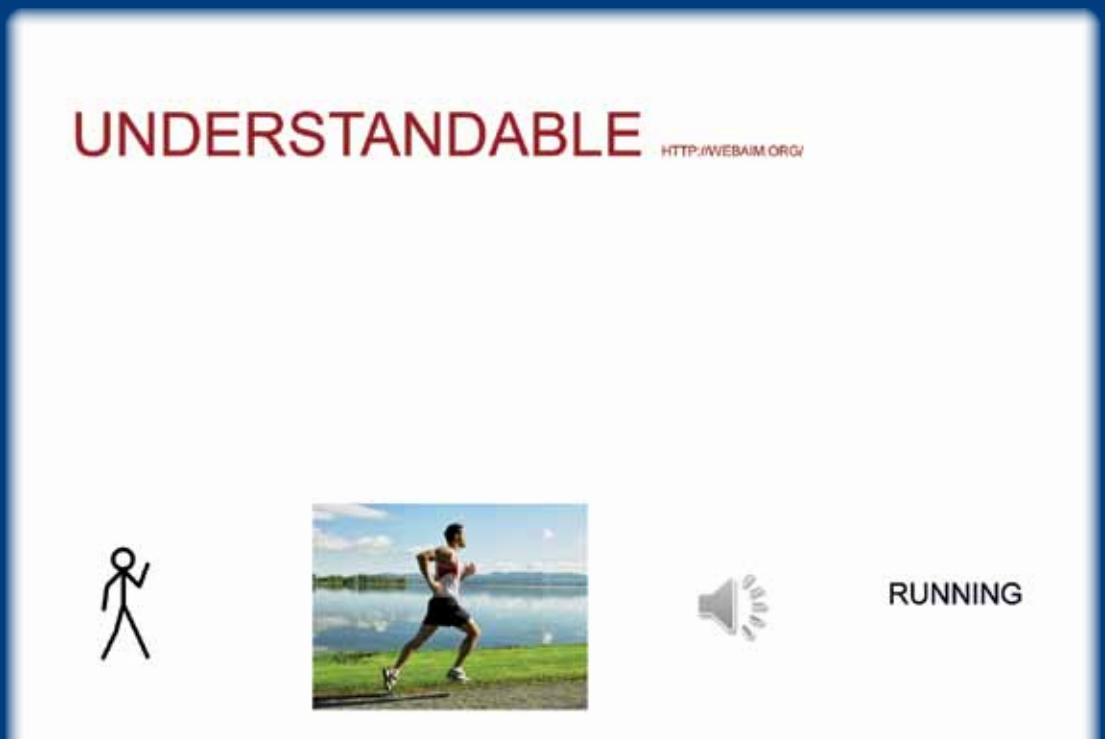


SENSORY INPUT DOES NOT NECESSARILY INDICATE THE INPUT IS PROCESSED.

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ROBUST HTTP://WEBAIM.ORG/







TOOLS TO ASSESS ACCESSIBLE DIGITAL MATERIAL: EXAMPLE 1

VPAT™

Voluntary Product Accessibility Template®

Version 1.3

The purpose of the **Voluntary Product Accessibility Template**, or **VPAT™**, is to assist Federal contracting officials and other buyers in making preliminary assessments regarding the availability of commercial "Electronic and Information Technology" products and services with features that support accessibility. It is assumed and recommended that offerers will provide additional contact information to facilitate more detailed inquiries.

14

Is Content Accessibility in Online/Technology Enhanced Learning UDL Compliant? An American Perspective

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VOLUNTARY PRODUCT ACCESSIBILITY TEMPLATE -SAMPLE



15

Epsilen **Epsilen, LLC.**	Not Listed	See accessibility information referenced here - Accessibility Info	Content/Learning Management	Commercial	6/25/2013	N
Facebook **Facebook**	Not Listed	See accessibility information referenced here - Accessibility Info	Social Networking		6/25/2013	N
IStation **IStation**	Not Listed	See accessibility information referenced here - Accessibility Info	Content Area Products	Commercial	7/10/2013	Y
Kindle Fire 2nd Generation **Amazon**	Not Listed	See accessibility information referenced here- Accessibility Info	eBooks/eReader	Commercial	6/25/2013	Y
Kindle for PC with Accessibility Plug-In **Amazon**	Not Listed	See accessibility information referenced here- Accessibility Info	eBooks/eReader	Commercial	6/25/2013	Y
Kindle HD 7" **Amazon**	Not Listed	See accessibility information referenced here- Accessibility Info	eBooks/eReader	Commercial	6/25/2013	Y
Kindle HD 8.9" **Amazon**	Not Listed	See accessibility information referenced here- Accessibility Info	eBooks/eReader	Commercial	6/25/2013	Y
Kindle Keyboard **Amazon**	Not Listed	See accessibility information referenced here- Accessibility Info	eBooks/eReader	Commercial	6/25/2013	Y
McGraw Hill Inkling **Inkling**	Not Listed	See accessibility information referenced here - Accessibility Info	Instructional Content	Commercial	6/25/2013	Y
McGraw Hill Online **McGraw Hill Education**	Not Listed	See accessibility information referenced here - Accessibility Info	Instructional Content	Commercial	6/25/2013	N
Moodle **Moodle**	Not Listed	See accessibility information referenced here - Accessibility Info	Content/Learning Management	Open Source	6/26/2013	Y
Ning **Ning**	Not Listed	See accessibility information referenced here- Accessibility Info	Social Networking		6/27/2013	N
Open Office **Open Office**	Not Listed	See accessibility information referenced here - Accessibility Info	Document Creation	Open Source	6/26/2013	Y
PDF **Adobe**	Not Listed	See accessibility information referenced here - Accessibility Info	Document Creation	Commercial	6/26/2013	N
Pearson My Lab/Mastering **Pearson Education Inc.**	Not Listed	See accessibility information referenced here for MyWritingLab - Accessibility Info	Instructional Content		6/26/2013	N

Is Content Accessibility in Online/Technology Enhanced Learning UDL Compliant? An American Perspective

Dr. Barbara Schwartz-Bechet

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EdisonLearning		Management			
Edmodo Edmodo	Not Listed	Blogs & Hybrid CMS Systems		6/25/2013	Y
Evernote Evernote	Not Listed	Organizational/Concept Mapping		6/25/2013	N
GoalBook GoalBook	Not Listed	Progress Monitoring		6/25/2013	Y
Houghton Mifflin Harcourt/MBS Direct HMH/MBS Direct	Not Listed	Instructional Content	Commercial	6/25/2013	N
K12 (Aventa Learning) K12 Inc.	Not Listed	Content/Learning Management	Commercial	6/25/2013	N
Khan Academy Khan Academy	Not Listed	Instructional Content	Open Source	6/25/2013	N
Learning.com Learning.com	Not Listed	Instructional Content	Commercial	6/25/2013	Y
Lucidchart Lucid Software	Not Listed	Organizational/Concept Mapping		6/25/2013	Y
Mosaica Online Education Mosaica Education, Inc.	Not Listed	Content/Learning Management	Commercial	6/28/2013	N
My Reading Coach Mindplay	Not Listed	Content Area Products	Commercial	7/10/2013	Y
NaMaYa NaMaYa Education	Not Listed	Content/Learning Management	Commercial	6/26/2013	N
Odysseyware Odysseyware	Not Listed	Content/Learning Management	Commercial	6/26/2013	Y
OER Commons ISKME	Not Listed	Instructional Content	Open Source	6/26/2013	Y
PBS LearningMedia PBS & WGBH Educational Foundation	Not Listed	Instructional Content		6/27/2013	N

SO…..WHAT IS UNIVERSAL DESIGN ?

…design of products and environments to be usable by all people, to the greatest extent possible, *without the need for specialized adaptations or accommodations*

http://www.deeperdivelearning.com/udl.htm

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Universal Design for Learning Guidelines

I. Provide Multiple Means of **Representation**	II. Provide Multiple Means of **Action and Expression**	III. Provide Multiple Means of **Engagement**
1: Provide options for perception 1.1 Offer ways of customizing the display of information 1.2 Offer alternatives for auditory information 1.3 Offer alternatives for visual information	4: Provide options for physical action 4.1 Vary the methods for response and navigation 4.2 Optimize access to tools and assistive technologies	7: Provide options for recruiting interest 7.1 Optimize individual choice and autonomy 7.2 Optimize relevance, value, and authenticity 7.3 Minimize threats and distractions
2: Provide options for language, mathematical expressions, and symbols 2.1 Clarify vocabulary and symbols 2.2 Clarify syntax and structure 2.3 Support decoding of text, mathematical notation, and symbols 2.4 Promote understanding across languages 2.5 Illustrate through multiple media	5: Provide options for expression and communication 5.1 Use multiple media for communication 5.2 Use multiple tools for construction and composition 5.3 Build fluencies with graduated levels of support for practice and performance	8: Provide options for sustaining effort and persistence 8.1 Heighten salience of goals and objectives 8.2 Vary demands and resources to optimize challenge 8.3 Foster collaboration and community 8.4 Increase mastery-oriented feedback
3: Provide options for comprehension 3.1 Activate or supply background knowledge 3.2 Highlight patterns, critical features, big ideas, and relationships 3.3 Guide information processing, visualization, and manipulation 3.4 Maximize transfer and generalization	6: Provide options for executive functions 6.1 Guide appropriate goal-setting 6.2 Support planning and strategy development 6.3 Facilitate managing information and resources 6.4 Enhance capacity for monitoring progress	9: Provide options for self-regulation 9.1 Promote expectations and beliefs that optimize motivation 9.2 Facilitate personal coping skills and strategies 9.3 Develop self-assessment and reflection
Resourceful, knowledgeable learners	**Strategic, goal-directed learners**	**Purposeful, motivated learners**

NATIONAL CENTER ON UNIVERSAL DESIGN FOR LEARNING, AT CAST, 2012

IDENTIFYING ACCESSIBLE COURSE CONTENT!

UDL SCAN TOOL

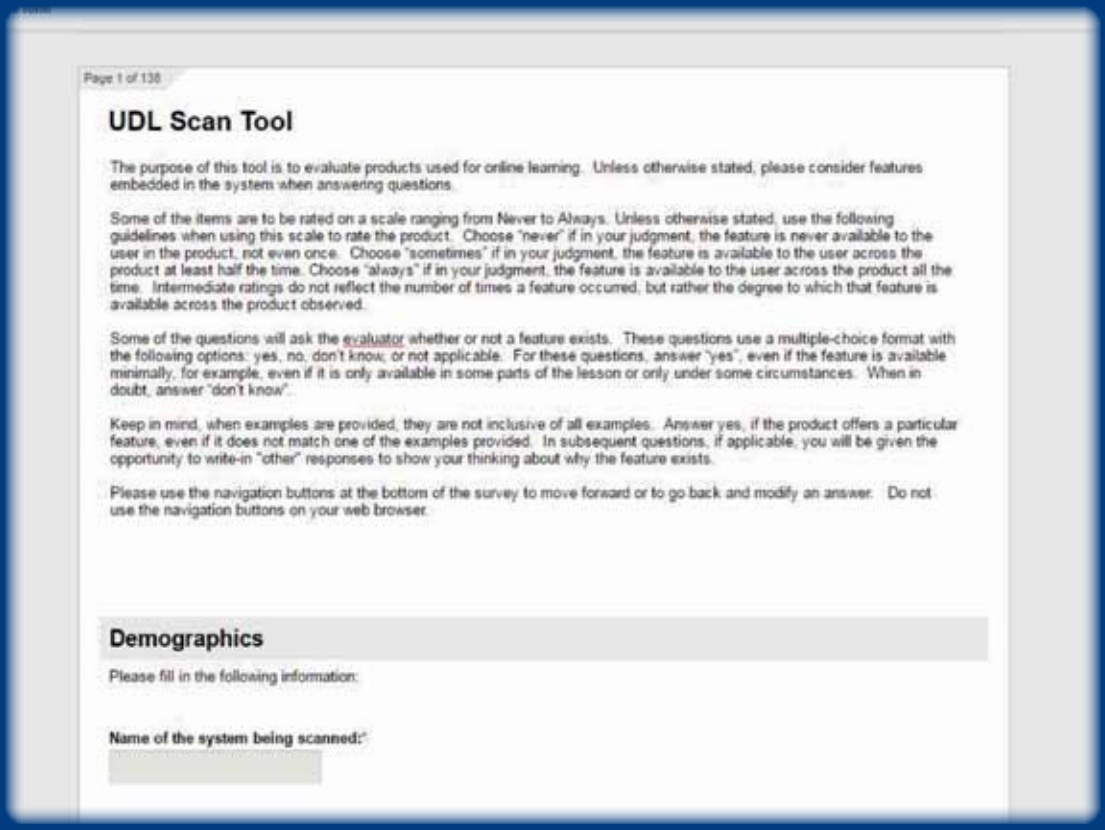


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UDL Scan Tool

The purpose of this tool is to evaluate products used for online learning. Unless otherwise stated, please consider features embedded in the system when answering questions.

Some of the items are to be rated on a scale ranging from Never to Always. Unless otherwise stated, use the following guidelines when using this scale to rate the product. Choose "never" if in your judgment, the feature is never available to the user in the product, not even once. Choose "sometimes" if in your judgment, the feature is available to the user across the product at least half the time. Choose "always" if in your judgment, the feature is available to the user across the product all the time. Intermediate ratings do not reflect the number of times a feature occurred, but rather the degree to which that feature is available across the product observed.

Some of the questions will ask the evaluator whether or not a feature exists. These questions use a multiple-choice format with the following options: yes, no, don't know, or not applicable. For these questions, answer "yes", even if the feature is available minimally, for example, even if it is only available in some parts of the lesson or only under some circumstances. When in doubt, answer "don't know".

Keep in mind, when examples are provided, they are not inclusive of all examples. Answer yes, if the product offers a particular feature, even if it does not match one of the examples provided. In subsequent questions, if applicable, you will be given the opportunity to write-in "other" responses to show your thinking about why the feature exists.

Please use the navigation buttons at the bottom of the survey to move forward or to go back and modify an answer. Do not use the navigation buttons on your web browser.

Demographics

Please fill in the following information:

Name of the system being scanned:*



UDL & ONLINE LESSON ALIGNMENT: PRINCIPLE 1

(MULTIPLE MEANS OF REPRESENTATION)

INPUT:

INCLUSION OF AUDITORY, ALTERNATIVE VISUAL, AND CAPTIONING OPTIONS; VARIETY OF EXAMPLES; SCAFFOLDED LEARNING OPPORTUNITIES

OUTPUT:

OPTIONS TO DEMONSTRATE COMPREHENSION SUCH AS EMPLOYING PREVIOUS KNOWLEDGE IN RESPONSES, VARIOUS WAYS TO MANIPULATE INFORMATION THROUGH INTERACTIVE FUNCTION IN THE LMS

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UDL & ONLINE LESSON ALIGNMENT: PRINCIPLE 2:

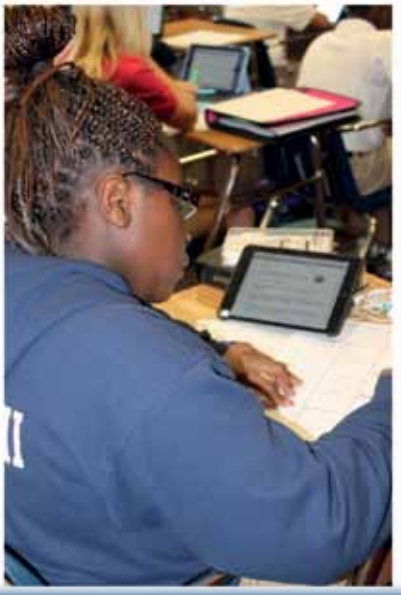
(MULTIPLE MEANS OF ACTION & EXPRESSION)

INPUT:

ENABLE CIRCUITOUS MOVEMENT, LINKS WITHIN AND OUTSIDE THE LMS, CUSTOMIZABLE OPTIONS, CLEAR PROMPTS (EMBEDDED SUPPORTS)

OUTPUT:

OPTIONS FOR USE OF EXECUTIVE FUNCTIONS AND HIGHER ORDER THINKING, CREATIVITY



UDL & ONLINE LESSON ALIGNMENT: PRINCIPLE 3:

(MULTIPLE MEANS OF ENGAGEMENT)

INPUT:

INTERACTIVE EXPERIENCES, MOTIVATIONAL AND ENGAGING

OUTPUT:

OPPORTUNITY TO DEMONSTRATE UNDERSTANDINGS IN VARIED PERFORMANCE OPTIONS, PROVISION OF CYCLIC SUPPORT FOR REVIEW, VARIED, SELECTABLE FEEDBACK DEPENDENT UPON RESULTS



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WHICH IS AN EXAMPLE OF UDL FOR INSTRUCTION?









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ENGAGEMENT:
Top Place Winner CAST Competition (tie): UDL Year One – North Farmington High School, Farmington, Michigan (MI); Chris DeYonke, Elizabeth Crane, Parker Salowich, Vera Fakhouri, Todd Hecker, Danielle Alexander, Kathryn Dodge, Val Nafso, Stephanie Lanning

BUT IS SOMETHING MISSING? WERE ALL PROJECTS ACCESSIBLE TO ALL? THAT IS SOMETHING THAT WE MUST ALWAYS KEEP IN MIND!

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UDL *MUST* BE INCLUDED IN THE CONVERSATION *WITH* ACCESSIBILITY





Representation, Expression, & Engagement

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REFERENCES

- NATIONAL CENTER ON UNIVERSAL DESIGN FOR LEARNING, AT CAST, 2012
- HTTP://CENTERONONLINELEARNING.ORG/RESOURCES/UDL-SCAN-TOOL/
- GRANT, P. & BAYSE, D. (2014). PERSONALIZED LEARNING: A GUIDE FOR ENGAGING STUDENTS WITH TECHNOLOGY. INTERNATIONAL SOCIETY FOR TECHNOLOGY IN EDUCATION.
- SMITH, S.J. (2016). INVITED IN: MEASURING UDL IN ONLINE LEARNING, OFFICE OF SPECIAL EDUCATION PROGRAMS; US DEPARTMENT OF EDUCATION
- SYLVIA, J. (2011). HTTPS://PORTAL.GEORGIA.GOV/INTERACTIVE/BLOG/2014-12-17PDFWORLD WIDE WEB CONSORTIUM.
- WEB CONTENT ACCESSIBILITY GUIDE WORLD WIDE WEB CONSORTIUM. (2011). WEB CONTENT ACCESSIBILITY GUIDELINES (WCAG) 2.0.
- YESILDA, Y., BRAJNIK, G., VIGO, M., & HARPER, S. (2012). UNDERSTANDING WEB ACCES IBILITY AND ITS DRIVERS, PROCEEDINGS OF THE INTERNATIONAL CROSS DISCIPLINARY CONFERENC EON WEB ACCESSIBILITY W4A. AARHUS, DENMARK: ACM PRESS.
- HTTP://WWW.DEEPERDIVELEARNING.COM/UDL.HT

HTTP://WEBAIM.ORG/

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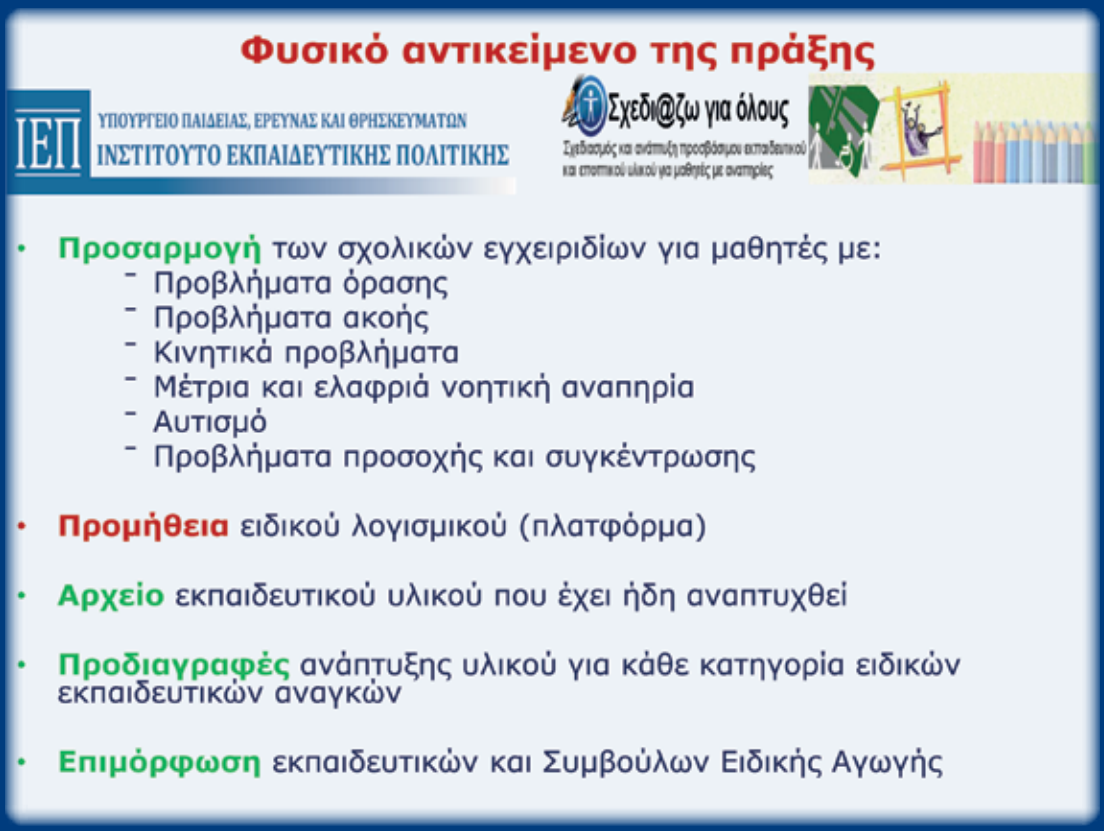
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Η ανάπτυξη του υλικού βασίστηκε:



- Στη Σύμβαση του ΟΗΕ για τα δικαιώματα των ατόμων με αναπηρίες, 2006 / ΝΟΜΟΣ ΥΠ' ΑΡΙΘ. 4074, 2012
- Στις αρχές του καθολικού σχεδιασμού για τη μάθηση(design for all) και της διαφοροποιημένης παιδαγωγικής προσέγγισης και με την αξιοποίηση των Τ.Π.Ε
- Στην πολυαισθητηριακή προσέγγιση
- Στα γενικά και μαθησιακά χαρακτηριστικά των μαθητών με αναπηρία

Προσαρμοσμένο εκπαιδευτικό υλικό για μαθητές με νοητική αναπηρία





ψηφιοποίηση και προσαρμογή των σχολικών εγχειριδίων των τάξεων Α' και Β' Δημοτικού με τη μέθοδο easy to read για μαθητές με νοητική αναπηρία





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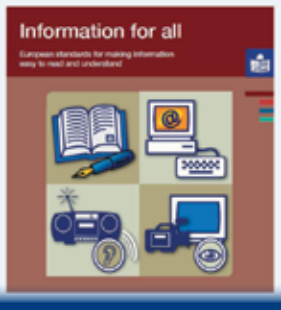
Easy to read - κείμενο για όλους

- Η προσαρμογή βασίστηκε στη μέθοδο easy to read
- Στοχεύει στην προσαρμογή του κειμένου με τέτοιο τρόπο, ώστε η πληροφορία να είναι εύληπτη και κατανοητή



Κείμενο για όλους-easy to read

- Οι αρχές που τη διέπουν είναι διαθέσιμες στο: http://www.inspiredservices.org.uk/Information%20for%20all.pdf



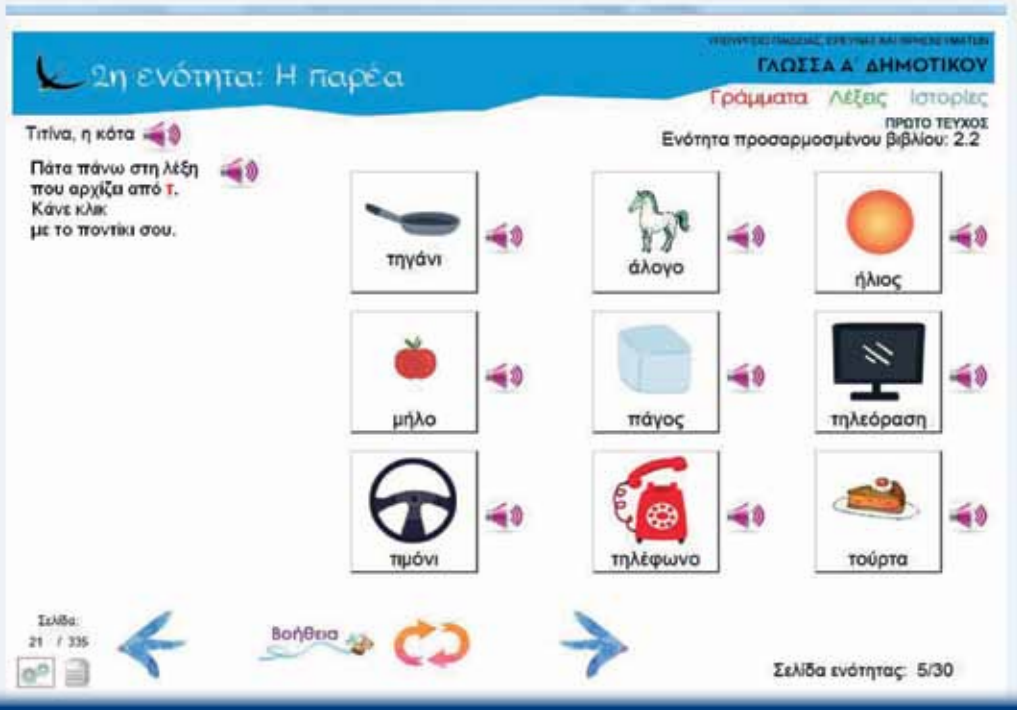
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Προδιαγραφές ανάπτυξης υλικού

- **ως προς το κείμενο**
  απλό λεξιλόγιο, απλή δομή προτάσεων-μια ιδέα σε κάθε πρόταση, κατάλληλη διάταξη, απουσία μεταφορικού λόγου, οπτικοποίηση του νοήματος, χρήση ορισμών, παραδειγμάτων και επεξηγήσεων, κ.α.
- **ως προς την εικόνα**
  ευκρίνεια, σαφήνεια, άμεση συσχέτιση με το περιεχόμενο, κ.α
- **ως προς τη διεπαφή του χρήστη του ψηφιακού βιβλίου**
  διευκόλυνση στη χρήση της εφαρμογής

Απόδοση του λεξιλογίου: κείμενο, εικόνα, ήχος



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Στόχος

Με την ανάπτυξη του προσβάσιμου υλικού επιδιώκεται η **δημιουργία ενός βασικού κορμού κειμένων,** τα οποία ο εκπαιδευτικός θα μπορεί να τροποποιεί εύκολα ή και να δημιουργεί νέα διαφοροποιημένα κείμενα ανάλογα με το μαθητή αξιοποιώντας τη βάση δεδομένων του προσβάσιμου υλικού (εικόνες, σκίτσα, πικτογράμματα, λεξιλόγιο, κ.α)

Μορφές προσβάσιμου υλικού

- Διαθέσιμο σε 2 μορφές: **έντυπη και ηλεκτρονική**

- Ηλεκτρονική μορφή:
  - **Επεξεργάσιμη μορφή** από οποιονδήποτε επεξεργαστή κειμένου, συμπεριλαμβανομένων και εφαρμογών ανοικτού κώδικα
  - **PDF**
  - **Εικονικό βιβλίο**
  - **Πολυμεσική εφαρμογή**

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Δείγματα προσαρμοσμένου υλικού

Ενδεικτικές Προσαρμογές έντυπου υλικού
Γλώσσα-Μαθηματικά Α΄ Δημοτικού

Απλοποίηση κειμένου, οπτική ενίσχυση με εικόνα, προσθήκη ορισμού



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Επεξήγηση μεταφορικού λόγου



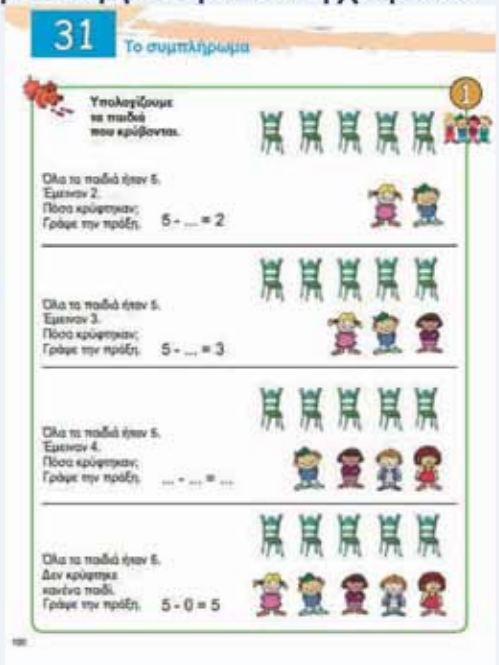
Η φράση «η πείνα με θερίζει» σημαίνει ότι πεινάω πολύ.

Ανάλυση ύλης σε βήματα - Οπτική ενίσχυση

Συμβατικό εγχειρίδιο



Προσαρμοσμένο εγχειρίδιο



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Συμβατικό σχολικό εγχειρίδιο Ανθολογίου Α΄-Β΄δημοτικού



Δώσε την αγάπη

Ο Μάνος και ο Στάθης είναι φίλοι και συμμαθητές σε ένα «διαπολιτισμικό σχολείο». Κάθονται στο ίδιο θρανίο μέχρι που κάποια μέρα η δασκάλα τους, η κυρία Μάρθα, τους αλλάζει θέση με αφορμή τον έρχομό δυο παιδιών από άλλες χώρες. Η αλλαγή αυτή δυσαρεστεί τα παιδιά. Κάποια μέρα η κυρία Μάρθα προτείνει στην τάξη να ετοιμάσουν μια πρωτότυπη γιορτή...*

Ήταν μια Δευτέρα κοντά στα Χριστούγεννα και η κυρία Μάρθα λίγο πριν φύγουν από το σχολείο τούς είπε:

– Αύριο θα κάνουμε μια γιορτούλα μέσα στην τάξη.

– Τι γιορτή; Ποιος άγιος γιορτάζει; ρωτούσαν τα παιδιά.

– Αυτός ο άγιος δεν υπάρχει στο ημερολόγιο. Μην ψάξετε, γιατί δε θα τον βρείτε. Είναι ο άγιος της φιλίας.

– Μα δεν έχει όνομα;

– Να τον πούμε... Φιλάγιο; φώναξε ο Μάνος.

– Να τον πούμε έτσι, συμφώνησε η δασκάλα του. Για να τον τιμήσουμε, αύριο θα φέρετε όλοι σας ένα δωράκι για ν' ανταλλάξουμε μεταξύ μας δώρα. Σύμφωνοι; Περίεργη γιορτή, αλλά... σύμφωνοι!

Του Μάνου το μυαλό έτρεξε στο φίλο του το Στάθη. Ήξερε τι θα του πάρει. Ένα φακελάκι με ποδοσφαιριστές της αγαπημένης του ομάδας. Τον Γιάνναους, που καθόταν και δίπλα του, ούτε που τον σκέφτηκε.

Την επόμενη μέρα αυτός ο άγιος της φιλίας που δεν είχε όνομα θα πρέπει να ήταν πολύ καρούμενος. Γιατί όλα τα παιδιά είχαν φέρει κάτι μαζί τους, ακόμα και χαρτιά με ζωγραφιές, ακόμα και ποιηματάκια.

Η Νταντέλλα είχε φέρει ένα ταψί προσόπιτα να τη μοιράσει σε όλους. Ο Γιάννους είχε φέρει ένα καλαθάκι μήλα.

– Τι θα τα κάνεις τόσα μήλα; ρώτησε το Πολωνεζάκι, ο Μάνος. Θα τα φας όλα εσύ; Θα σκάσεις! Θα κάνεις μπαμ! Ο Γιάννους έκανε πράγματι μπαμ, αλλά όχι από το πολύ φαΐ. Όταν ήρθε η σειρά του να δώσει τα δώρα του, πήρε το

* **διαπολιτισμικά σχολεία**: σχολεία όπου φοιτούν και μαθητές που έρχονται από άλλες χώρες

Προσαρμοσμένο σχολικό εγχειρίδιο Ανθολογίου Α΄-Β΄δημοτικού – Έντυπη μορφή



[Αγάπησε]

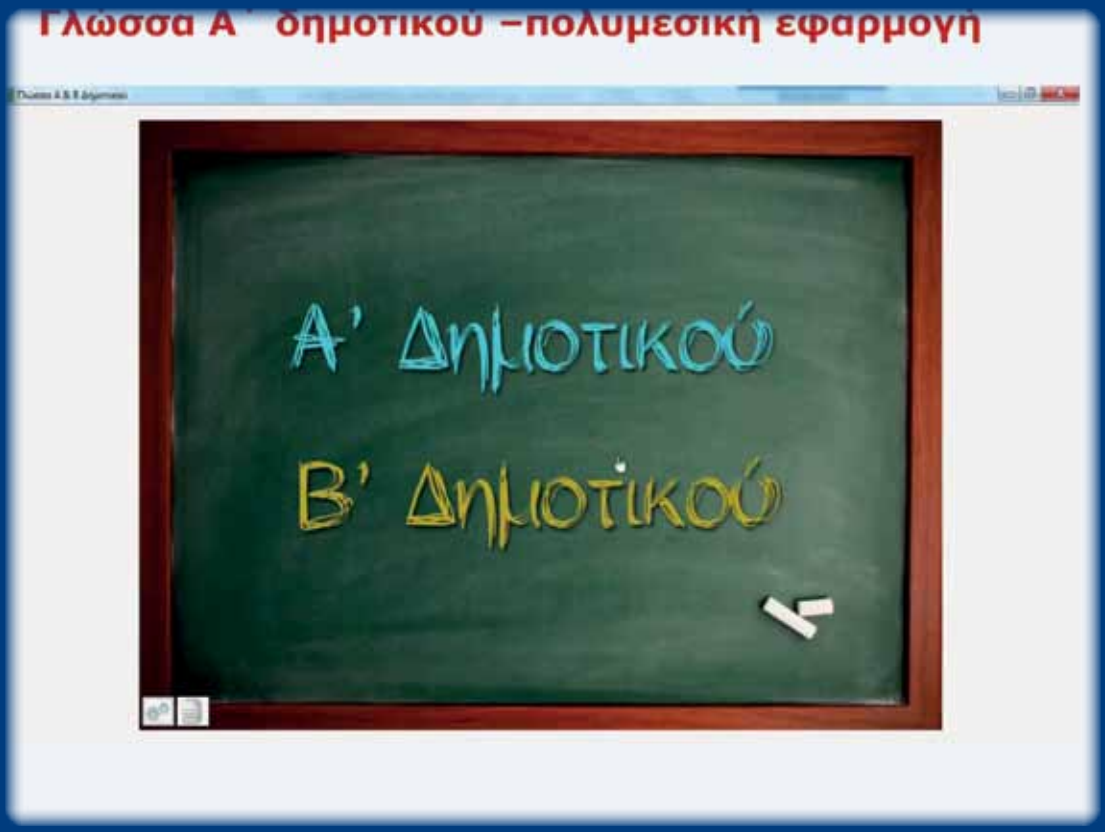
Ο Μάνος και ο Στάθης
είναι φίλοι και συμμαθητές
σε ένα σχολείο,
όπου υπάρχουν παιδιά
από πολλές χώρες του κόσμου.
Κάθονται στο ίδιο θρανίο.
Κάποια μέρα
η δασκάλα τους,
η κυρία Μάρθα,
τους αλλάζει θέση.
Η αλλαγή αυτή
δεν αρέσει στα παιδιά.
Κάποια μέρα
η κυρία Μάρθα
προτείνει στην τάξη
να ετοιμάσουν μια γιορτή...

Πλησίαζαν τα Χριστούγεννα
και η κυρία Μάρθα
λίγο πριν σχολάσουν
είπε:

προτείνει σημαίνει λέει.

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Πολυμεσική εφαρμογή Μελέτης Περιβάλλοντος



Προσαρμοσμένο εκπαιδευτικό υλικό για κωφούς και βαρήκοους μαθητές

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Η δίγλωσση εκπαίδευση

Στον 3699/2008
«Ως **πρώτη γλώσσα** των κωφών και βαρήκοων μαθητών αναγνωρίζεται **η Ελληνική Νοηματική Γλώσσα** και ως δεύτερη γλώσσα τους η Νέα Ελληνική, η οποία προσλαμβάνεται και εκφέρεται με τη γραπτή της μορφή, ενώ η προφορική της αντίληψη και έκφραση αποτελεί πρόσθετη κοινωνική επιλογή των κωφών μαθητών. [...]
Η ενδεδειγμένη γλωσσική παιδαγωγική προσέγγιση είναι η δίγλωσση εκπαίδευση.»

Πολυμεσικό ηλεκτρονικό και έντυπο εκπαιδευτικού υλικού

Αφορά στην απόδοση όλων των σχολικών εγχειριδίων των δύο πρώτων τάξεων του Δημοτικού στην Ελληνική Νοηματική Γλώσσα

- Γλώσσα
- Ανθολόγιο
- Μαθηματικά
- Μελέτη Περιβάλλοντος

Selected Universally Designed Educational Material for Students with Disability

Maria Gelastopoulou, Spyridoula Karipi, Dr Vassilis Kourbetis
Institute of Educational Policy, Greece

Σχολικά Εγχειρίδια Α΄ & Β΄ Δημοτικού στην Ελληνική Νοηματική Γλώσσα









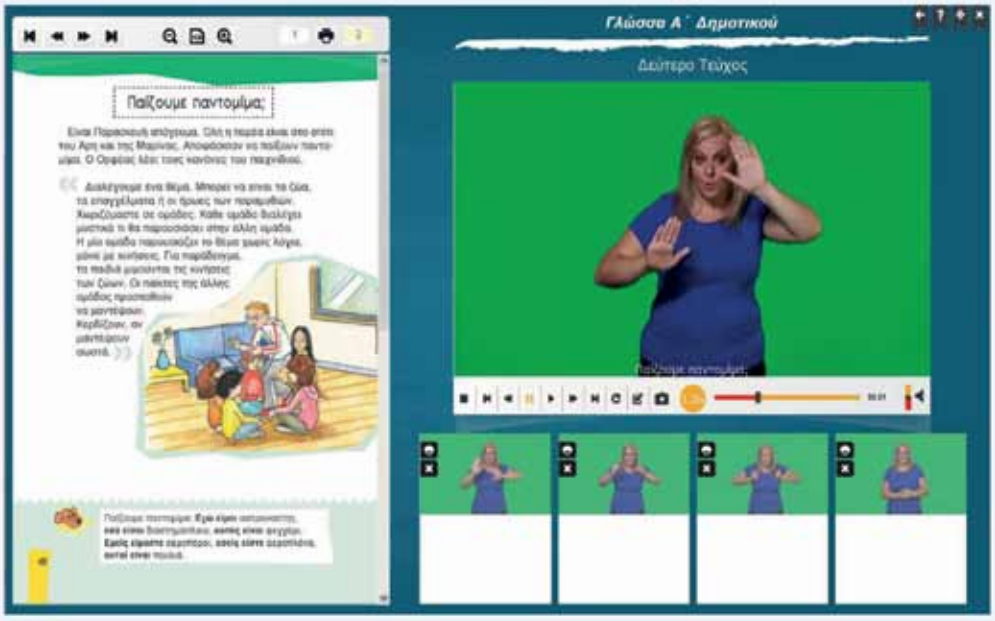
Προδιαγραφές Προσβάσιμου Εκπαιδευτικού Υλικού για κώφωση

1. Η Διεπαφή
2. Η απόδοση των ελληνικών κειμένων στην ΕΝΓ (παραμύθια, λογοτεχνικά κείμενα).
3. Νοηματικές φράσεις και κείμενα από ειδικούς και έμπειρους νοηματιστές σύμφωνα με τους στόχους του ΑΠΣ της ΕΝΓ.

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Δομή και Περιεχόμενο του ψηφιακού εκπαιδευτικού υλικού - γλώσσα



Δομή και Περιεχόμενο του ψηφιακού εκπαιδευτικού υλικού - μελέτη περιβάλλοντος



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Δομή και Περιεχόμενο του ψηφιακού εκπαιδευτικού υλικού - ανθολόγιο



Δομή και Περιεχόμενο του ψηφιακού εκπαιδευτικού υλικού - μαθηματικά



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Γιατί ένα λογισμικό για την εκμάθηση της ΕΝΓ;

- Εξασφαλίζεται η πρόσβαση στις πληροφορίες του περιβάλλοντος.
- Δυνατότητα εκμάθησης της ΕΝΓ από μικρή ηλικία.
- Διευκόλυνση στον σχεδιασμό και την εφαρμογή εκπαιδευτικών πρακτικών με στόχο την δίγλωσση εκπαίδευση.

Καινοτόμο λογισμικό ...Γιατί;

- Η νοηματική γλώσσα →γλώσσα στόχος.
  Η νοηματική γλώσσα δεν χρησιμοποιείται μόνον ως γλώσσα επικοινωνίας και διδασκαλίας αλλά και **ως γλώσσα-στόχος που διδάσκεται και καλλιεργείται συστηματικά όπως η ομιλούμενη και γραπτή γλώσσα της κοινότητας των ακουόντων**.
- Έχει αναπτυχθεί με βάση τις αρχές και τους στόχους του αναλυτικού προγράμματος σπουδών ΕΝΓ του ΠΙ (2004).

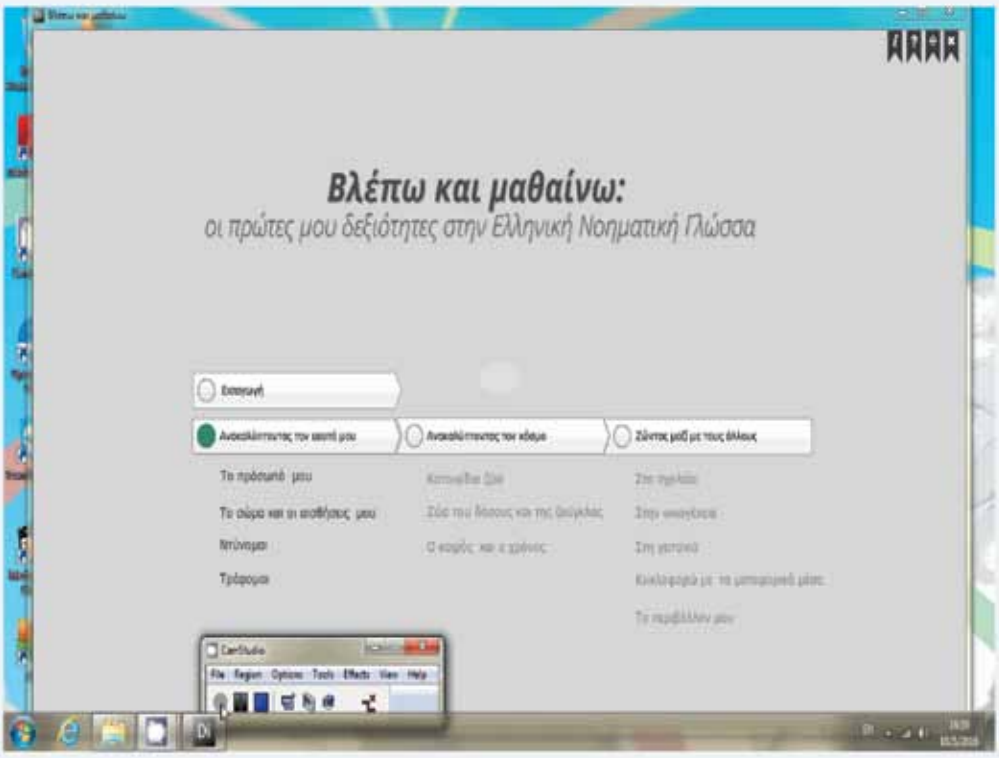
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Ειδικό Εκπαιδευτικό υλικό Ελληνικής Νοηματικής Γλώσσας

- Γλωσσική ετοιμότητα στην Ελληνική Νοηματική Γλώσσα (νηπιαγωγείο).
- Εκμάθηση της Ελληνικής Νοηματικής Γλώσσας (Α΄, Β΄ δημοτικού).





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Ενδεικτικά εργαλεία αξιολόγησης ΕΝΓ

- Εργαλεία Αξιολόγησης για το Νηπιαγωγείο:
  - ✓ Κατάλογος Ελέγχου Πρώτου Λεξιλογίου
  - ✓ Κατάλογος Ελέγχου Νοημάτων και Φράσεων



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Ενδεικτικά εργαλεία αξιολόγησης ΕΝΓ:

- Διαρθρωτική και τελική αξιολόγηση για Α΄- Β΄ Δημοτικού.
- Ανάπτυξη χαρτοφυλακίου του μαθητή- τρεις υποφακέλους:
  - α) ατομικών εργασιών
  - β) ομαδικών εργασιών
  - γ) εργασιών στην ολομέλεια

Το υλικό αυτό αποτελεί **εξαιρετικά σημαντικό εργαλείο για την εφαρμογή της δίγλωσσης προσέγγισης**, σύμφωνα με την οποία η συστηματική διδασκαλία της Ελληνικής Νοηματικής Γλώσσας ως γλώσσα-στόχος αποτελεί καθοριστικό παράγοντα εξέλιξης των κωφών μαθητών.

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Ηλεκτρονικό και έντυπο εκπαιδευτικό υλικού

Όλα τα κείμενα βρίσκονται σε ξεχωριστούς φακέλους και είναι επεξεργάσιμα από τις σύγχρονες εφαρμογές επεξεργασίας κειμένου (όπως WORD), συμπεριλαμβανομένων και εφαρμογών ανοιχτού κώδικα (όπως Open Office).

Τα δεδομένα των πολυμέσων, PDF, βίντεο και ηχητικά αρχεία βρίσκονται, επίσης, σε ανεξάρτητους φακέλους στους οποίους οι εκπαιδευτικοί έχουν πρόσβαση για οποιαδήποτε επεξεργασία, διαφοροποίηση και διδακτική χρήση.

Το προσαρμοσμένο υλικό αποτελεί σημαντικό **εργαλείο για την εφαρμογή της διαφοροποιημένης παιδαγωγικής προσέγγισης, ενταξιακών εκπαιδευτικών πρακτικών** και κυρίως αποτελεί καθοριστικό παράγοντα συμμετοχής και κατά συνέπεια εξέλιξης των μαθητών με αναπηρία.

Είναι κατάλληλο και για μαθητές χωρίς αναπηρίες.

Επιπλέον, αποτελεί σημαντικό εργαλείο στα χέρια των εκπαιδευτικών για την υποστήριξη του έργου τους.

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Αξιολόγηση

Η πρώτη αξιολόγηση από εκπαιδευτικούς που το χρησιμοποιούν είναι πολύ ενθαρρυντική.

Μετά την εφαρμογή του υλικού στα σχολεία και την αξιολόγηση από τους εκπαιδευτικούς θα υλοποιηθούν οι απαραίτητες βελτιώσεις.

Το εκπαιδευτικό υλικό και λογισμικό είναι διαθέσιμο στην ηλεκτρονική διευθύνση

http://www.prosvasimo.gr/



Σχεδι@ζω για όλους



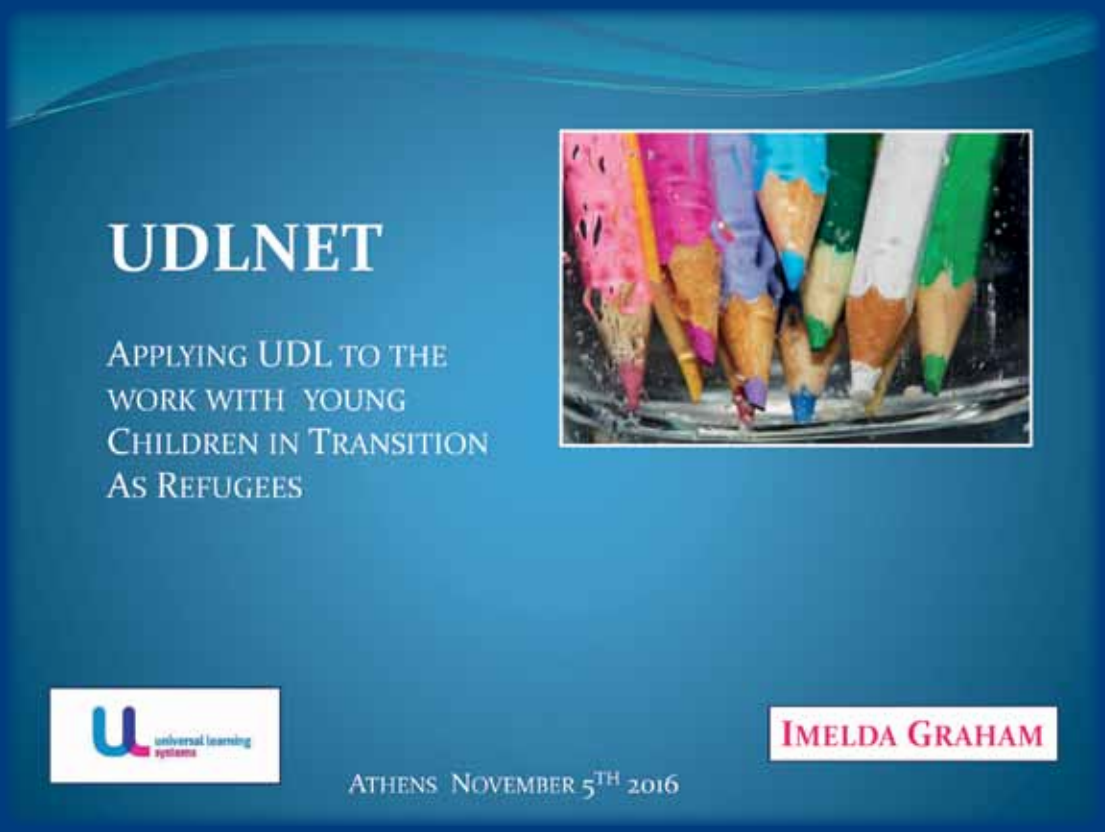
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Applying UDL with children in transition

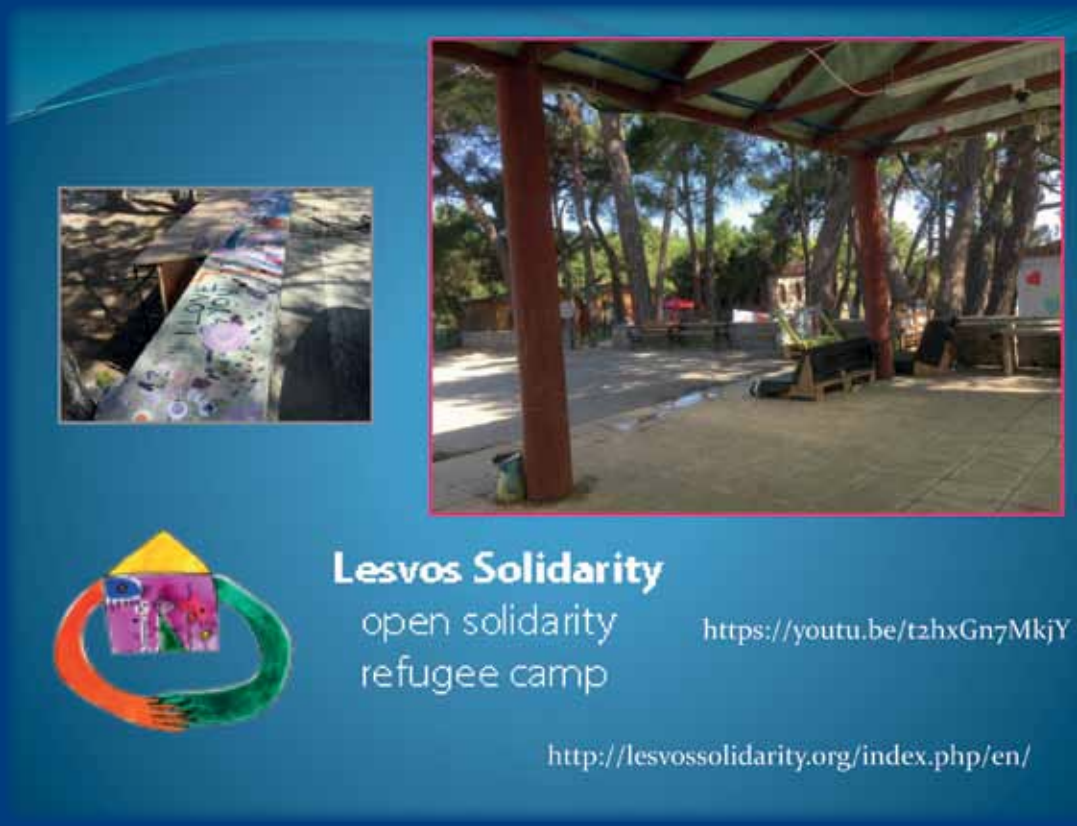
Ms. Imelda Graham
Consultant, Universal Learning Systems, Ireland





Applying UDL with children in transition

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Consultant, Universal Learning Systems, Ireland

The three governing principles of UDL are:

- **Multiple means of representation** (present information in different ways)
- **Multiple means of action and expression** (allow students to approach tasks in different ways and show what they know in different ways)
- **Multiple means of engagement** (offer different options that make and keep students interested and motivated)

UDL: A Framework for Addressing Learner Variability

Aistear: The Irish National Curriculum Framework



http://www.ncca.ie/en/Curriculum_and_Assessment/Early_Childhood_and_Primary_Education/Early_Childhood_Education/

Applying UDL with children in transition

Ms. Imelda Graham
Consultant, Universal Learning Systems, Ireland

Aistear Themes and Main Aims

Well-being Children are confident, happy and healthy.

Identity and Belonging Children have a positive sense of who they are, develop a sense of their culture and heritage and feel valued and respected as part of a family and community.

Communicating Children share their experiences, thoughts, ideas and feelings with growing confidence and competence in a variety of ways and for different purposes.

Exploring and Thinking Children make sense of the things, places and people in their world.



Applying UDL with children in transition

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Consultant, Universal Learning Systems, Ireland



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Consultant, Universal Learning Systems, Ireland

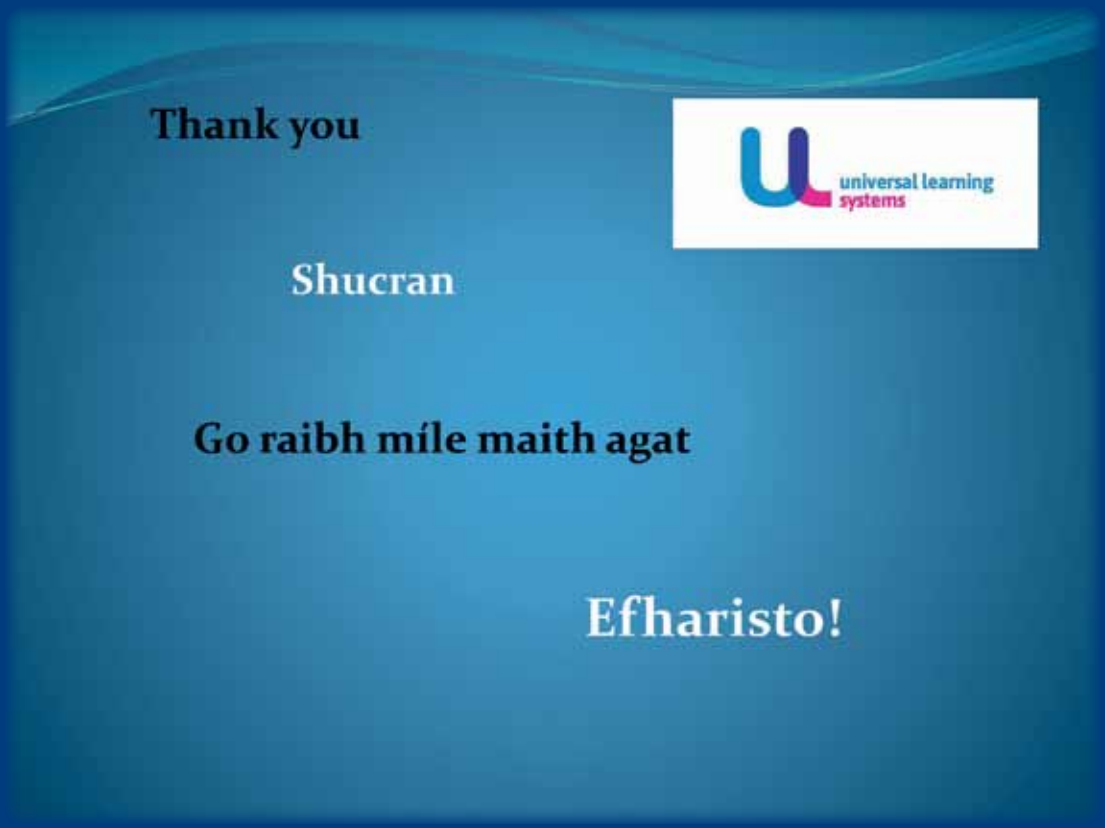




'Children come to us stuffed with wonder, eyes lit bright with projects. Their hands are eager to pull apart life's mysteries, their voices ready to shout out accomplishments, each echo adding shape to their being.' *(Greenman, 1998 in Graham, 2014)*

Applying UDL with children in transition

Ms. Imelda Graham
Consultant, Universal Learning Systems, Ireland



Science Education for Responsible Citizenship

Dr. Angelos Lazoudis
Ellinogermaniki Agogi



Science Education for Responsible Citizenship

Dr. Angelos Lazoudis
Research & Development Dept.
Ellinogermaniki Agogi

Science Education in the United States



Pursuing Excellence:
Comparisons of International Eighth-Grade Mathematics and Science Achievement from a U.S. Perspective, 1995 and 1999

PURSUING EXCELLENCE:
A STUDY OF U.S. TWELFTH-GRADE MATHEMATICS AND SCIENCE ACHIEVEMENT IN INTERNATIONAL CONTEXT



FIGURE 16:
AVERAGE PHYSICS PERFORMANCE OF ADVANCED SCIENCE STUDENTS IN ALL COUNTRIES

NATIONS WITH AVERAGE SCORES SIGNIFICANTLY HIGHER THAN THE U.S.	
NATION	AVERAGE
NORWAY	581
SWEDEN	573
(RUSSIAN FEDERATION)	545
(DENMARK)	534
(SLOVENIA)	523
(GERMANY)	522
(AUSTRALIA)	519
(CYPRUS)	494
(LATVIA)	488
SWITZERLAND	488
GREECE	486
(CANADA)	485
FRANCE	466
CZECH REPUBLIC	451

NATIONS WITH AVERAGE SCORES NOT SIGNIFICANTLY DIFFERENT FROM THE U.S.	
NATION	AVERAGE
(AUSTRIA)	435
(UNITED STATES)	423

NATIONS WITH AVERAGE SCORES SIGNIFICANTLY LOWER THAN THE U.S.	
NATION	AVERAGE
NONE	

INTERNATIONAL AVERAGE = 501

U.S.A
Average
423

International
Average
501

Countries: **41**
Students: **500,000**

NOTE: Nations not meeting international sampling and other guidelines are shown in parentheses.
See Appendix B for details for each country.

Science Education for Responsible Citizenship

Dr. Angelos Lazoudis
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Science Education in the United States



Before It's Too Late:
A Report to the Nation from The National Commission on Mathematics and Science Teaching for the 21st Century

"The basic teaching style in too many mathematics and science classes today remains essentially what it was two generations ago. By contrast, teaching innovation and higher student performance are well documented in other countries, where students' improvements are anchored to an insistence on **strong professional development for teachers."**

TIMSS UNITED STATES

The Third International Mathematics and Science Study (TIMSS) tested the students of 41 nations. Children in the U.S. were among the leaders in the fourth-grade assessment, but by high school graduation they were *almost last...*



TIMSS 2003

Table 13. Average science scales scores of eighth-grade students, by country: 1995 and 2003

Country	1995	Country	2003
Singapore	580	Singapore	578
Japan	554	Korea, Republic of	558
Sweden	553	Hong Kong SAR[12]	556
Korea, Republic of	546	Japan	552
(Bulgaria)	545	Hungary	543
(Netherlands)	541	Netherlands[3]	536
Hungary	537	**(United States)**	**527**
Belgium-Flemish	533	Australia	527
Slovak Republic	532	Sweden	524
Russian Federation	523	Slovenia	520
Norway	514	New Zealand	520
(Australia)	514	Lithuania[3]	519
(Slovenia)	514	Slovak Republic	517
United States	**513**	Belgium-Flemish	516
New Zealand	511	Russian Federation	514
Hong Kong SAR[2]	510	Latvia-LSS[4]	513
(Scotland)	501	Scotland[5]	512
(Latvia-LSS)[4]	476	Norway	494
(Romania)	471	Bulgaria	479
Lithuania[3]	464	Romania	470
Iran, Islamic Republic of	463	Iran, Islamic Republic of	453
Cyprus	452	Cyprus	441

http://timss.bc.edu/timss2011/downloads/T11_IR_Science_FullBook.pdf

PISA 2000, 2003, 2006, 2009, 2012, 2015



	PISA 2000	PISA 2003	PISA 2006	PISA 2009	PISA 2012	PISA 2015
Countries	43	41	57	65	65	65

PISA 2006 — Are students interested in Science?

- 72% believe that it is important to do well in science
- 67% like to learn new things related to sciences
- 56% believe that science is important for their future studies
- 37% would like to have a job related to science
- 21% would like to devote their life to science
- 21% watch systematically on TV shows about science
- 13% often visit websites related to science
- 8% often borrow scientific books from a library



The European Council had set two objectives: to bring about an increase of at least 15% in the number of graduates in these fields by 2010 and at the same time to redress the imbalance between women and men.

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Eurobarometer survey (2006)

2001



Can Astrology be regarded as scientific?; YES: **52.7 %** !!!

Age at which your studies were completed	Astrology is science
Up to 15 years old	50.5
16-19 years old	55.1
20 years old & above	49.8
Still studying	55.3

2005



Comparison of results between 2005 and 1992
Average value on a five-point scale "Scientific rating of subjects"

	EU 25 (2005)	EC 12 (1992)	Difference
Biology	4.2	4.2	0
Astronomy	4.1	4.1	0
History	3.0	2.6	+0.4
Physics	4.4	4.5	-0.1
Astrology	3.1	3.0	+0.1
Economics	3.2	2.8	+0.4
Medicine	4.6	4.5	+0.1
Psychology	3.6	3.4	+0.2
Mathematics	4.1		
Homeopathy	3.1		
Horoscopes	1.9		

Coming Soon: Results from TIMSS 2015/TIMSS Advanced 2015

Results will be released at timssandpirls.bc.edu
10 a.m. Central European Time
November 29, 2016

IEA's TIMSS assesses trends in mathematics and science achievement every four years in countries around the world.

TIMSS 2015
57 Countries
7 Benchmarking Participants
- Grades 4 and 8
- Mathematics and Science

TIMSS Advanced 2015
9 Countries
- Final Year of Secondary School
- Advanced Mathematics and Physics

20 Years of Achievement Trends

630,000 Students assessed around the world in 2015

TIMSS 2015/TIMSS Advanced 2015 will report:

Country comparisons in mathematics and science achievement

Trend results over time for each country

Comprehensive data on the home and school contexts for learning mathematics and science

PISA 2015

The results of PISA 2015 will be published in December 2016.

The next administration of PISA will be in 2018. Reading literacy will be the major domain.





Science Education for Responsible Citizenship

Dr. Angelos Lazoudis
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Science Education in Europe, 2006



Science Education NOW: A Renewed Pedagogy for the Future of Europe

- **A reversal of school science-teaching pedagogy from mainly deductive to inquiry-based methods provides the means to increase interest in science.**
- **Renewed school's science-teaching pedagogy based on IBSE provides increased opportunities for cooperation between actors in the formal and informal arenas.**
- **Scientific disciplines in school have to be enlarged.** The introduction of problem oriented fields of studies instead of more traditional disciplines would attract the interest of more young people.
- **Teachers are key players in the renewal of science education. Among other methods, being art of a network allows them to improve the quality of their teaching and supports their motivation.** Networks can be used as an effective component of teachers' professional development, are complementary to more traditional forms of in-service teacher training and stimulate morale and motivation.



Other very significant actors are the **out-ofschool science education organisations** with a particular role played by cultural partners, science centres, science museums and associations for the promotion of sciences, often organising fairs and events.

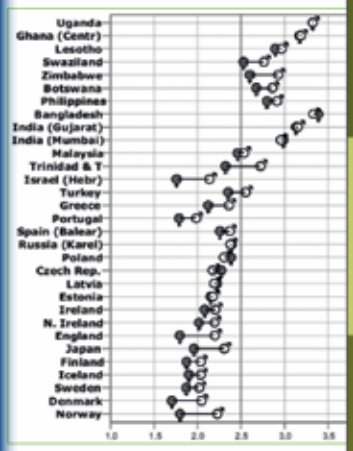


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ROSE (the Relevance of Science Education) Study 2010

"It is a worrying observation that **in many countries where the students are on top of the international TIMSS and PISA score tables, they tend to score very low on interest for science and attitudes to science.** These negative attitudes may be long - lasting and in effect rather harmful to how people later in life relate to S&T as citizens."



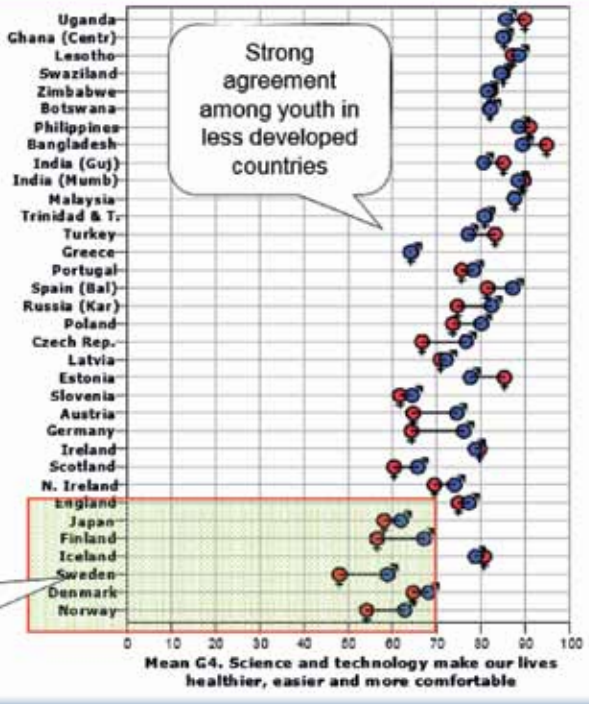
Compare **2006** study to **2010**

I like school science better than most other subjects



ROSE (the Relevance of Science Education) Study 2010

(ROSE) Science and technology make our lives healthier, easier and more comfortable



Scepticism among youth in the Nordic countries and Japan, in particular among girls.

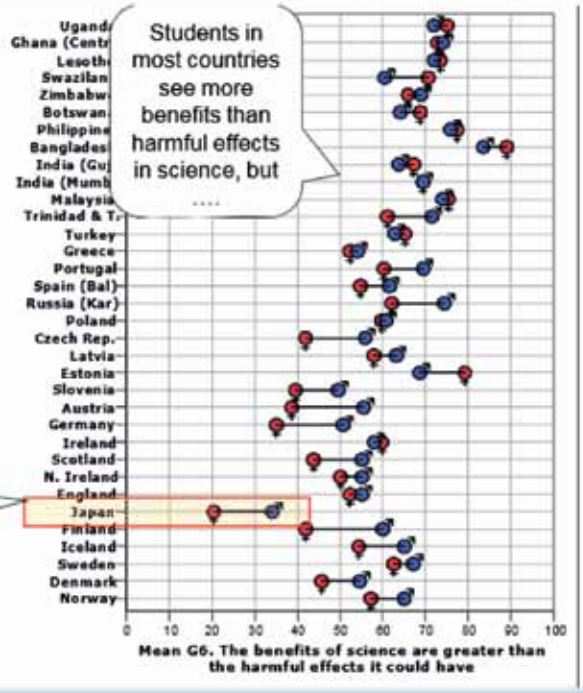
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ROSE (the Relevance of Science Education) Study 2010

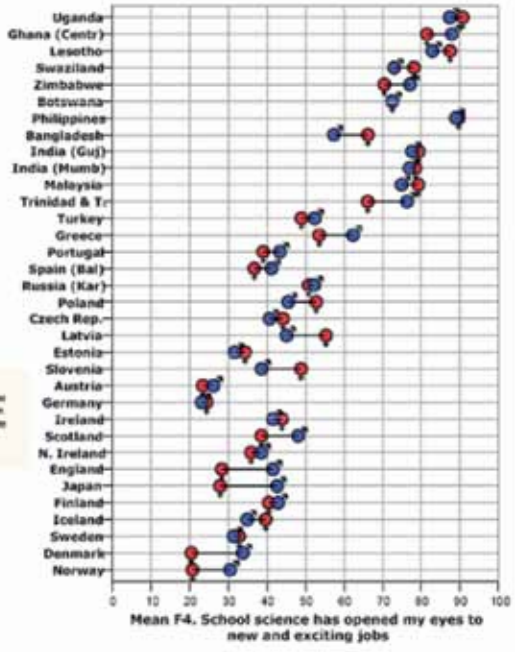
(ROSE)
The benefits of science are greater than the harmful effects that it could have

In Japan, the scepticism towards science is considerable



ROSE (the Relevance of Science Education) Study 2010

School science has opened my eyes for new and exciting jobs

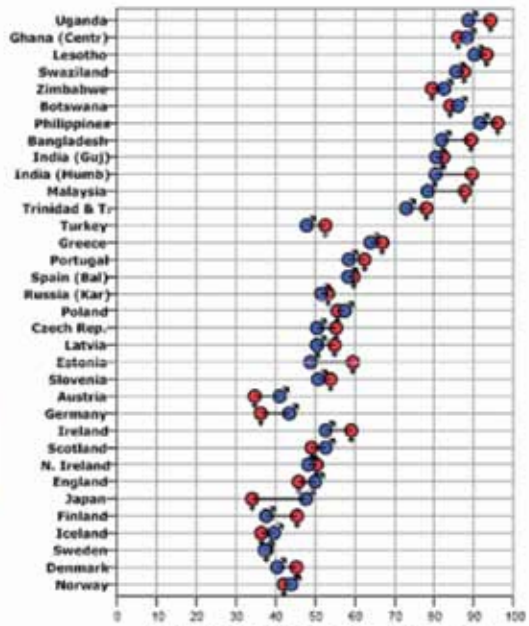


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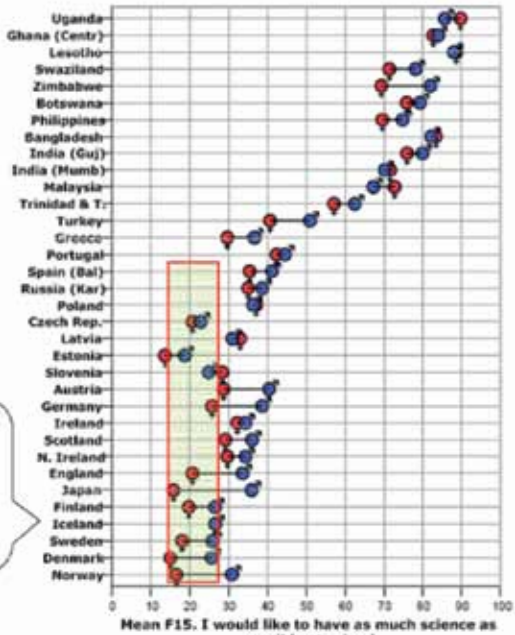
School science has shown me the importance of science for our way of living.



ROSE (the Relevance of Science Education) Study 2010

I would like to have as much science as possible at school

In wealthy countries, young people are not enthusiastic about school science -- in particular not the girls



Science Education for Responsible Citizenship

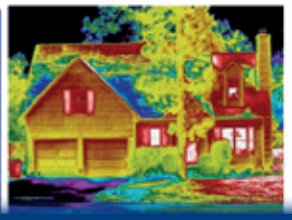
Dr. Angelos Lazoudis
Ellinogermaniki Agogi

Why Science Education matters

Science learning helps us to interpret and understand our world, to manage risk and put uncertainty into perspective, to guide technological development and innovation and to forecast and plan for the future. It improves job prospects, cultural awareness and our ability to act as well-informed citizens in solidarity with citizens around the world.

For some people, science refers only to knowledge of physical systems, living systems, earth and space systems and technology. Sometimes it refers specifically to STEM (science, technology, engineering and mathematical) disciplines. Too often, science is seen as something separate from all other subjects or disciplines in education, disconnected from people's lives beyond school.

But, **science influences all parts of our lives and our decision-making processes**. Along with language and artistic literacy, knowledge of science and mathematics is the basis for personal accomplishment and responsible citizenship, social and economic development and a benchmark of innovation, entrepreneurship and competitiveness in our global world.


STEM

Report-ROCARD-on-Science-Education (2007), in:
http://ec.europa.eu/research/science-society/document_library/pdf_06/report-rocard-on-science-education_en.pdf

Technopolis Final Report (Dec2012), in:
http://ec.europa.eu/research/science-society/document_library/pdf_06/executive-summary-122012_en.pdf

PISA 2012 Results – Full Reports and Data, in: http://www.oecd.org/pisa/keyfindings/pisa-2012-results.htm

2007_Technopolis main report, in:
http://ec.europa.eu/research/science-society/document_library/pdf_06/technopolis-mainreport_en.pdf

Science Policy Briefing/June 2013 "Science in Society: caring for our futures in turbulent times", European Science Foundation, in: http://seaforsociety.eu/np4/%7B$clientServletPath%7D/?newsId=207&fileName=ESF_Report_ScienceInSociety_Sept_2013.pdf

RRI EUROBAROMETER SURVEY/November 2013, in: http://ec.europa.eu/public_opinion/archives/ebs/ebs_401_en.pdf

RRI EUROBAROMETER MEMO, in: http://europa.eu/rapid/press-release_MEMO-13-987_nl.htm

Report – Options-for-Strengthening RRI, in: http://ec.europa.eu/research/science-society/document_library/pdf_06/options-for-strengthening_en.pdf

UNESCO (2010). *Current Challenges in Basic Science Education*, UNESCO Education Sector, in:
http://unesdoc.unesco.org/images/0019/001914/191425e.pdf

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ALLEA (2013), "Ethics Education in Science - Statement by the ALLEA Permanent Working Group on Science and Ethics", Final Version September 2013, in: http://www.allea.org/Content/ALLEA/Statement_Ethics_Edu_web_final_2013_10_10.pdf

European Commission Report on: "Ethics for Researchers", in:
http://ec.europa.eu/research/participants/portal/desktop/en/funding/guide.html

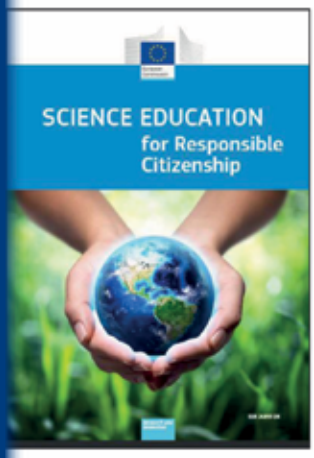
Challenging Futures of Science in Society – Emerging trends and cutting-edge issues/*Report of the MASIS Expert Group setup by the European Commission*, in: ftp://ftp.cordis.europa.eu/pub/fp7/sis/docs/sis_masis_report_en.pdf

Science Education for Responsible Citizenship

Dr. Angelos Lazoudis
Ellinogermaniki Agogi

Science Education in Europe, 2015

Science Education for Responsible Citizenship



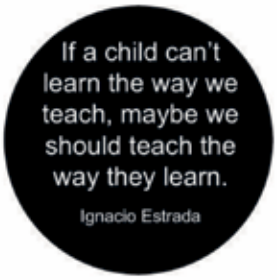
Science Education Expert Group (SEEG)

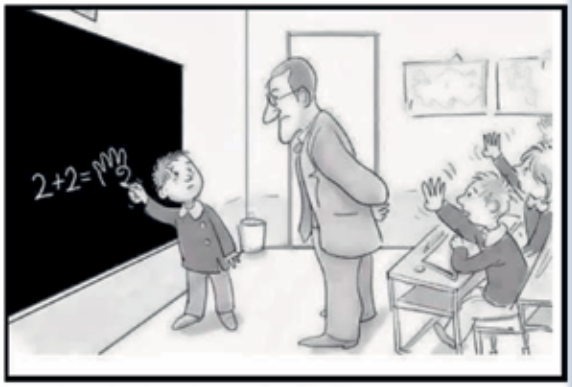
1. Science education should be an essential component of a learning continuum for all, **from pre-school to active engaged citizenship**
2. Science education should focus on competences with an **emphasis on learning through science and shifting from STEM to STEAM** by linking science with other subjects and disciplines
3. The quality of teaching, from induction through pre-service preparation and in-service professional development, **should be enhanced to improve the depth and quality of learning outcomes**
4. Collaboration **between formal, non-formal and informal educational providers, enterprise and civil society should be enhanced** to ensure relevant and meaningful engagement of all societal actors with science and increase uptake of science studies and science-based careers to improve employability and competitiveness
5. Greater attention should be given to **promoting Responsible Research and Innovation (RRI)** and enhancing public understanding of scientific findings and the capabilities to discuss their benefits and consequences
6. Emphasis should be placed on **connecting innovation and science education strategies, at local, regional, national, European and international levels,** taking into account societal needs and global developments

1. Science education should be an essential component of a learning continuum for all, from pre-school to active engaged citizenship



- Support schools, teachers, teacher educators and students of all ages to adopt an inquiry approach to science education as part of the core framework of science education for all
- Address socio-economic, gender and cultural inequalities in order to provide everyone with the opportunities to pursue excellence in learning





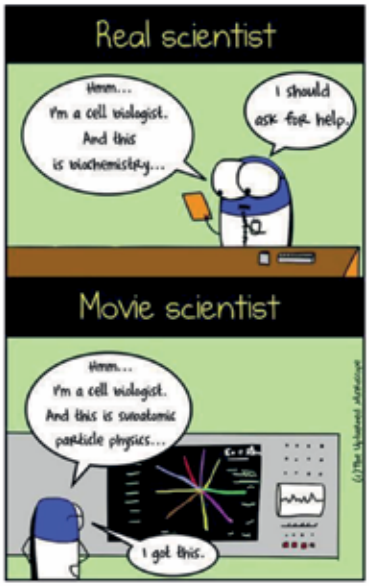
Consequence of Einstien's Proverb - Imagination is more important than knowledge

Science Education for Responsible Citizenship

Dr. Angelos Lazoudis
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2. Science education should focus on competences with an emphasis on learning through science and shifting from STEM to STEAM* by linking science with other subjects and disciplines (* The letter "A" in STEAM stands for "All other disciplines")

- Learning about science through other disciplines and learning about other disciplines through science
- Strengthening connections and synergies between science, creativity, entrepreneurship and innovation.
- More emphasis should be placed on ensuring all citizens are equipped with the skills and competences needed in the digitalized world starting with preschool





3. The quality of teaching, from induction through pre-service preparation and in-service professional development, should be enhanced to improve the depth and quality of learning outcomes

- Continuous Professional Development (CPD) should become a requirement and a right for all teachers throughout their teaching career.
- Efforts should be undertaken to attract more highly qualified and motivated people to become teachers and to boost the status and prestige of the profession.



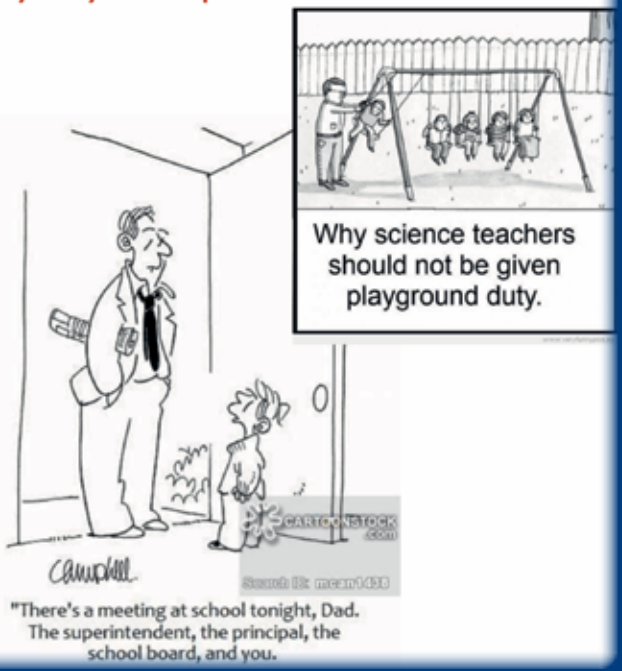
Science Education for Responsible Citizenship

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4. Collaboration between formal, non-formal and informal educational providers, enterprise and civil society should be enhanced to ensure relevant and meaningful engagement of all societal actors with science and increase uptake of science studies and science-based careers to improve employability and competitiveness

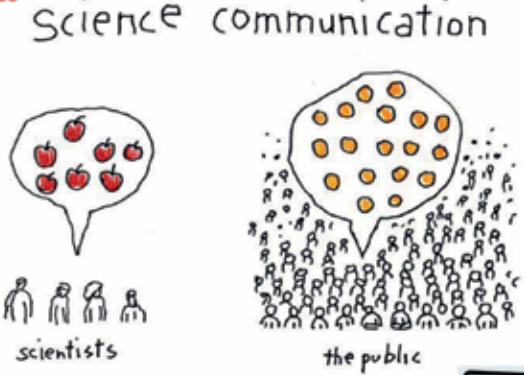
- Encourage "open schooling" where
  - Schools become an agent of community well-being;
  - Families are encouraged to become real partners in school life and activities;
  - Professionals from enterprise, civil and wider society are actively involved in bringing real-life projects into the classroom.

- Promote partnerships between teachers, students, researchers, innovators, professionals in enterprise and other stakeholders in science-related fields, in order to work on real-life challenges and innovations, including associated ethical and social and economic issues



5. Greater attention should be given to promoting Responsible Research and Innovation (RRI) and enhancing public understanding of scientific findings and the capabilities to discuss their benefits and consequences

- The link between scientists, researchers, science educators and the media should be strengthened to ensure more effective public communication, in a way that makes the underlying issues and consequences understandable by citizens.









Science Education for Responsible Citizenship

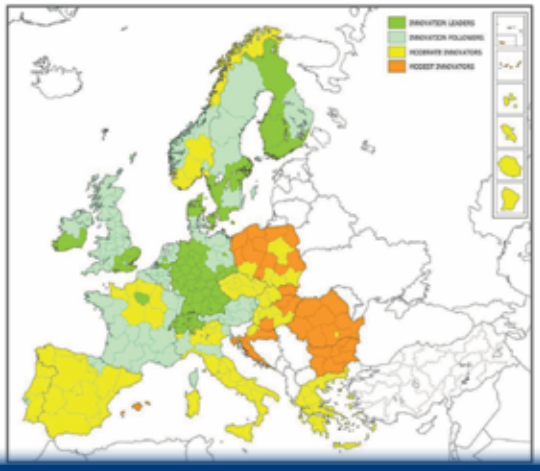
Dr. Angelos Lazoudis
Ellinogermaniki Agogi

6. Emphasis should be placed on connecting innovation and science education strategies, at local, regional, national, European and international levels, taking into account societal needs and global developments

- Links between science education and innovation strategies should be strengthened in order to remove regional, gender and socio-economic disparities across Europe and the world and to make Europe an attractive hub for new investments and professionals and enterprises that want to succeed

A smart, sustainable and inclusive Europe can only exist and only makes sense when it is open to the world and collaborates and interacts dynamically with partners internationally. Because borders are porous, challenges in one part of the world can quickly become problems in another part.





Interesting Practices Promoting Responsible Science Education

Examples from some FP7 Projects

PATHWAY

Fibonacci project

Primas

SiS CATALYST

SCIENTIX

Interesting Practices Promoting Responsible Science Education, from across Europe and around the world

PROJECTS FOR SPECIFIC GROUPS AND LEVELS

COOPERATION SCHOOLS, (SCIENCE) MUSEUMS AND INTER-ACTIVE (SCIENCE) SCIENCE CENTRES

STEM EDUCATION AND ENTREPRENEURSHIP EDUCATION OR INNOVATION /RESEARCH ACTIVITIES

GENDER ISSUES : WOMEN IN SCIENCE

TUTORS, MENTORS, BUDDIES OR ROLE MODELS

SCIENCE CPD/LEARNING CENTRES AND SUPPORT FOR TEACHERS

NATIONAL/REGIONAL PLATFORMS OR NETWORKS

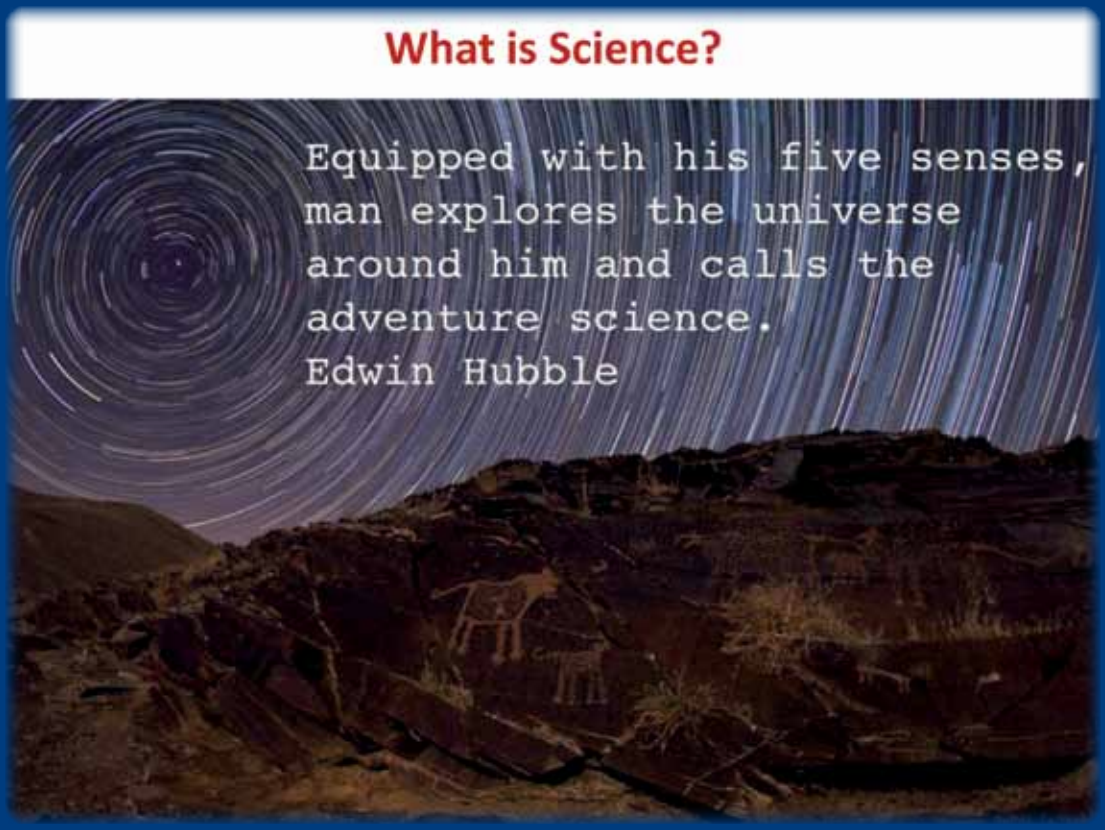
CONTESTS AND COMPETITIONS, INITIATIVES PROMOTED BY FOUNDATIONS, TRUSTS AND OTHER CIVIL SOCIETY ORGANISATIONS (CSO)

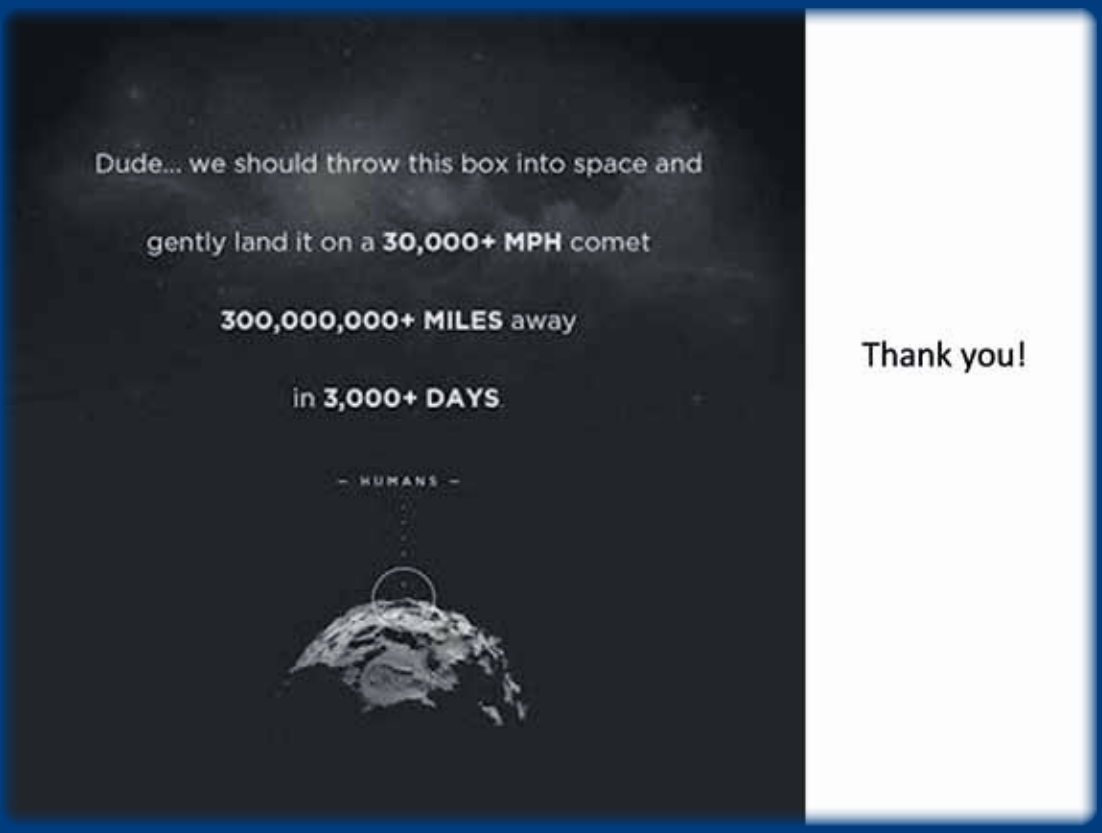
INFORMAL SCIENCE EDUCATION

STEAM

Science Education for Responsible Citizenship

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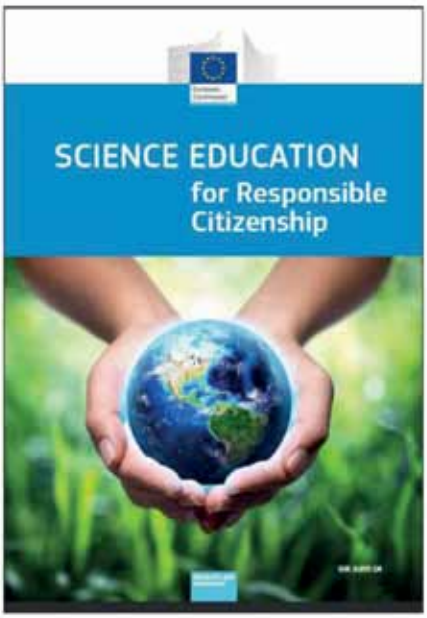




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Science Education for Responsible Citizenship



http://ec.europa.eu/research/swafs/pdf/pub_science_education/KI-NA-26-893-EN-N.pdf

Mary left Apton and rode at the same speed for 2 hours.

She reached this sign.



Mary continues to ride at the same speed to Brandon.

How many hours will it take her to ride from the sign to Brandon?

Ⓐ $1\frac{1}{2}$ hours

Ⓑ 2 hours

● 3 hours

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Stephanie has a balance and four cubes (1, 2, 3, 4). The cubes are made of different materials.

She puts two cubes at a time on the balance and observes the following results.

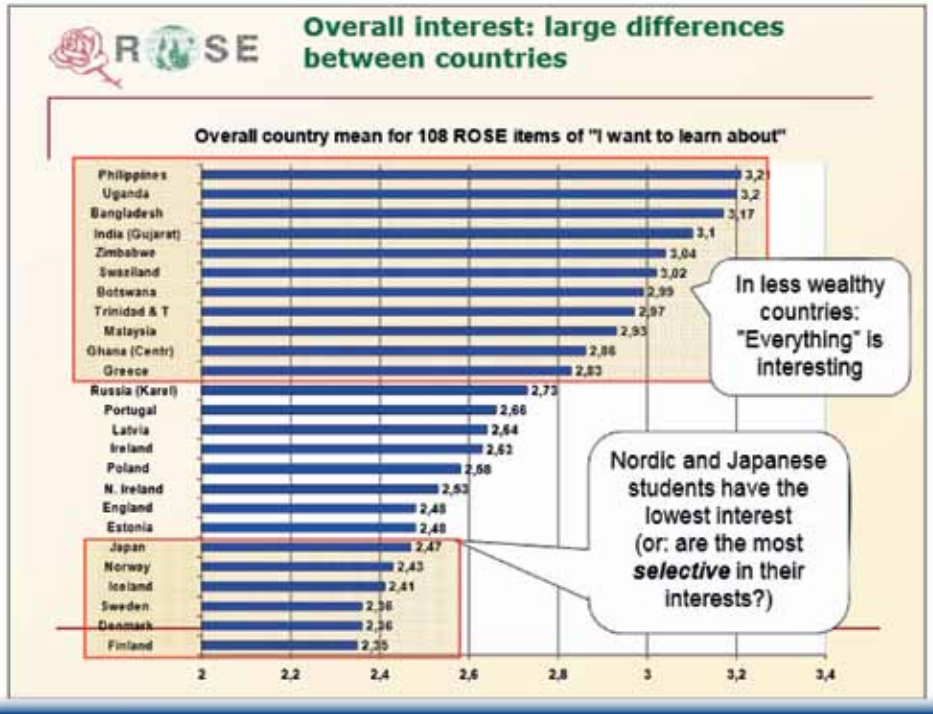


What can she conclude about the weight of cube 2?

- ● It is heavier than cubes 1, 3, and 4.
- Ⓑ It is heavier than cube 1 but lighter than cubes 3 and 4.
- Ⓒ It is heavier than cube 3 but lighter than cubes 1 and 4.
- Ⓓ It is heavier than cube 4 but lighter than cubes 1 and 3.

S041305

ROSE (the Relevance of Science Education) Study 2010



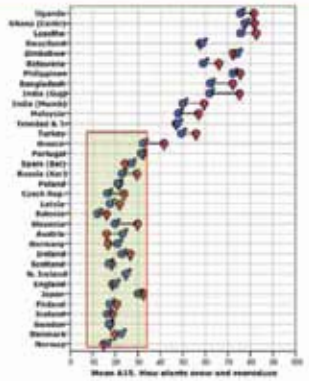
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ROSE (the Relevance of Science Education) Study 2010

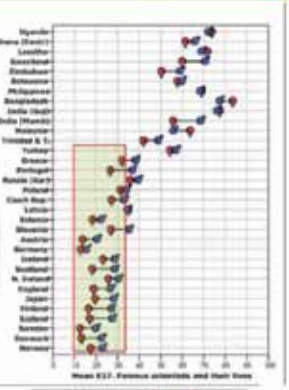
How plants grow and reproduce

Very low interest, 20 % average



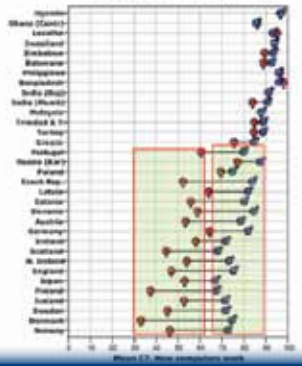
Famous scientist and their lives

Biographies of (often male, old – and dead!) scientists. Low interest, in particular for girls



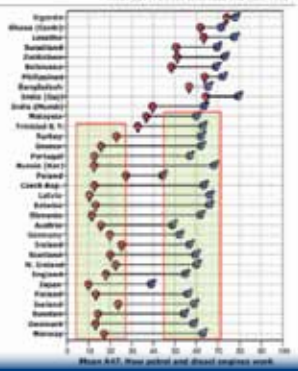
How computers work

"Technical context" large (and growing) gender difference



How petrol and diesel engines work

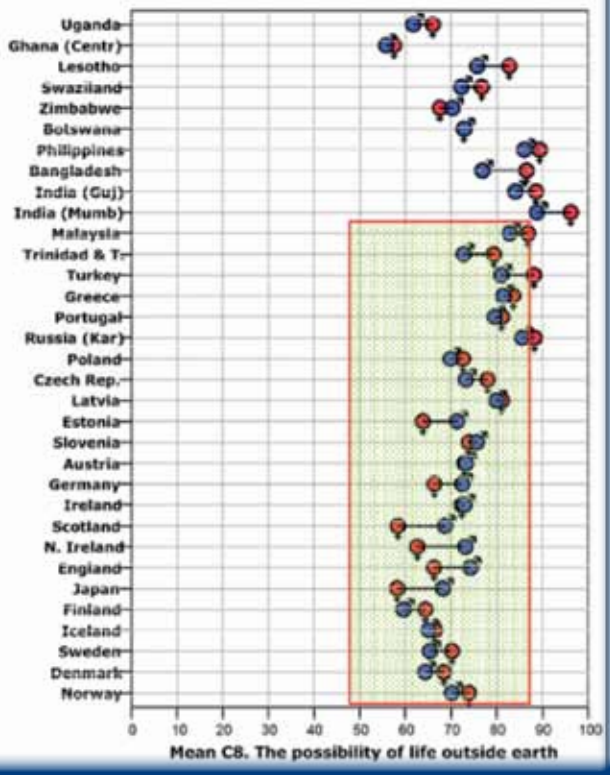
"Technical context" Only of interest for boys



The "winner" is:

The possibility of life outside earth

"Space, life, wonder, oppenness"
The **most** popular for girls and boys



Trends, challenges, and responsible research in a new era of technology: Quantum physics coming to application

Prof. Georgios Neofotistos
Center for Quantum Complexity and Nanotechnology, Physics Department, University of Crete





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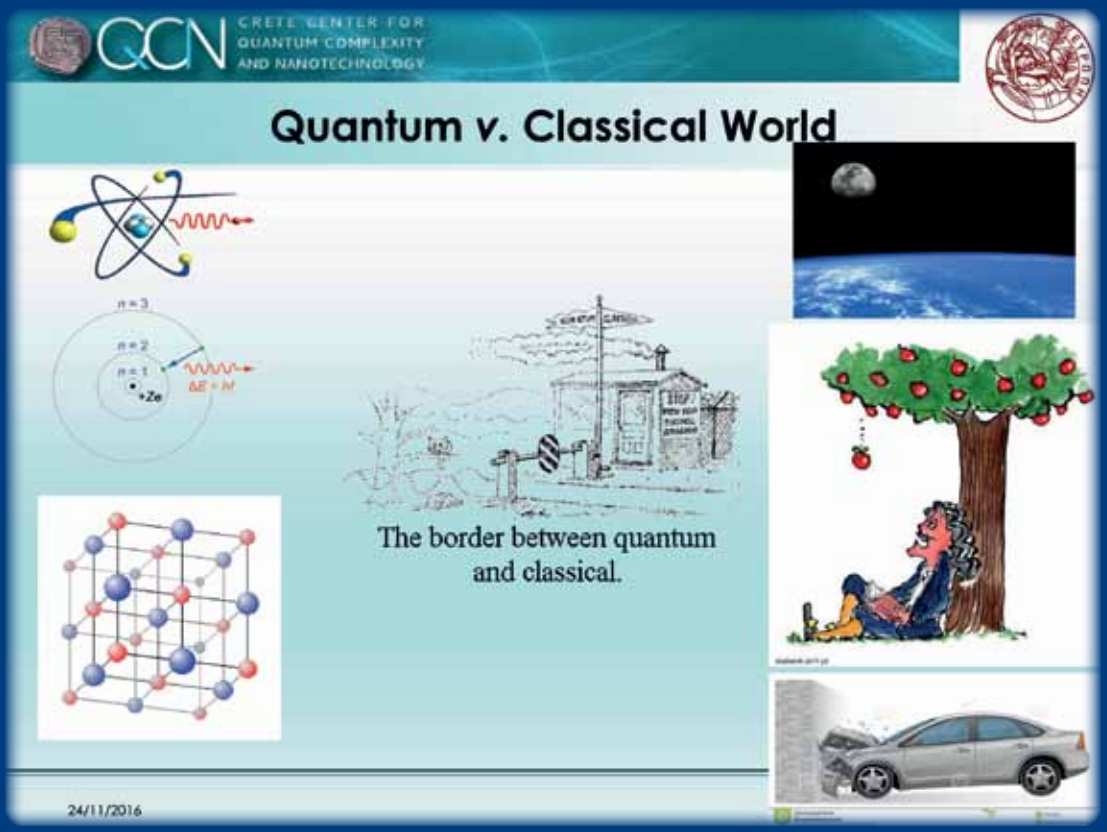
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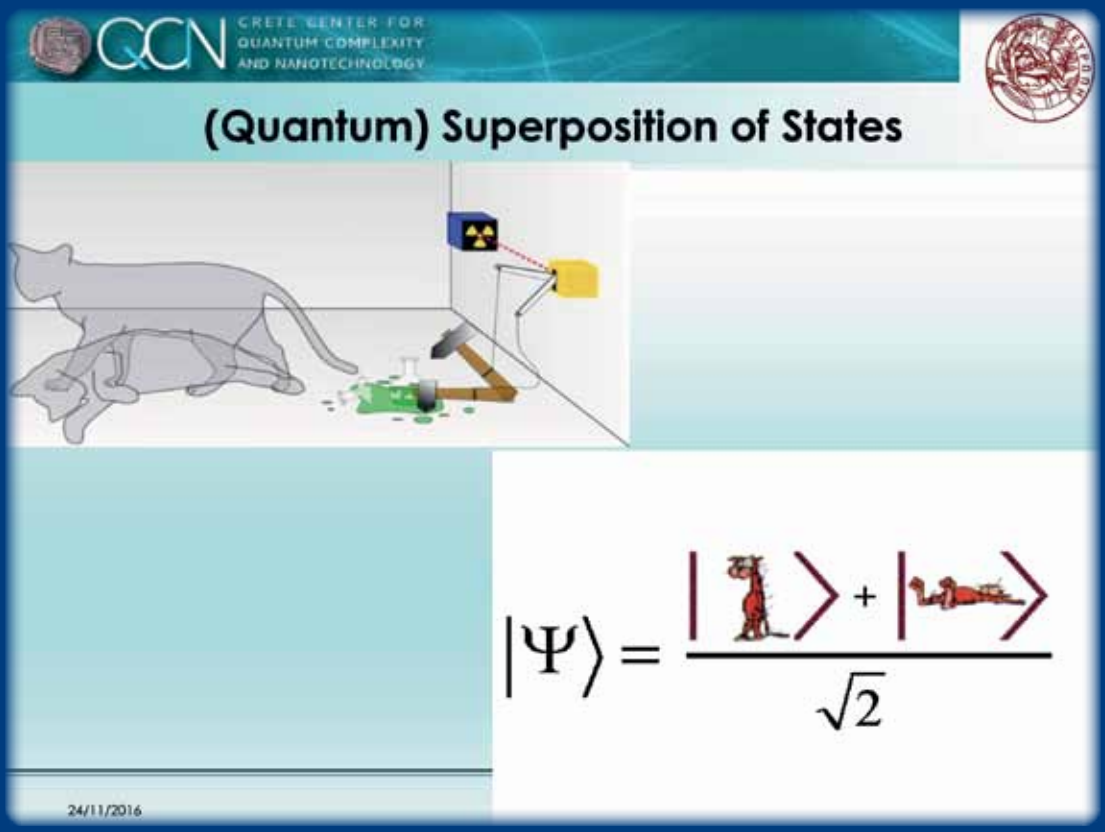


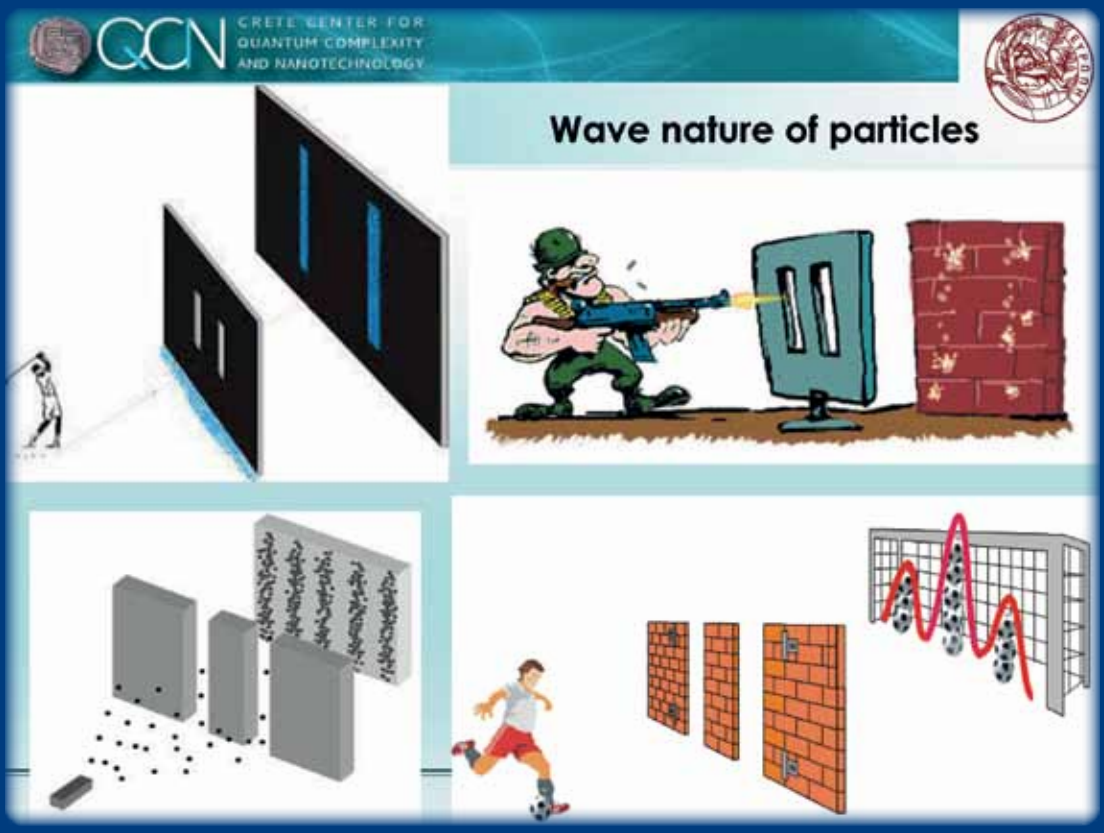


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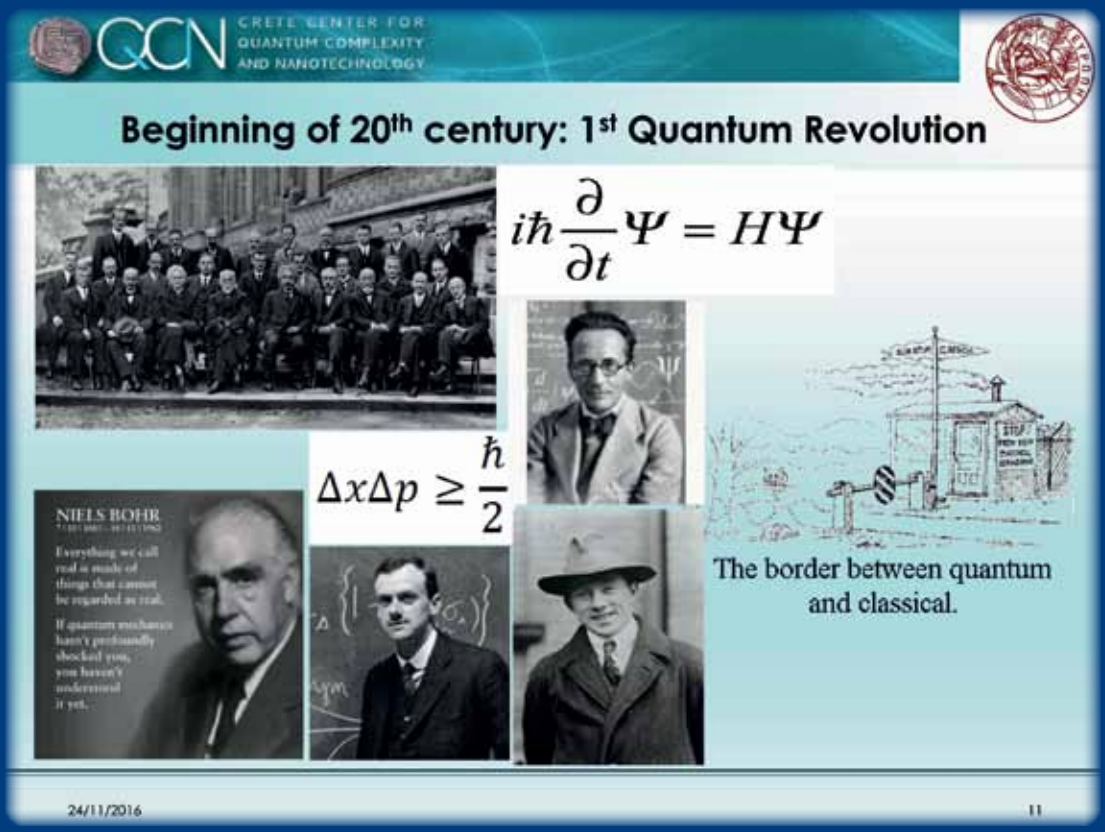
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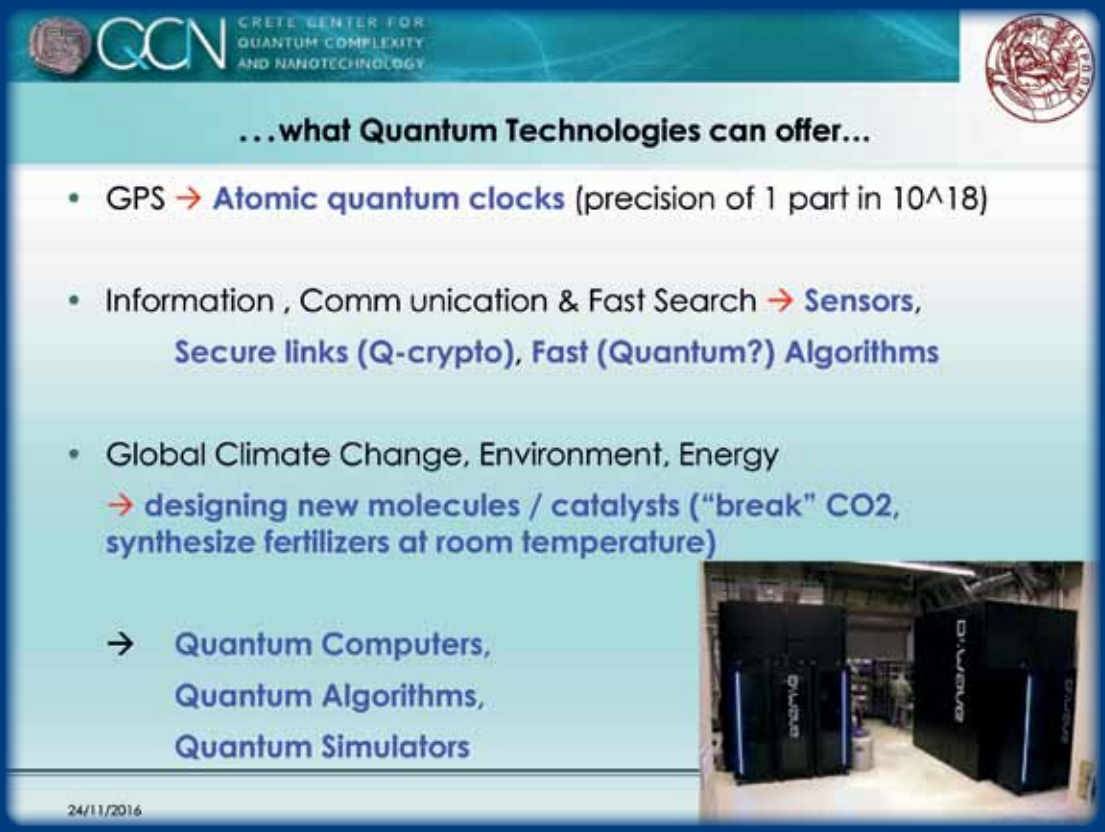
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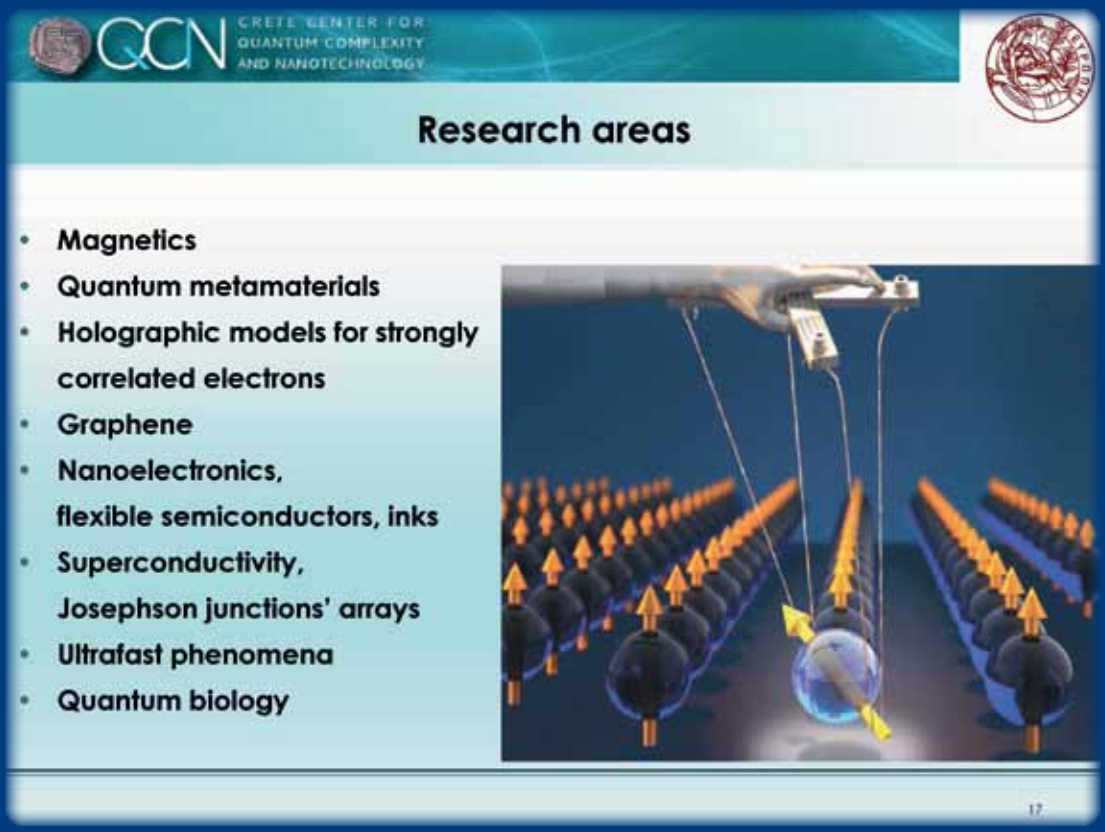


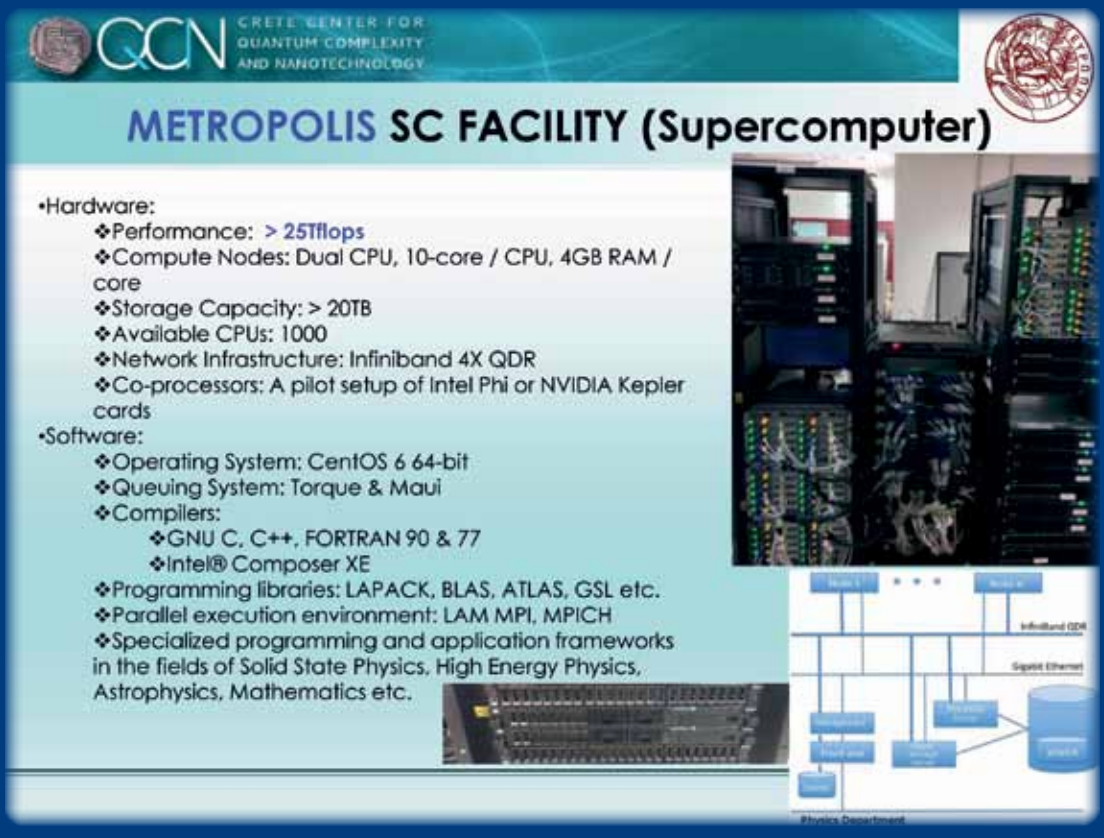


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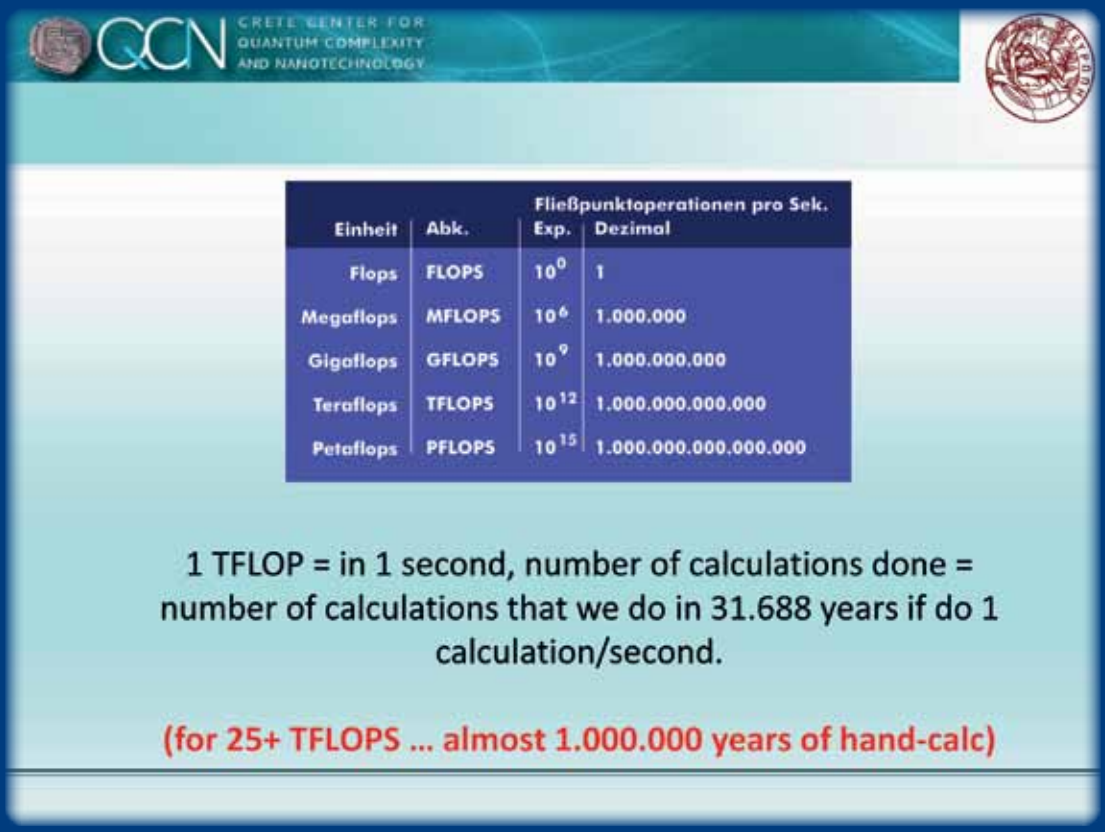
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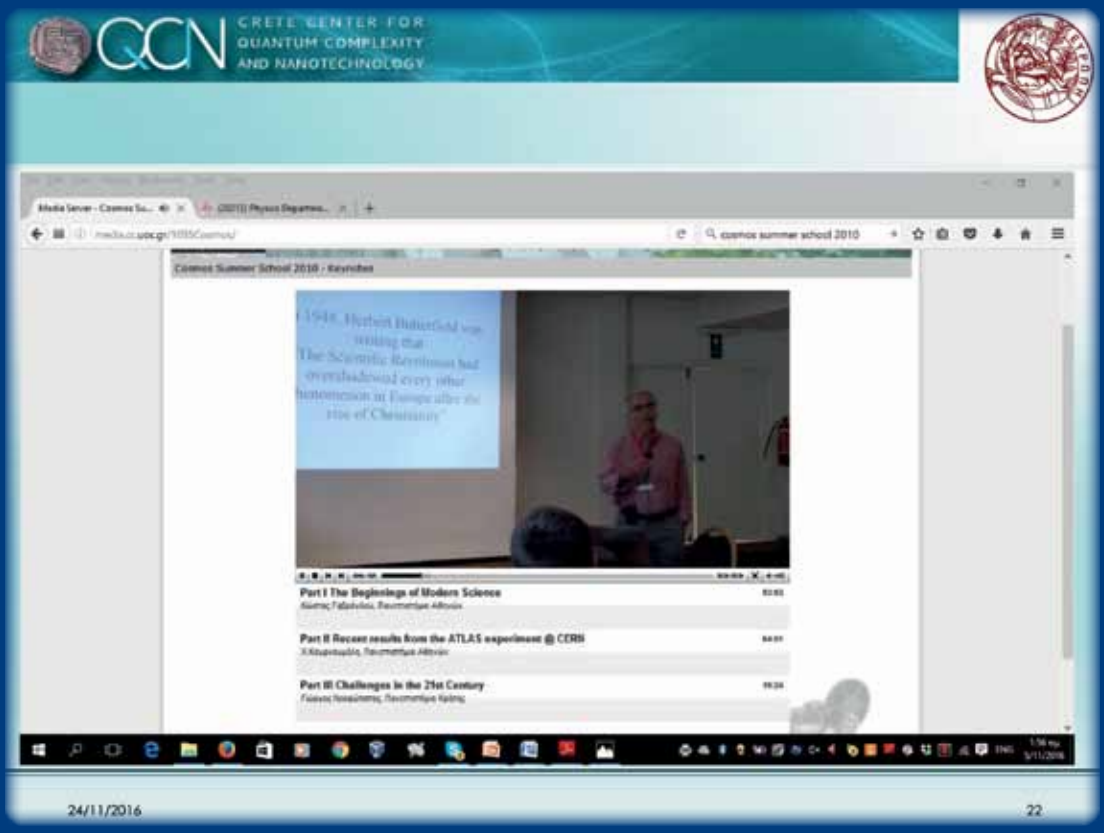


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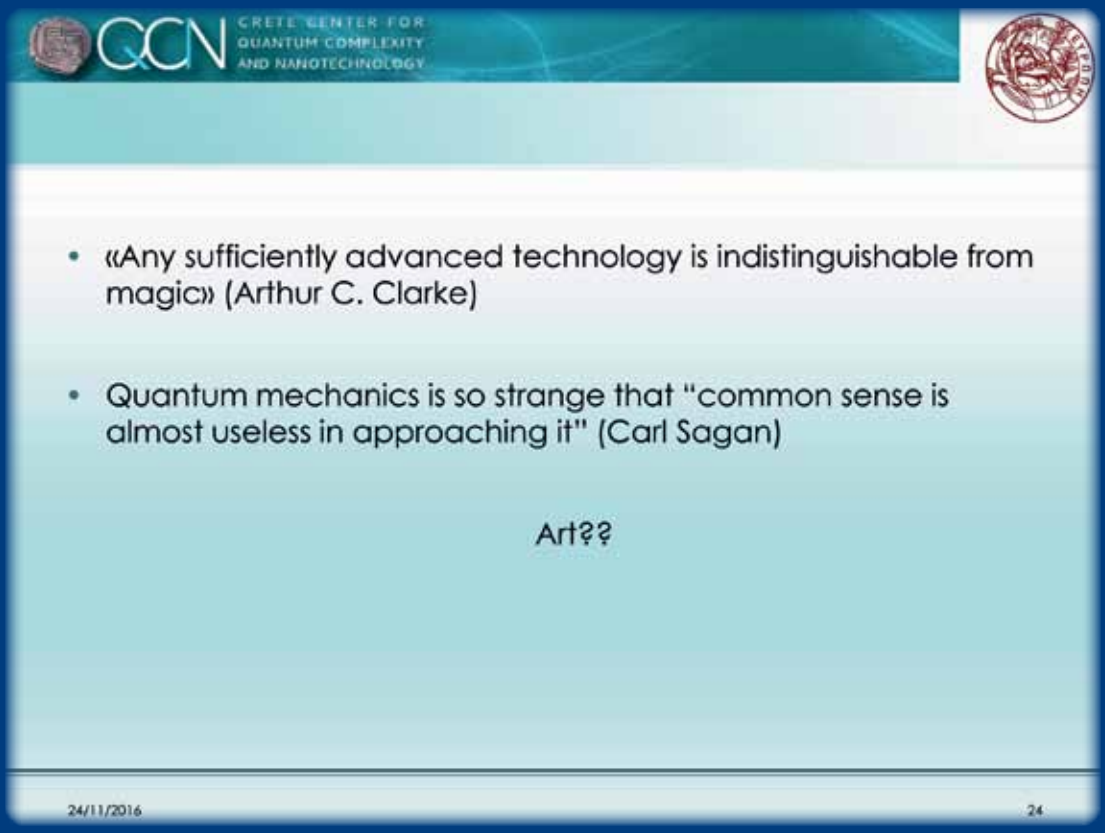




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CRETE CENTER FOR QUANTUM COMPLEXITY AND NANOTECHNOLOGY

CCQCN's Twinning Institutions

- **Max Planck Institute for Dynamics and Self-Organization, Goettingen** (T. Geisel)
- **Institute for Solid State Researc**h (IFW), **Dresden** (B. Buchner)
- **Cambridge University**, incl. **Department of Applied Mathematics and Theoretical Physics** (DAMTP) **Cavendish Laboratory** and **Center for Advanced Photonics and Electronics** (S. S. Saxena) including specialized scientists in the focus areas in other UK institutions
- **Leiden University** (J. Zaanen)
- **Laboratory of Analysis and Architecture of Systems (LAAS-CNRS), Toulouse**
- **Institute of Solid State Physics, Technion**, Haifa including I-Core collaboration and scientists in Israel (M. Segev)
- **Cologne University** (P.H.M. van Loosdrecht)
- **Physics Institute, Karlsruhe Institute of Technology** (KIT). (A. Ustinov)
- **Laboratoire de Physique Theorique de l'Ecole Normale Superieure** (LPT ENS), including scientists of the Paris area. (C. Bachas)

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http://qcn.physics.uoc.gr



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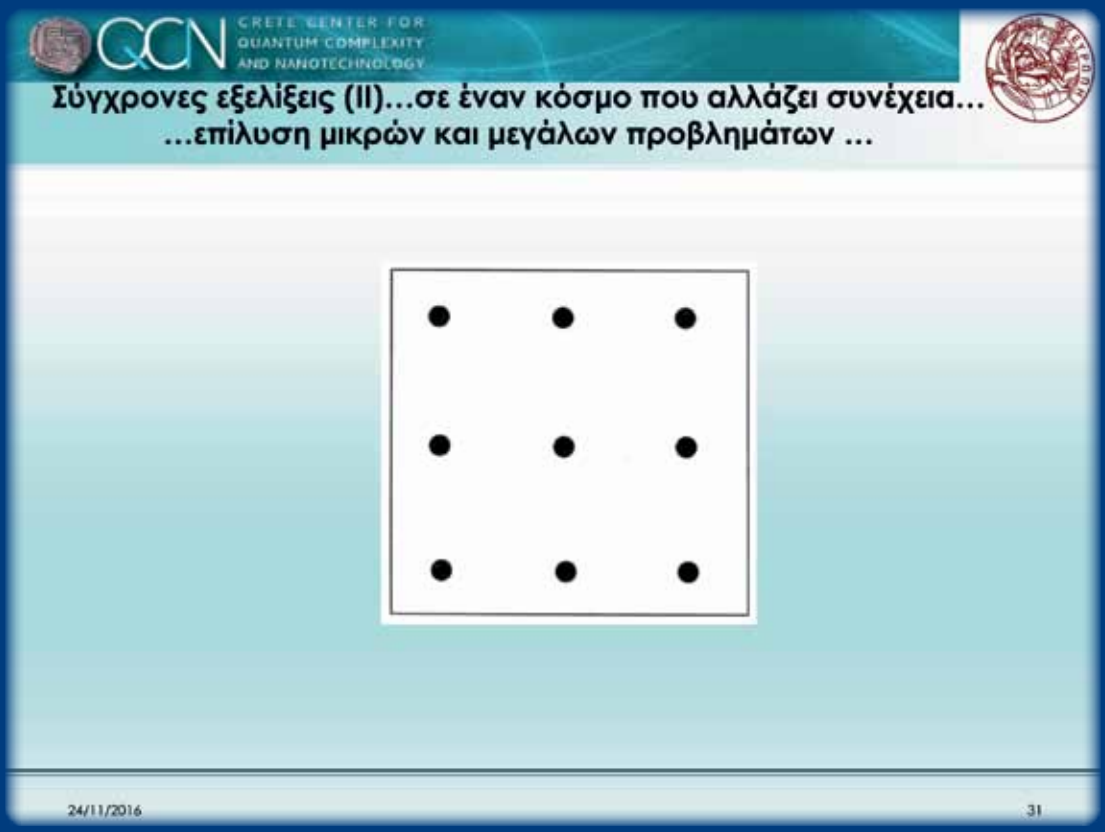
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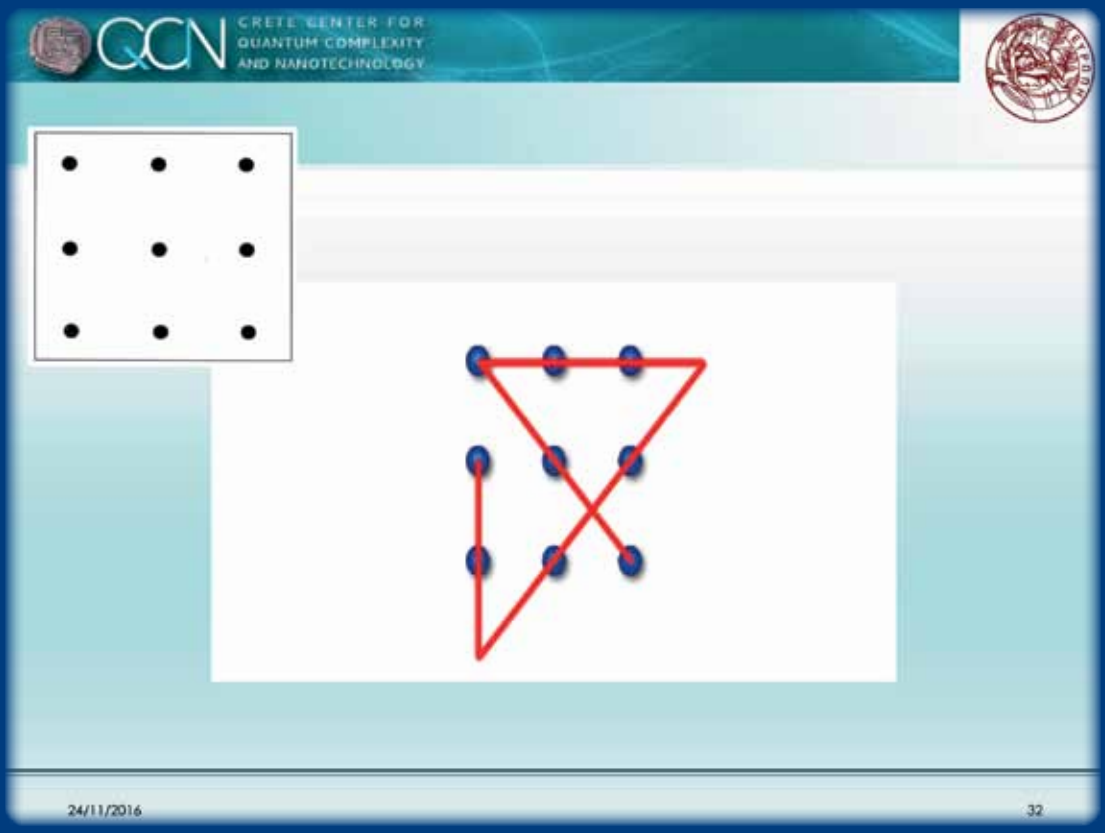




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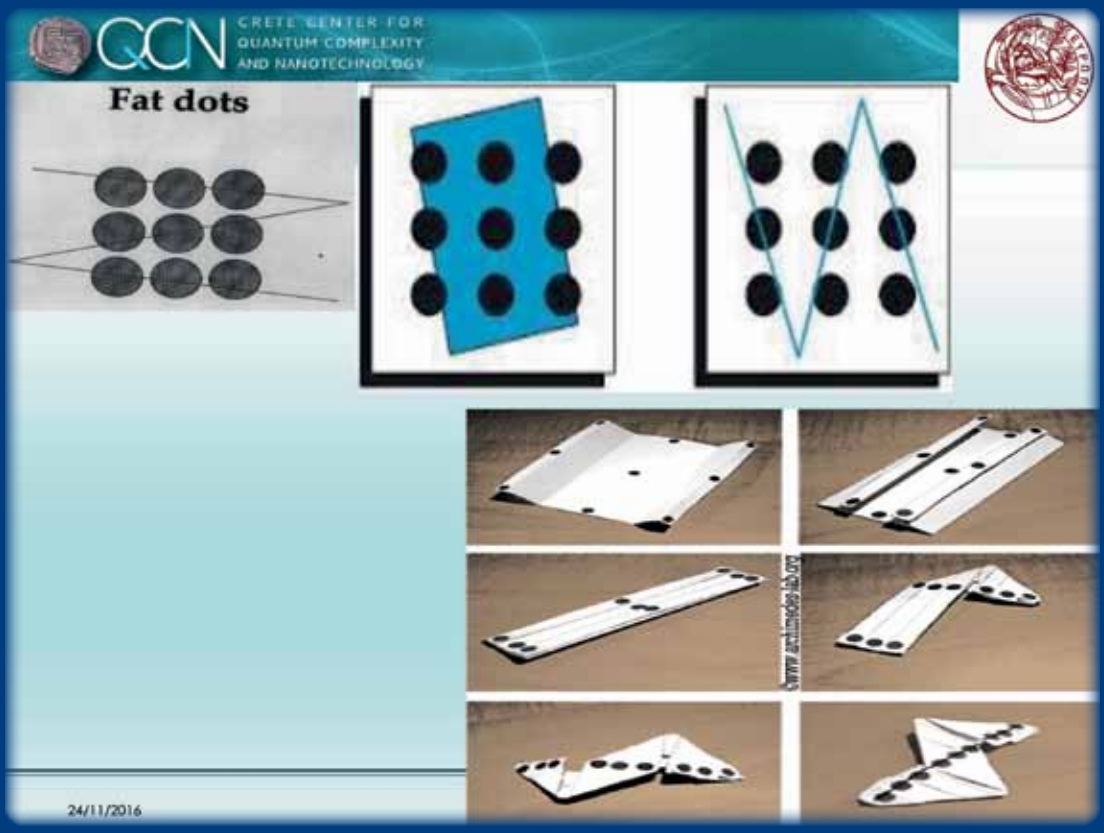




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Responsible research and innovation in the formal education context

Aliki Giannakopoulou
Ellinogermaniki Agogi

RRI Tools
Fostering Responsible Research and Innovation

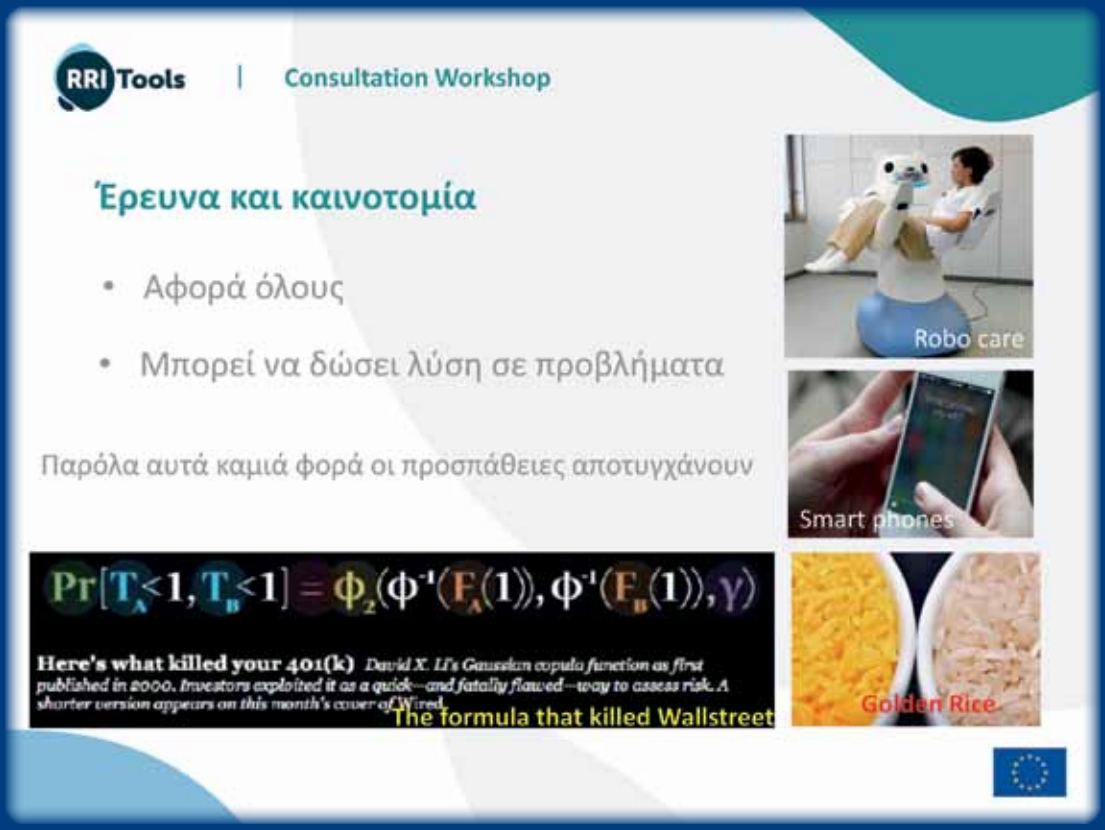
Υπεύθυνη Έρευνα και Καινοτομία στον τομέα της Εκπαίδευσης

Αλίκη Γιαννακοπούλου, 5 Νοεμβρίου 2016 ,
Ελληνογερμανική Αγωγή



Responsible research and innovation in the formal education context

Aliki Giannakopoulou
Ellinogermaniki Agogi





Responsible research and innovation in the formal education context

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RRI Tools | Συμμετοχή από φωνές που συνήθως δεν ακούγονται, πρόσβαση στα αποτελέσματα της έρευνας και της καινοτομίας

Το πιο μεγάλο ποσοστό της έρευνας των εταιριών φαρμάκων πάει σε ασθένειες του πρώτου κόσμου

The Guardian. Special Report. Aids.

GlobalForum

The 10/90 gap

Most drug research is for the wealthiest people on earth

More than **$70bn** is spent each year in the world on research and development of new drugs

Less than **10%** of this is spent on **90%** of the world's health problems

New drugs are needed for: sleeping sickness, dengue fever, malaria, schistosomiasis, tuberculosis, chagas disease, lymphatic filariasis, leishmaniasis, leprosy, onchocerciasis.

Incorporate future-oriented governance
Incentivize RRI from institutions
Foster participatory governance

GOVERNANCE

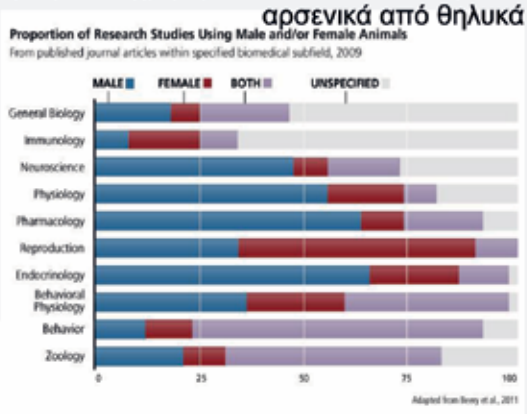
RRI Tools | Ισότητα των φύλων.

Από το 1997 ως 2000, 10 φάρμακα αποσύρθηκαν από την αμερικάνικη αγορά εξαιτίας θανατηφόρων επιπτώσεων για την υγεία. Οκτώ από αυτά παρουσίασαν περισσότερο ρίσκο σε γυναίκες ".

(US GAO, 2001)



Στην έρευνα χρησιμοποιούνται πολύ περισσότερα αρσενικά από θηλυκά ζώα



Gender Balance in decision making
Gender balance in research teams
Gender dimension in the content of R&I

GENDER EQUALITY

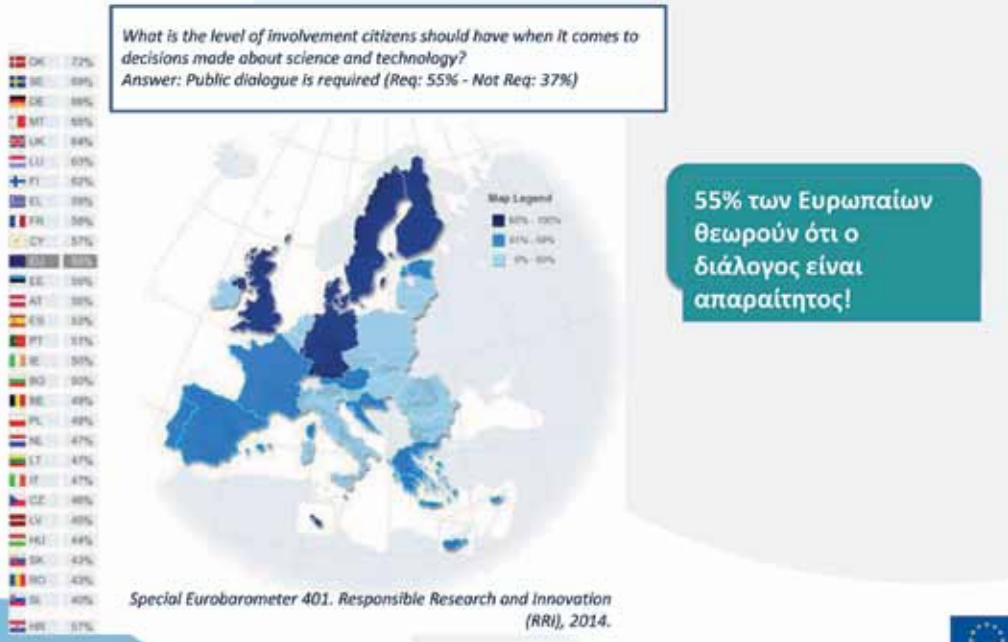
Responsible research and innovation in the formal education context

Aliki Giannakopoulou
Ellinogermaniki Agogi

RRI Tools

Η κοινωνία θέλει να συμμετάσχει

What is the level of involvement citizens should have when it comes to decisions made about science and technology?
Answer: Public dialogue is required (Req: 55% - Not Req: 37%)



55% των Ευρωπαίων θεωρούν ότι ο διάλογος είναι απαραίτητος!

Special Eurobarometer 401. Responsible Research and Innovation (RRI), 2014.

RRI Tools | Consultation Workshop

Ανάγκη για ΥΕΠ



Responsible research and innovation in the formal education context

Aliki Giannakopoulou
Ellinogermaniki Agogi

RRI Tools | Consultation Workshop

Ανάγκη για ΥΕΠ



RRI Tools | Consultation Workshop

Ποιόν αφορούν οι εξελίξεις στον τομέα της έρευνας;

- Επιστήμονες
- Πολιτικούς φορείς
- Βιομηχανία
- ΜΚΟς
- Εκπαιδευτικούς



Responsible research and innovation in the formal education context

Aliki Giannakopoulou
Ellinogermaniki Agogi

RRI Tools | Consultation Workshop

Πως συμμετέχουν λοιπόν οι εκπαιδευτικοί στη διαδικασία της υπεύθυνης έρευνας και καινοτομίας;

- *Αναφερόμαστε σε μια **δυναμική διαδικασία***
- ***Όλοι οι φορείς συμμετέχουν** σε αυτή και αλληλεπιδρούν;*
- *Μοιράζονται την ευθύνη για τα **αποτελέσματα** αλλά και τις **διαδικασίες** της υπεύθυνης έρευνας και καινοτομίας.*

RRI Tools | Consultation Workshop

Ποια θέματα καλύπτει η ΥΕΚ;



Responsible research and innovation in the formal education context

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Ellinogermaniki Agogi

RRI Tools | Consultation Workshop

Πως μπορώ να την εφαρμόσω στην τάξη;

Διαφορετικότητα και ενσωμάτωση

Σεβασμός στην διαφορετικότητα των μαθητών , η επιστήμη έχει φύλο.., συμμετοχή διαφορετικών απόψεων

Προβληματισμός

Δεν παρουσιάζουμε μόνο τα αποτελέσματα της έρευνας και της επιστήμης, προσθέτουμε συζήτηση για τις επιπτώσεις, για τις ηθικές επιπλοκές, για την επιλογή διαφορετικων μεθόδων κλπ

Ανοιχτότητα και διαφάνεια

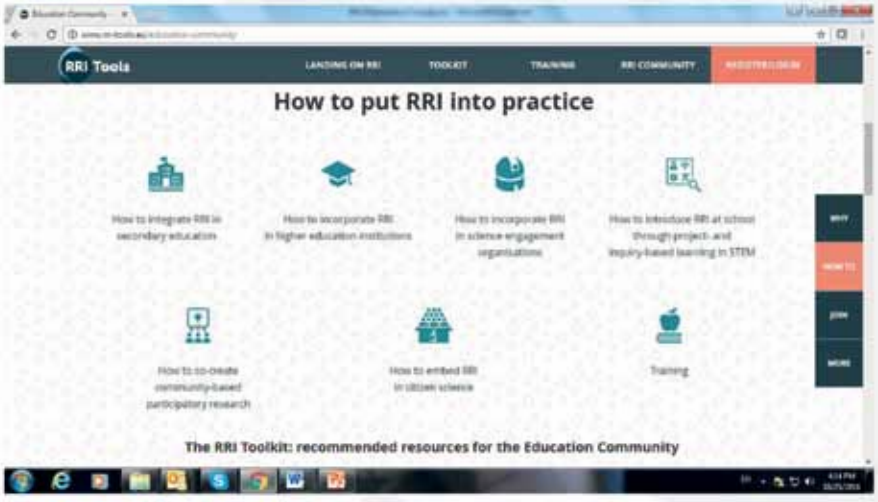
Μοιραζόμαστε πληροφορίες για τα λάθη που πολλές φορές υπάρχουν στην διαδικασία της έρευνας, συζητούμε για την χρήση των δεδομένων της έρευνας

Προσαρμοστικότητα στις αλλαγές

Πως εξωτερικοί παράγοντες επηρεάζουν την επιστήμη, πως οι ανάγκες και οι κοινωνικές αξίες επηρεάζουν την έρευνα

RRI Tools | Consultation Workshop

www.rri-tools.eu



Responsible research and innovation in the formal education context

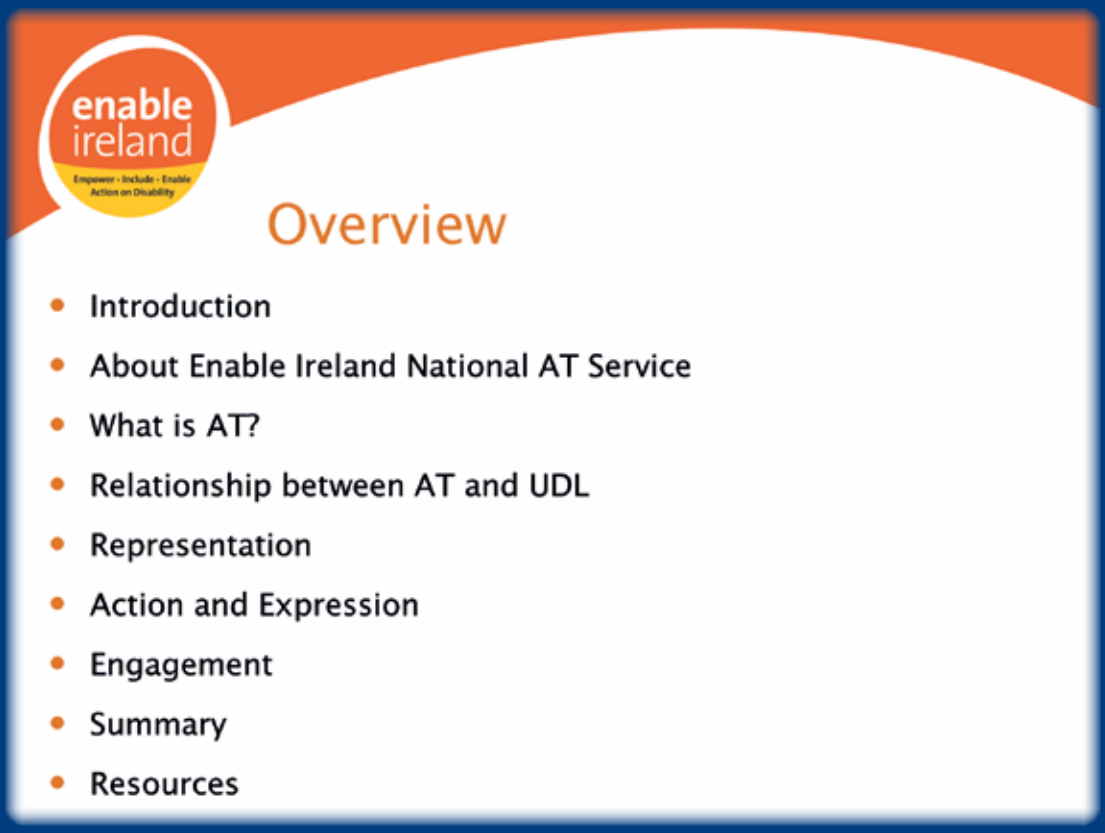
Aliki Giannakopoulou
Ellinogermaniki Agogi



The role of Assistive Technology in UDL

Mr. Karl O'Keefe
Enable Ireland Disability Services Ltd





The role of Assistive Technology in UDL

Mr. Karl O'Keefe
Enable Ireland Disability Services Ltd

National AT Training Service

Enabling Independence

Putting technology into the hands of those who need it



Assistive Technology

- Is a *tool*……
- To support individuals

  to achieve their potential..
- Ultimate goal:

Access all areas



The role of Assistive Technology in UDL

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Enable Ireland Disability Services Ltd

enable ireland

What do we mean when we talk about 'AT'?



enable ireland

What is Assistive Technology?

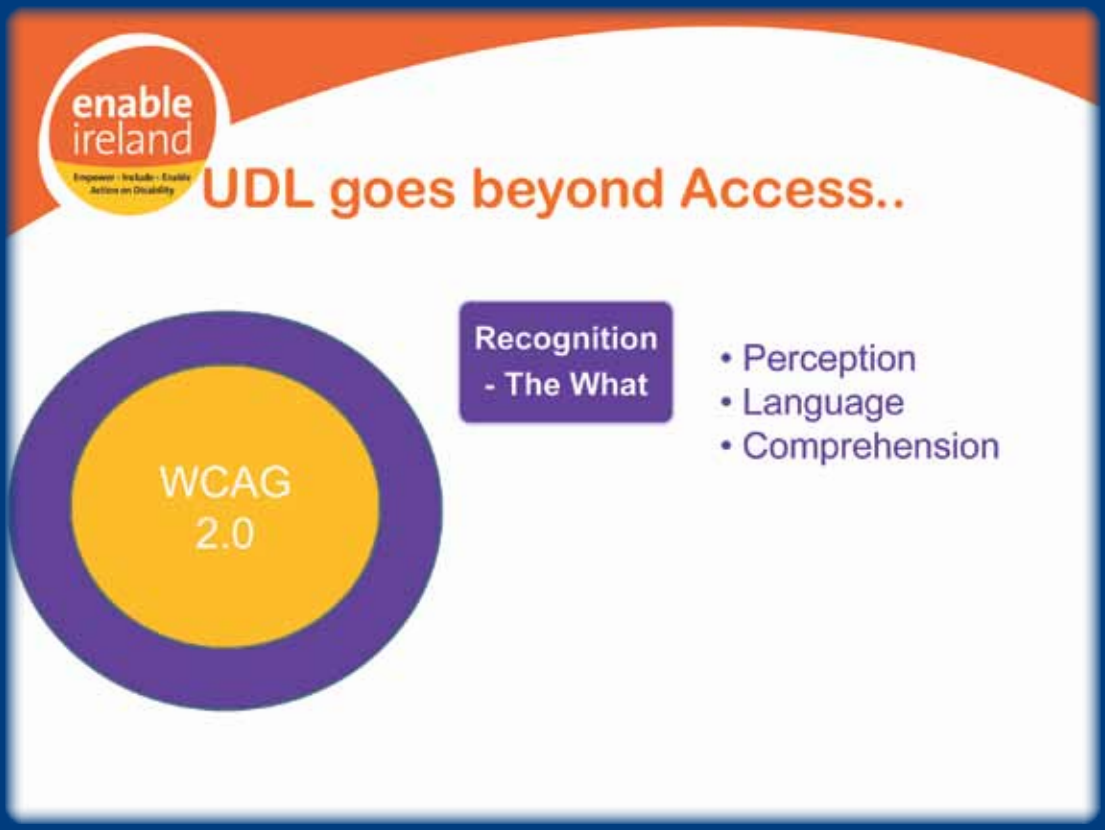
Any item or product whether acquired commercially, modified or customised that enhances the independence of individuals with disabilities.

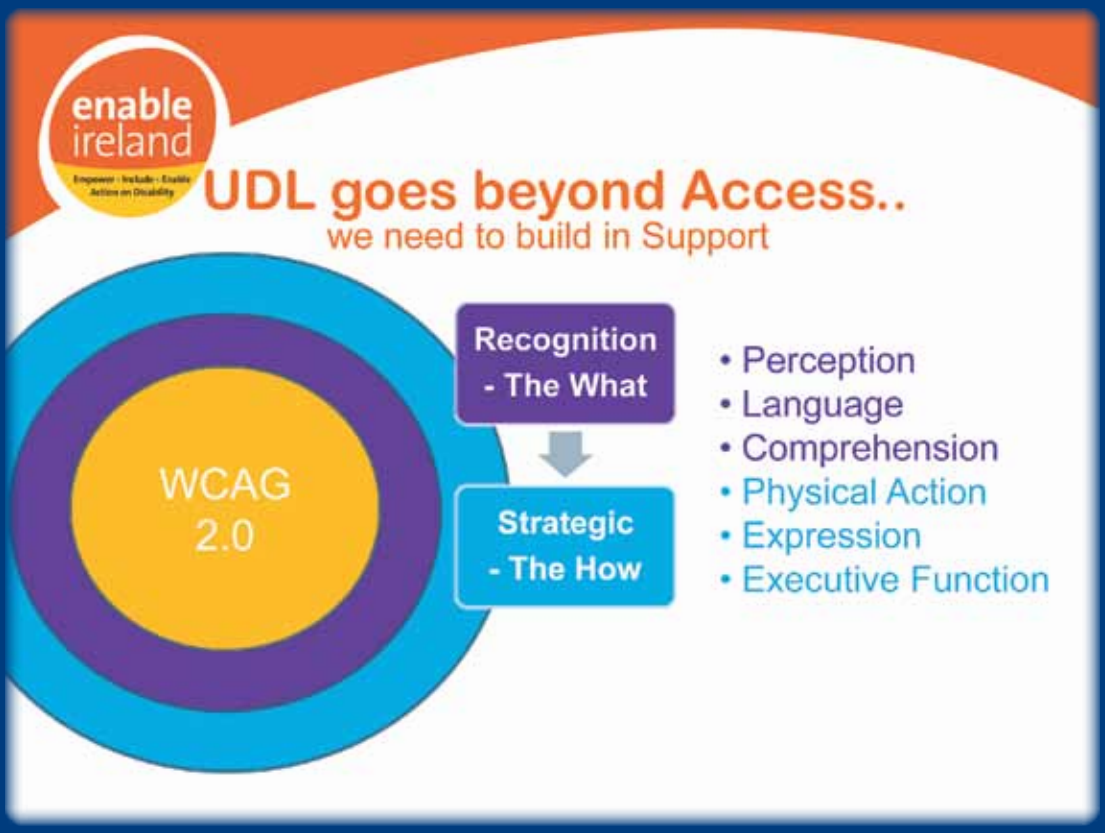
(*adapted from:* Technical assistance to the States act in U.S.)



The role of Assistive Technology in UDL

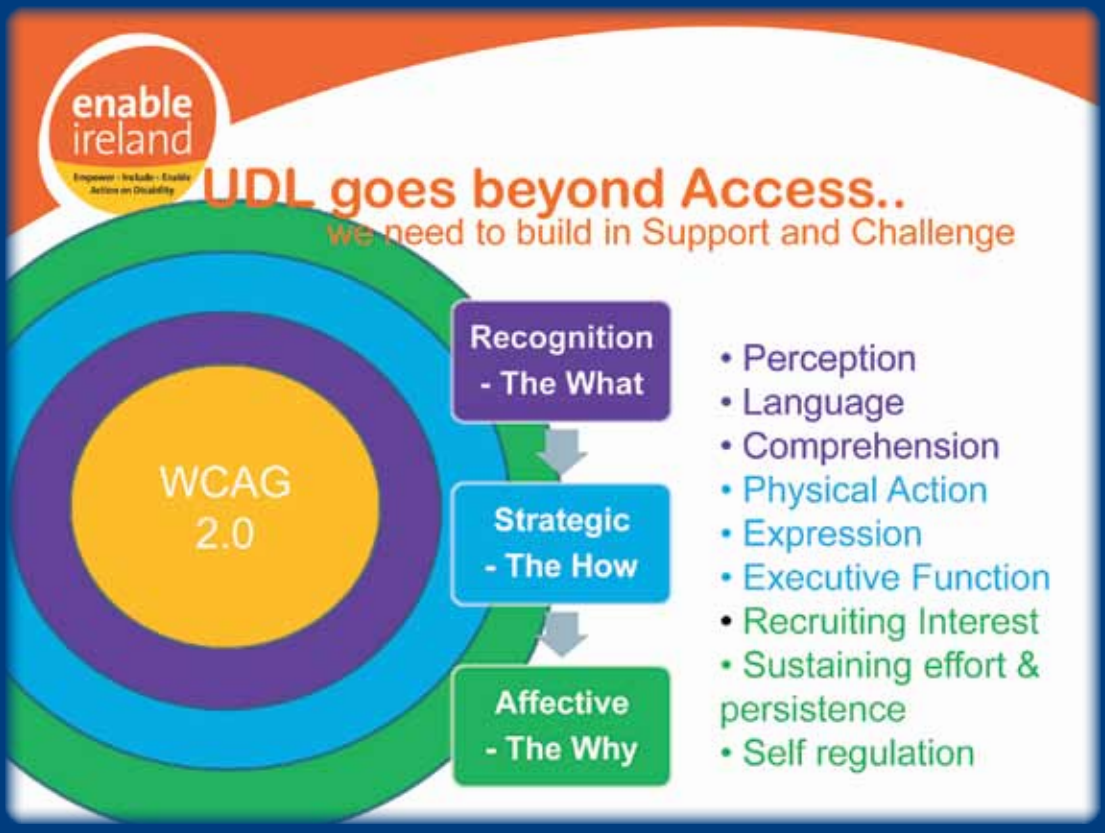
Mr. Karl O'Keefe
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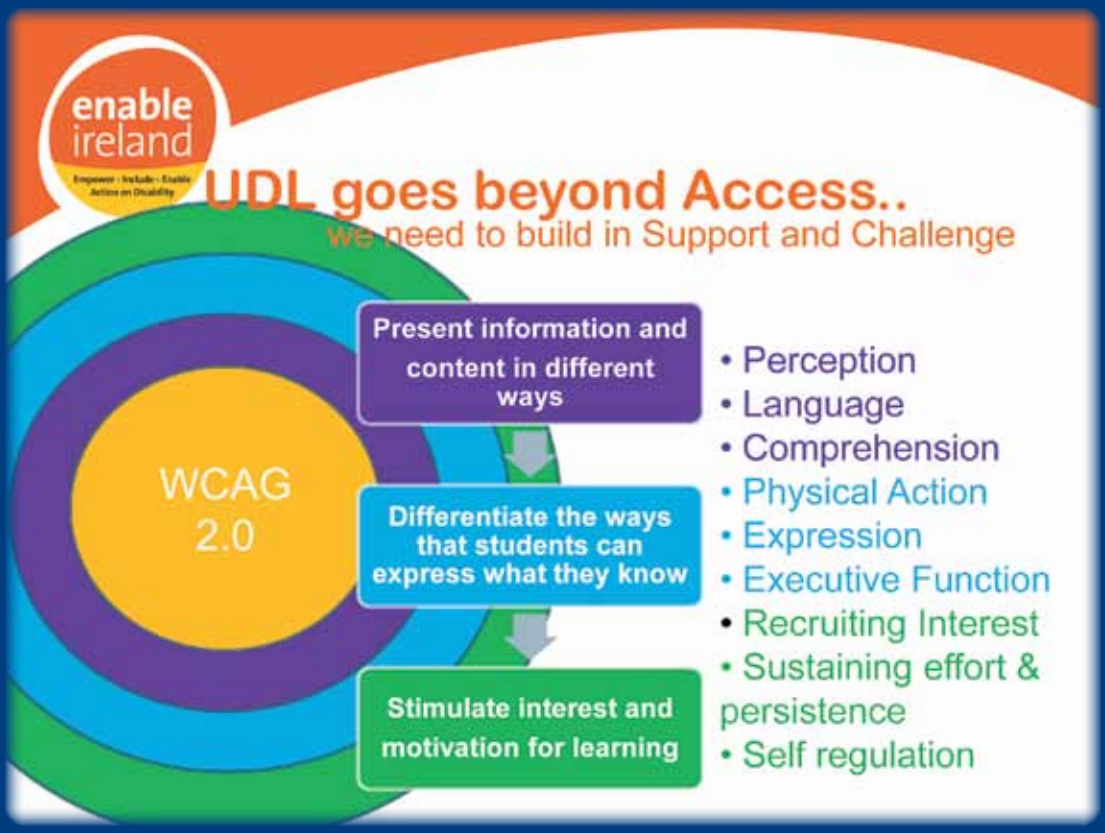




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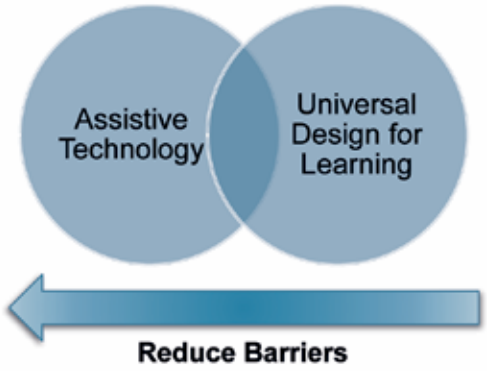
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AT & UDL – Two Sides of the Same Coin*

AT & UDL while different are complementary

- Similar Goals – Increased Access, Participation and Progress
- Accessible Curriculum Content increases the efficiency of AT
- AT can help support students for whom the Accessible Curriculum still poses a barrier.
- UDL content must be designed to consider AT and AT should fully utilise UDL content.



"When UDL and AT are designed to co-exist, learning for all individuals is enhanced."
*David H. Rose, Ted S. Hasselbring, Skip Stahl, and Joy Zabala

UDL & AT – Where they differ

- UDL seeks to educate those responsible for the design of curricula and learning environments on how to make them accessible and effective for the widest range of students.
- AT looks at the barriers faced by individuals and seeks to overcome those barriers through the use of appropriate tools.

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Assistive Technology for Learning

"Essentially, the goal of education has shifted from knowledge acquisition to learner expertise"*

Technology empowers the student and offers them tools to support independent learning. Knowing what tools to use and how to use them can therefore be seen as an pivotal step in becoming an expert learner.

* Anne Meyer, Universal Design for Learning: Theory and Practice

Closer look at UDL

3 Principles → 9 Guidelines → 31 Checkpoints

The Checkpoints are a useful tool through which educators can examine their curriculum according to the Principles of UDL.

Over the next few slides we will look at these Checkpoints from the AT perspective.

- What Checkpoints can the learner achieve independently through proper use of the appropriate (assistive) technology?
- How can educators facilitate learner independence through an understanding of the available technology, its capabilities and limitations?
- What checkpoints are poorly served by current technology (from the learner perspective) and rely on the educators creative use digital/web technologies and innovative class based activities?

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Provide Multiple means of Representation

★ Can be achieved by learner using technology	● Supported by technology	▲ Must be provided for in curriculum
1. Provide options for perception		
1. Offer ways of customizing the display of information		★
1. Offer alternatives for auditory information		▲
1. Offer alternatives for visual information		●
1. Provide options for language, mathematical expressions, and symbols		
2. Clarify vocabulary and symbols		●
2. Clarify syntax and structure		●
2. Support decoding of text, mathematical notation, and symbols		★
2. Promote understanding across language		★
2. Illustrate through multiple media		▲
1. Provide options for comprehension		
3. Activate or supply background knowledge		▲
3. Highlight patterns, critical features, big ideas, and relationships		▲
3. Guide information processing, visualization, and manipulation		●
3. Maximize transfer and generalization		●

Representation

Technology		UDL
• TextGrabber • AppWriter • Readability • Stylish • Inbuilt Accessibility Features	While providing alternative fonts, colours and magnification will increase the accessibility of your content. The tools listed on the left column will help the student access **all** content.	Customise the Display
• TextHelp • Co:Writer • MyStudyBar • ZoomText • GeoGebra & http://tube.geogebra.org/ • Google translate	While using unnecessarily complex language is widely regarded as bad practice over simplifying language can inhibit learning. Use appropriate language and terminology for the subject and level ensuring learners who need additional support have the tools and know how to use them.	Support decoding of text, mathematical notation, and symbols.
	While automatic language translation does not always produce perfect results it can be an invaluable tool for learners for whom English is not a first language.	Promote understanding across language

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Representation

Technology		UDL
• JAWS • ChromeVox • VoiceOver • NVDA	Context appropriate and informative alttext (alternative text) needs to be provided, Audio Description where necessary and proper formatting of content.	Offer alternatives for visual information
• Mindjet • Popplet • Coggle • Xmind	While literacy support software should be encouraged providing a subject specific Glossary would also be desirable.	Clarify vocabulary and symbols
• Visuwords • Visual Dictionary	Numeracy and literacy support software may not always provide the support needed.	Clarify syntax and structure
• Rewordify • Wordle	Rather than just providing mindmaps, diagrams, visualisations and flow charts create them as part of the lesson.	Guide information processing, visualization, and manipulation

Subtitles - Offer alternatives for auditory information

- There is no getting around the fact that subtitles need to be written although some services and techniques may lessen the pain.
- Youtube Community Captioning
- Amara – Subtitling Community
- Using Youtube



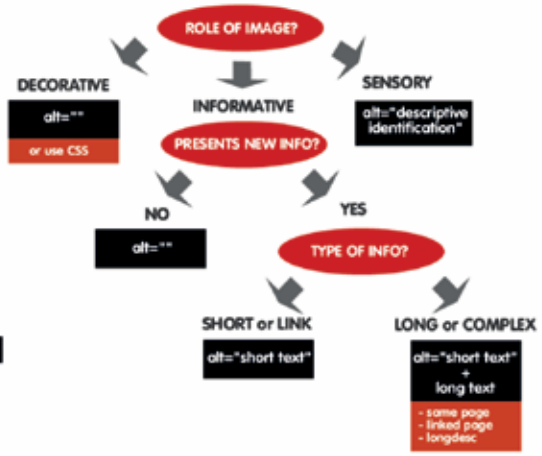
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Text Alternative Decision Tree

Alternative Text should:

- present the CONTENT and FUNCTION of the image.
- be succinct.
- depend heavily on the image's context.
- Decorative images still need an alt attribute (web), but it should be null (alt="").
- For those on Twitter think of it like tweeting!



Dey Alexander – Text Alternative decision tree

Provide Multiple Means for Action and Expression

★ Can be achieved by learner using technology	● Supported by technology	▲ Must be provided for in curriculum	
1. Provide options for physical action			
4.1 Vary the methods for response and navigation			●
4.2 Optimize access to tools and assistive technologies			●
1. Provide options for expression and communication			
5.1 Use multiple media for communication			●
5.2 Use multiple tools for construction and composition			●
5.3 Build fluencies with graduated levels of support for practice and performance			▲
1. Provide options for executive functions			
6.1 Guide appropriate goal setting			▲
6.2 Support planning and strategy development			★
6.3 Facilitate managing information and resources			★
6.4 Enhance capacity for monitoring progress			●

The role of Assistive Technology in UDL

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Action & Expression

Technology		UDL
• MyStudyLife.com • Cogi • Evernote • OneNote • Notability	Planning and strategy development can be supported by using Mindmapping, to-do lists, calendar and reminders, essay writing tools, citation tools and techniques like time boxing.	Support planning and strategy development
• SIRI • Cortana • Life Reminders • Pomos • Focus Booster • Zotero • EssayMap	Note taking and organisation can be difficult for some learners but fortunately there are a wide range of supports on every platform.	Facilitate managing information and resources

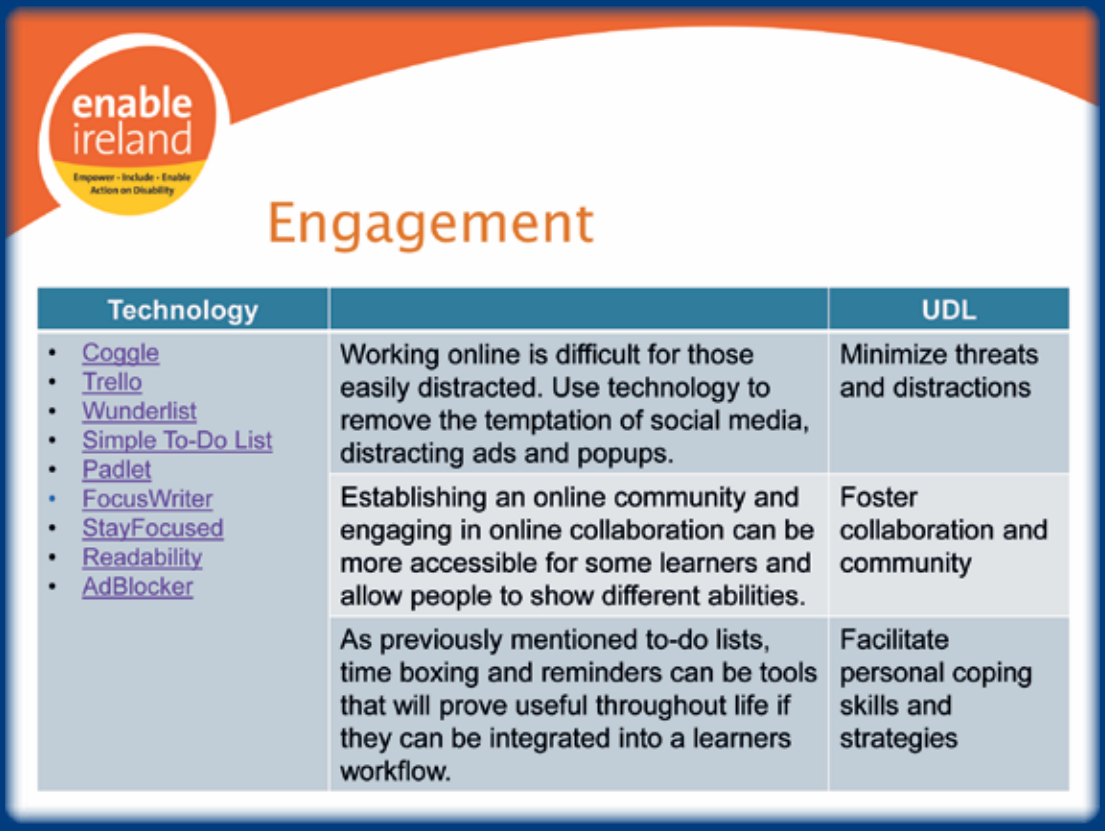
Speech Recognition

Technology	Description
Dragon Naturally Speaking	Probably the best known and most popular. Works offline. Can be trained to users voice and so offers improved accuracy. Premium version highly customisable.
MathTalk	This is a plugin for DNS rather than a stand alone product. Allows the user to voice any math…pre-algebra, algebra, trig, calculus, statistics, graphing…
Inbuilt Speech Recognition – Windows, Apple	Both good free options to trial Speech Recognition
Google Chrome Speech Recognition	A number of Chrome extensions and Google Docs addons offer a surprising level of accuracy and ease of use.

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The role of Assistive Technology in UDL

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Summary

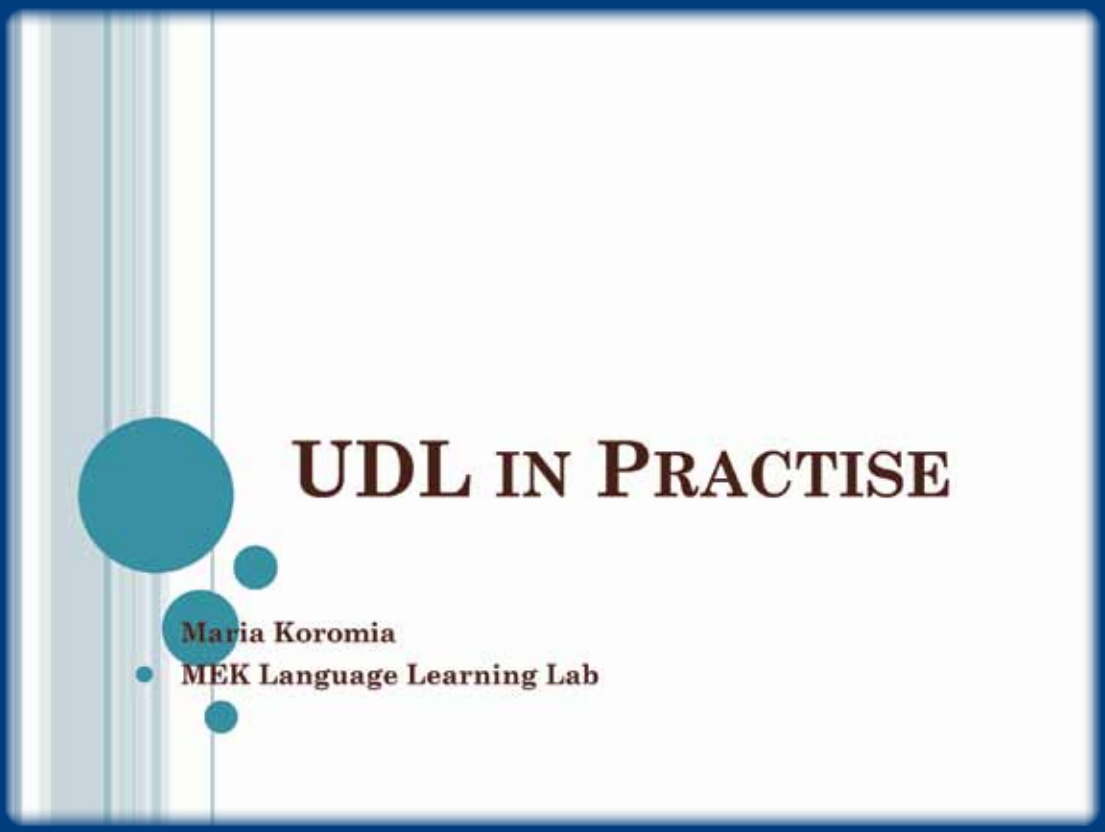
- While text is the dominant medium for both educational content and deliverables AT for literacy support will be essential for some learners.
- Educators need to be aware of Literacy, Productivity and Organisation technologies. their limits and capabilities.
- Although not part of the curriculum, training in the use of assistive software will be key in some learners success.
- Giving learners the tools to adapt content to their own needs and preferences should be seen as preferable to adapting the content for them.

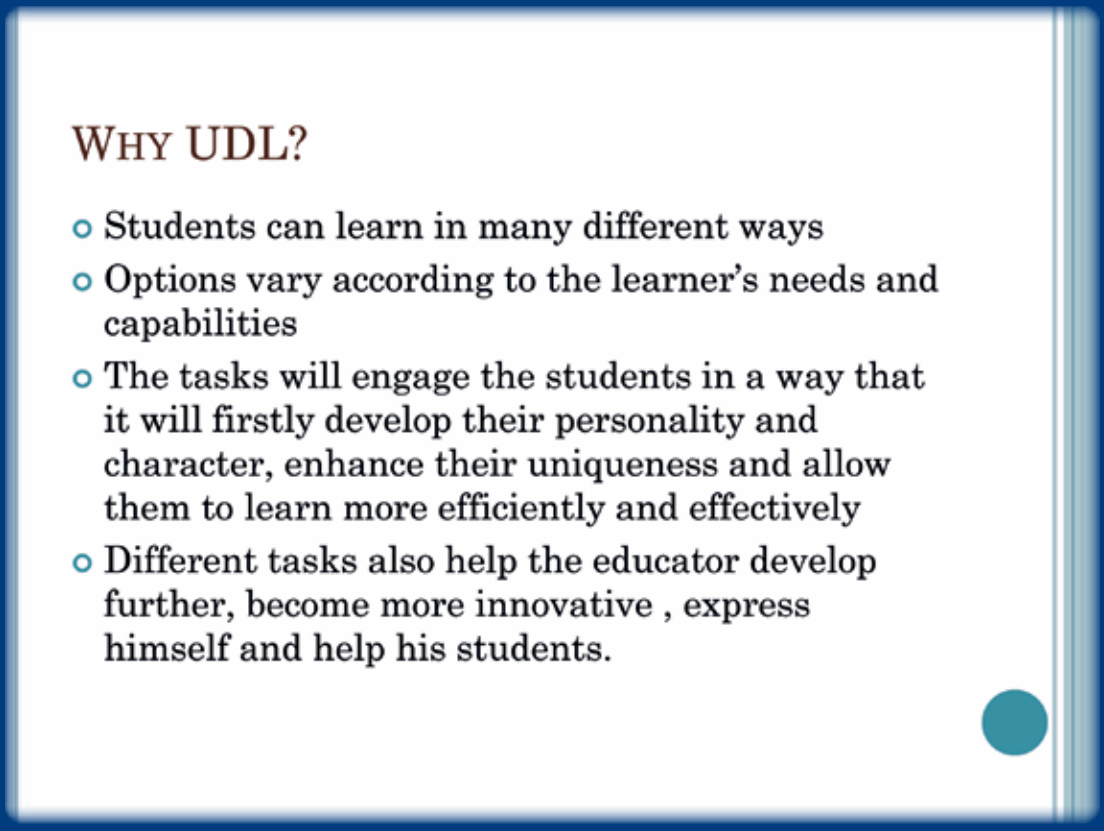
Resources

- Literacy Support Module
- Productivity and Organisation Module
- Both the above are also available on our ATandMe.com Blog.
- StudySmart – Apps for reading writing and organisation http://www.enableirelandat.com/mod/scorm/player.php
- The above module is available on our eLearning platform at www.enableirelandAT.com. Log in as Guest.

UDL in practice: the case of a school in Cyprus

Maria Konomia
Cyprus





UDL in practice: the case of a school in Cyprus

Maria Konomia
Cyprus

How can UDL be applied?

- Differentiated forms of formal assessment.



(1) Sally ___ dinner at the moment.



(a) cook (b) is cooking (c) cooking



(2) ___ Lucy listening to music in her room?

Section A (20 marks)
Choose the correct words and write them on the lines. There is one example.

Example:
There ___*is*___ a mouse under the bed.

A are B is C to be D be

1. Sally _____ dinner in the kitchen at the moment.
   A is cooking B cooking C cook D to cook
2. _____ Lucy listening to music in her room?
   A Does B Are C Is D Do
3. My brother _____ 5 km every morning.
   A running B runs C to run D run
4. Do your grandparents _____ in this town?

UDL in practice: the case of a school in Cyprus

Maria Konomia
Cyprus

- Let the students express themselves through games and presentations
- Make themselves feel more responsible
- Develop the sense of peer tutoring.



WHAT ARE THE BENEFITS OF UDL IN SCHOOLS AND EDUCATION?

- Tailor – made education allows students to become part of inclusive education.
- Differentiated forms of teaching and learning allows everyone to develop further, learn more, feel more independent and at the same time be part of a team where everyone has a stand.
- Teaching becomes a form of art both for those who receive it as well as for those who provide it.

UDL in practice: the case of a school in Cyprus

Maria Konomia
Cyprus

Benefits for students

- Participation
- Co –operation
- Identifying certain skills that each student might have and they were not as visible throughout a typical lesson.
- Have fun while learning!



UDL in practice: the case of a school in Cyprus

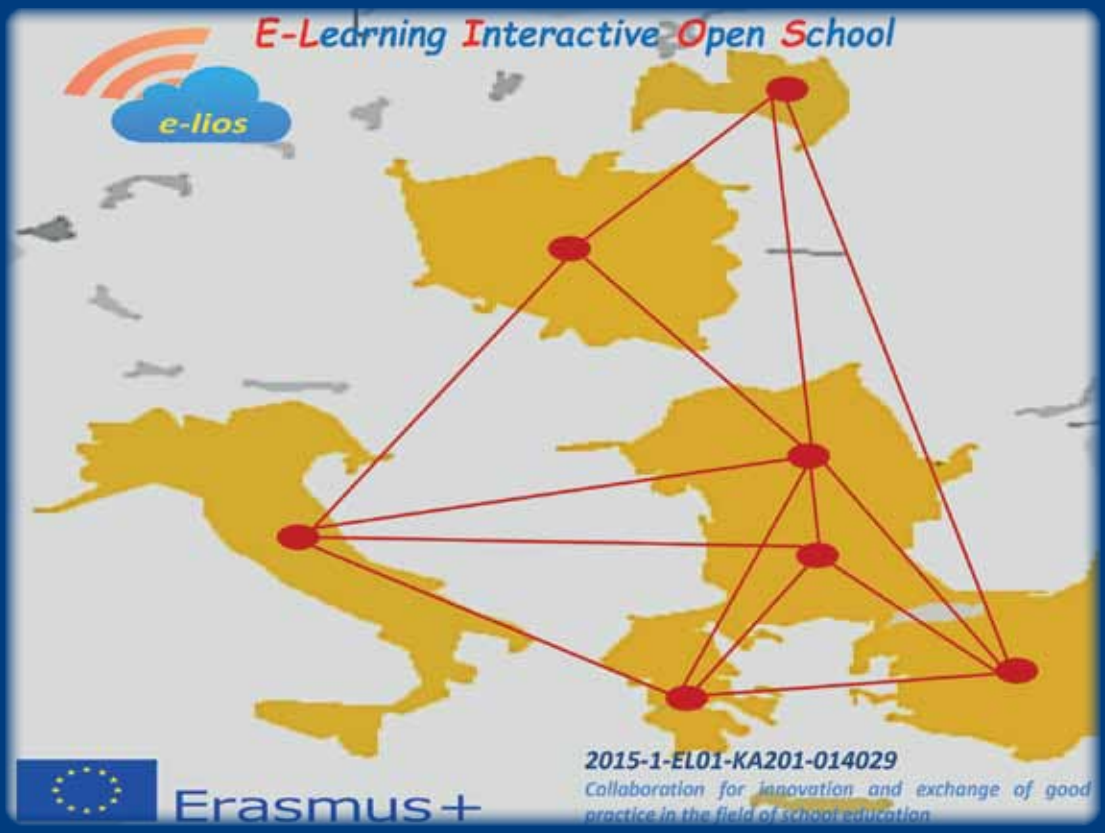
Maria Konomia
Cyprus



The E-LIOS project: A school alliance for Good Practices

Giannis Chiotelis





The E-LIOS project: A school alliance for Good Practices

Giannis Chiotelis





The E-LIOS project: A school alliance for Good Practices

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The E-lios project



ASSESSMENT CONCLUSION

Scoring: 85,50/100

Quality Thresholds attained? Yes, the project passes all thresholds

The partners...

Name of the Organisation
UNIVERSITY OF PATRAS
ORTAKOY 80.YIL MESLEKI VE TEKNIK ANADOLU LISESI
Osnovno uchilishte Hristo Smirnenski
Scoala Gimnaziala "Alexandru Stefulescu"
OU "Otec Paisii"
mehmet akif ersoy anadolu kiz imam hatip lisesi
Liepajas Raina 6. vidusskola
Liceo Polispecialistico Piero Calamandrei
Szkola Podstawowa w Jankowie Przygodzkim
OpenCom A.P.S.

The E-LIOS project: A school alliance for Good Practices

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The Budget...

PIC	Organisation	Budget Approved
949388665	Osnovno uchilishte Hristo Smirnenski	26550
948614702	Scoala Gimnaziala "Alexandru Stefulescu"	26550
947969555	OU "Otec Paisii"	26550
941379860	mehmet akif ersoy anadolu kiz imam hatip lisesi	26550
944034265	Liepajas Raina 6. vidusskola	22250
943262145	Liceo Polispecialistico Piero Calamandrei	22250
946432396	Szkola Podstawowa w Jankowie Przygodzkim	24175
948336894	OpenCom A.P.S.	30985
999894528	UNIVERSITY OF PATRAS	60090
948722954	ORTAKOY 80.YIL MESLEKI VE TEKNIK ANADOLU LISESI	26550
	total	292500

Expectations



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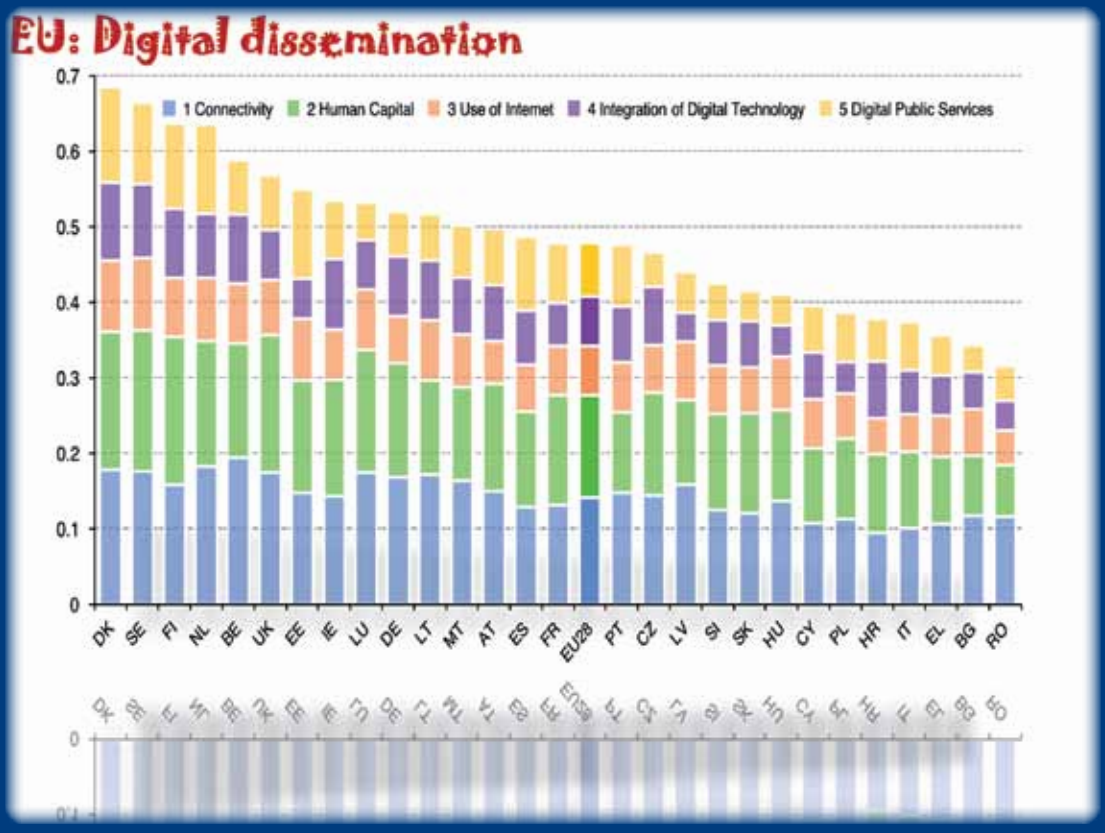
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Italian Agenda

In March 2015, the Ministry of Economic Development – Department of Communication – has published the Italian Digital Agenda (ADI). Italian Education is now ruled by Law 107 "The Good School", art 56 – 62.

- development of digital competences of students;
- strengthening of didactic and laboratory tools;
- adoption of organizational and technological tools in order to help governance, transparency and data sharing;
- training of teachers for didactic innovation and development of digital culture;
- training of administrative staff, in order to support digital innovation of administration.

Tools	Access
	Venues (environments, Learning Plan, Innovative School Buildings
	Digital Identity
	Digital Administration
Competences, contents (Students, Innovation, Computing, Updated tech)	
	Digital, Entrepreneurship and Job
	Digital Contents
Training	(Teachers, Staff)
	Tutoring and Support

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Turkish Digital Agenda

The strategic plan in Turkey was established in 2015 and has a four-year prospective

The Turkish Ministry of Education supports distance education structures, platforms supporting digital material, lifelong learning education and mobile learning.

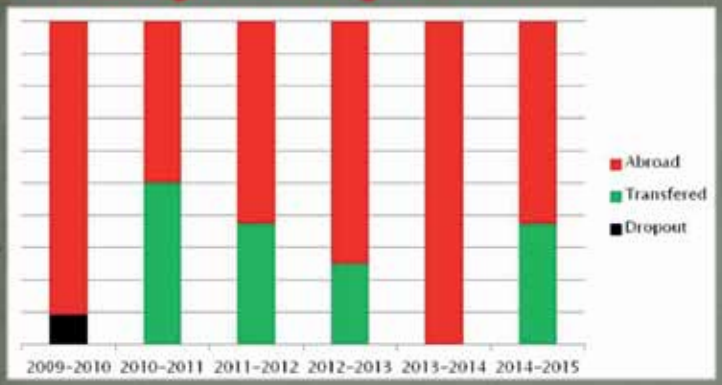
Schools are fairly well-equipped with computer labs and classrooms with interactive whiteboards.

Recently, within the context of strategic planning for the digital education several training programs for teachers were organized with a view to drawing up the integration of new technologies in everyday educational practice.

However, there is a dystocia in using new technologies in education mainly because of a lack of teacher training in the use of new technologies. The integration and the specific training procedures are lengthy at the risk of becoming outdated technological equipment of schools

Great attention has been given to the extroversion of schools via the European programs ERASMUS +. These programs introduced new educational techniques, such as project based learning, mentoring, peer education and use of social media in education.
The first results of the strategic plan of digital convergence in Turkish education system expected in 2019.

The Bulgarian Digital Era



In Bulgaria it has become accepted that modern societies are becoming rapidly technological.

In this context, the strategic plan for the digital convergence in Bulgaria has the following priorities:

- To raise students ' interest in ICT.
- To provide students with access to high-quality sources.
- To promote the creation of digital educational material.
- To promote interaction and critical thinking.
- To enhance the technological skills of the students.
- Introducing a modernized model educational administration.

The E-LIOS project: A school alliance for Good Practices

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The Bulgarian Digital Era

These priorities will be achieved through the following actions:

- National repository in the ' cloud '.
- National platform with educational, interactive material.
- Digital books, textbooks, and asynchronous lectures.
- Digital contests online, educational portals.
- Virtual tours to historical sites of Bulgaria.
- Training and certification of teachers in ICT.
- National competition for the supply of smart mobile devices.
- Develop appropriate educational software.
- Interface gate between schools – universities – the labor market.
- Interactive, distance learning workshops.
- Accessibility and broadband in each training area.

Romania: ICT in Education

Romania already prior its accession to the European Union invested in the introduction of technology in education. In 2001 the Romanian Government introduced the program SEI (Sistem Educational Informatizat).

This plan incorporated a large number of operations from equipping schools with computers and train teachers, until creation of software with learner-centered content.

The program was evaluated in 2004 and 2008, showing remarkable progress at all levels of education.

After the positive review of the SEI program, was regarded as necessary to further innovate, modernize and strengthen the Romanian education system by a second project entitled RoEduNet (Romanian Educational Network) aimed mainly on technological equipment for schools, universities and research centers.

The Romanian policy on new technologies in education emerged as a necessity of the Romanian society for economic growth and prosperity. They were convinced that the entrance of young people in the European labor market can only be done with the right skills associated with the acquisition of technological skills.

The E-LIOS project: A school alliance for Good Practices

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Digital Era in Polish Education

In Poland the Informatics and the basic principles taught for the first time in primary education.

In secondary Education there are addition courses of computing and technology.

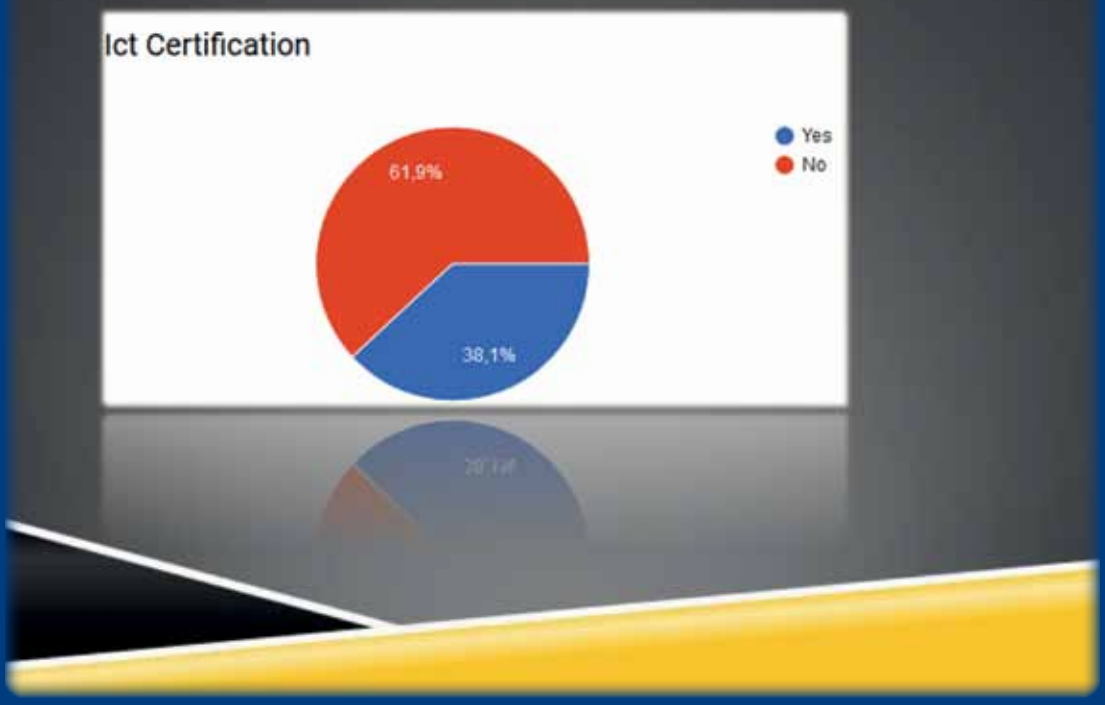
At the same time, in the course of project which is obligatory students are invited to integrate knowledge of new technologies to their drafting and research work.

In high school there is a study direction on informatics and students oriented towards this direction are tested in the corresponding course subject.

At the Universities respectively there is a branch for computer science, where students are specialized in new technologies.

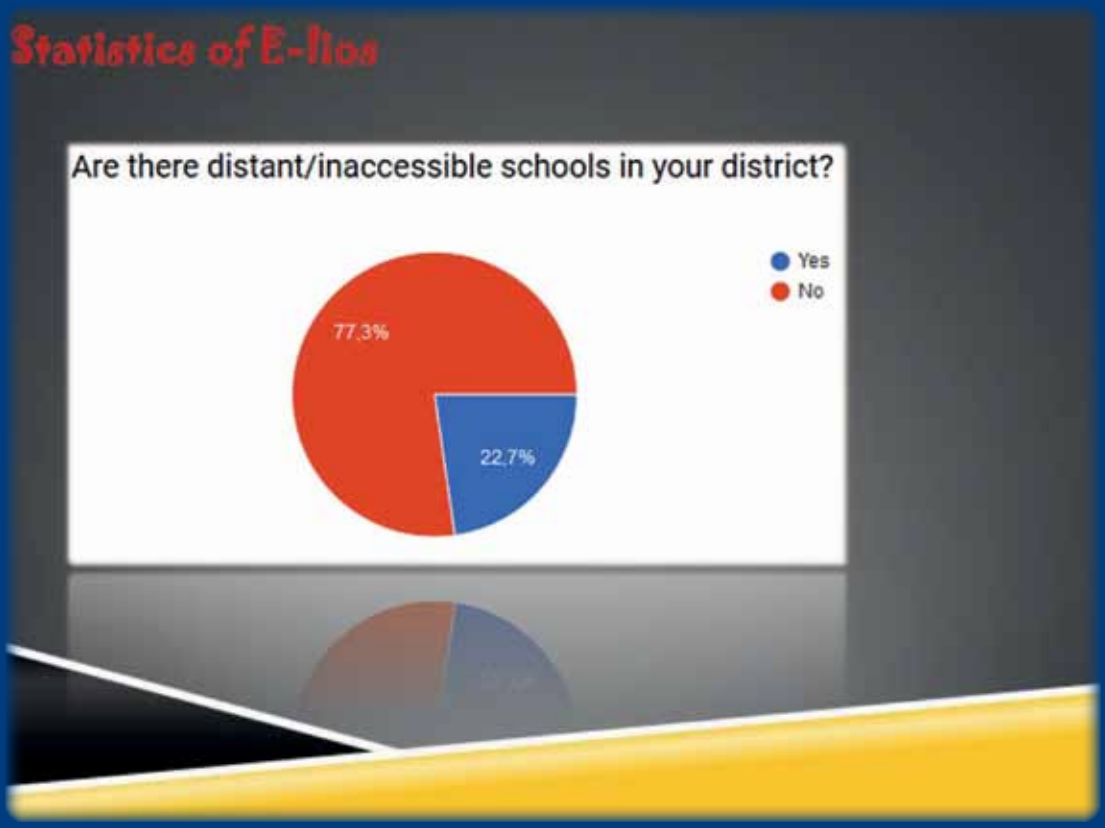
In any case the Government has failed to develop a concrete plan for the digital convergence of Polish education

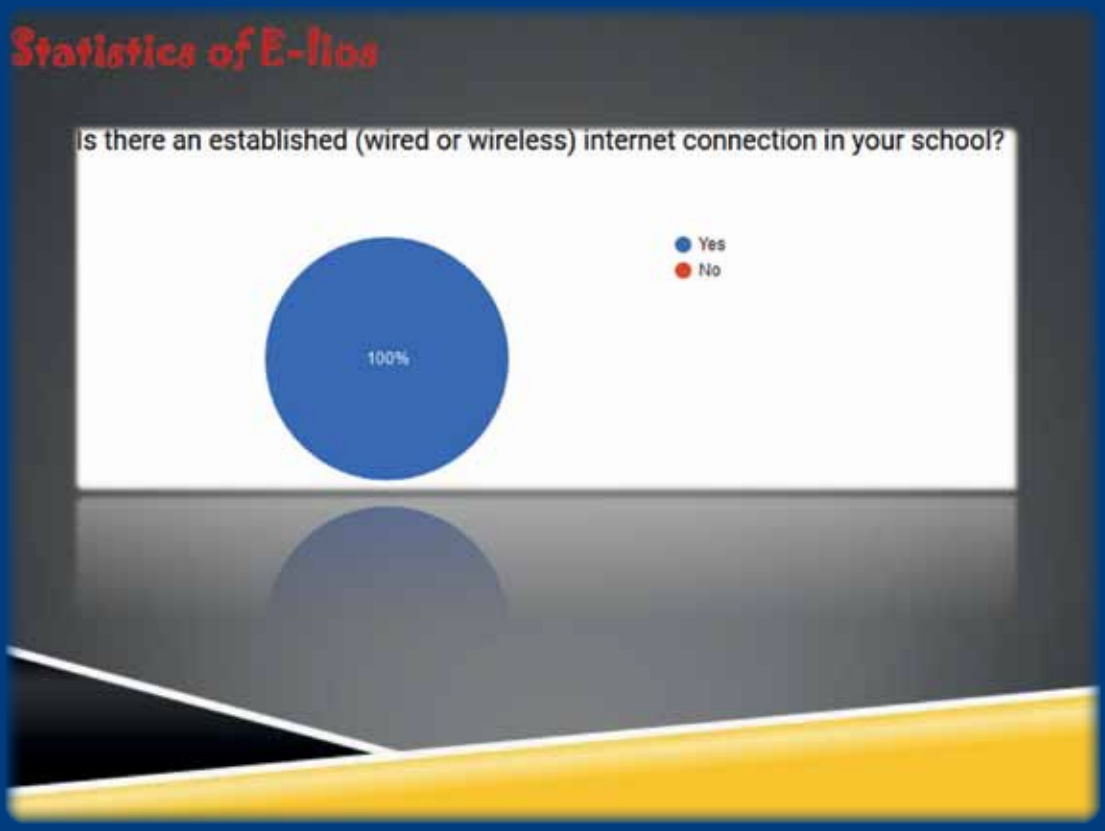
Statistics of E-lios



The E-LIOS project: A school alliance for Good Practices

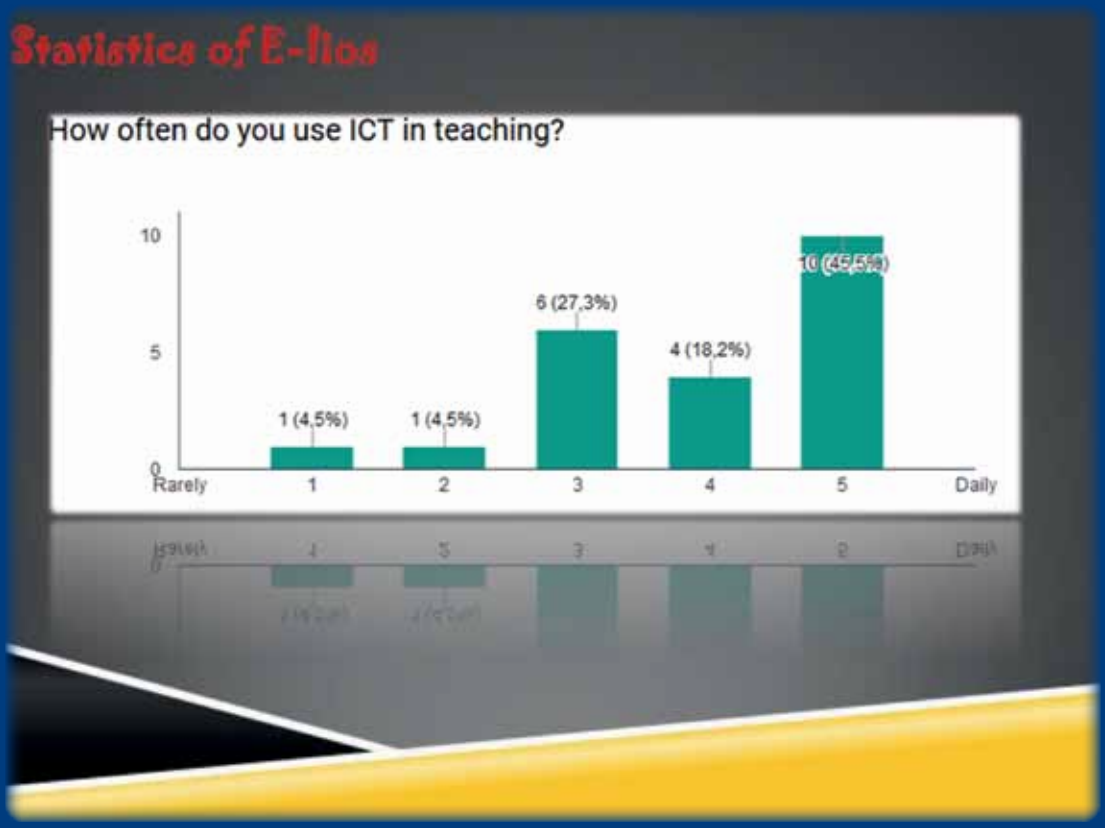
Giannis Chiotelis

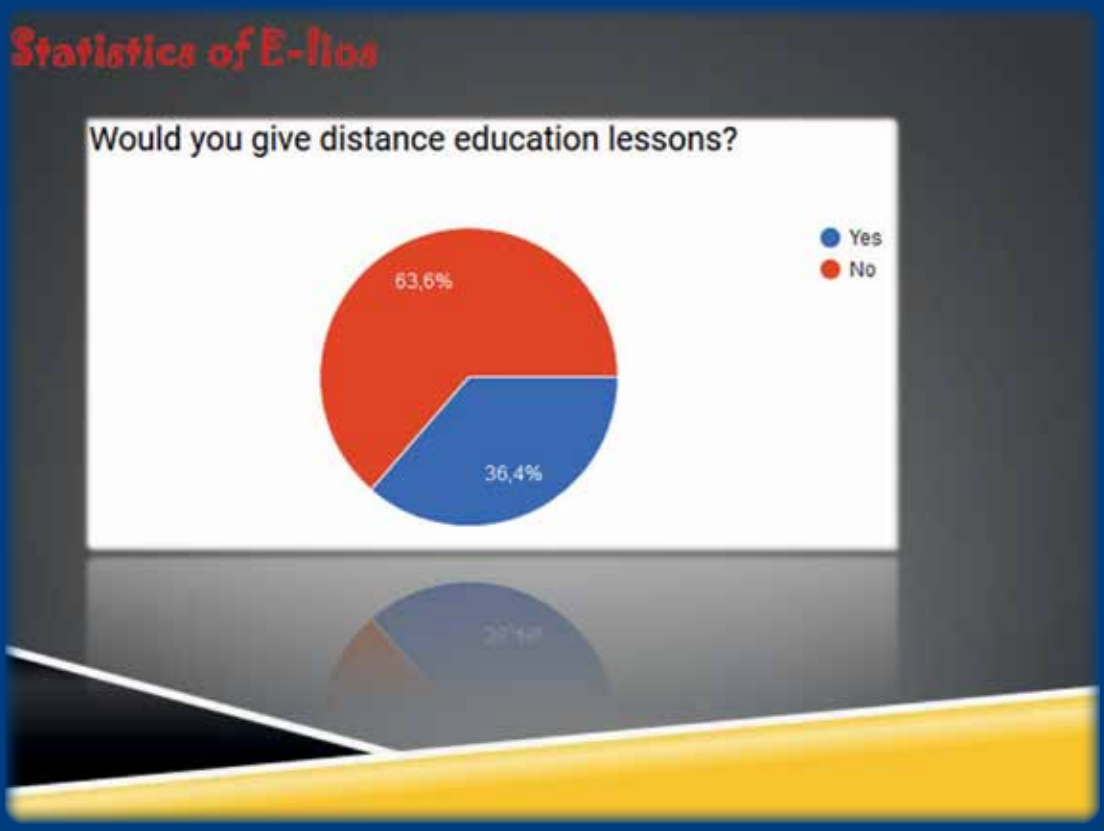




The E-LIOS project: A school alliance for Good Practices

Giannis Chiotelis





The E-LIOS project: A school alliance for Good Practices

Giannis Chiotelis



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Ellinogermaniki Agogi

Ο ΒΙΟΛΟΓΙΚΟΣ ΜΑΣ ΚΗΠΟΣ

Ελληνογερμανική Αγωγή
Α' τάξη

Ε. Σμυρνιωτάκη, Δ. Τσακανίκα, Α. Βαβουράκη

ΣΤΟΧΟΙ

- Προσέγγιση εννοιών σχετικών με το περιβάλλον και την ενασχόληση με τη γη και τη φροντίδα της.
- Κατανόηση της διαφοράς μεταξύ βιολογικών και συμβατικών προϊόντων.
- Ευαισθητοποίηση απέναντι στο περιβάλλον
- Διαισθητική προσέγγιση της επιστημονικής μελέτης.
  - Παρατήρηση
  - Μέτρηση
  - Καταγραφή
  - Σύγκριση
- Εξοικείωση με την ομαδική εργασία, κατανόηση της αξίας της συνεργασίας στην παραγωγή έργου, και καλλιέργεια συνεργατικών δεξιοτήτων.

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ΣΧΕΔΙΑΣΜΟΣ - ΔΡΑΣΕΙΣ

- Πλαίσιο
  - Ευέλικτη ζώνη
  - Διάρκεια: 4 μήνες
  - Δραστηριότητες στην τάξη/στον κήπο
- Μεθοδολογικές προσεγγίσεις
  - Βιωματικές δράσεις
  - Συνεργατική μάθηση
  - Μελέτη πεδίου
- Εκπαιδευτικά υλικά και εργαλεία
  - Ειδικά διαμορφωμένα φύλλα εργασίας
  - Εργαλεία και υλικά κηπουρικής

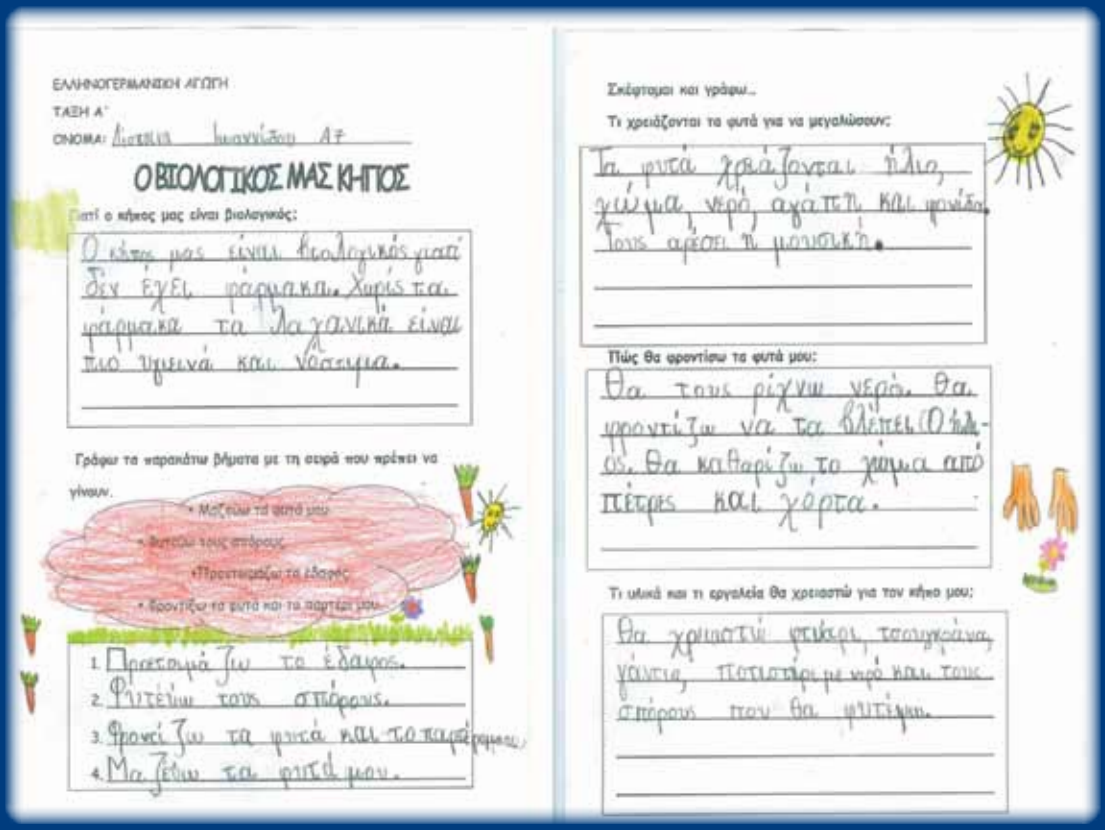
ΔΡΑΣΕΙΣ

Δράση 1. Προσέγγιση εννοιών

- Σχολική τάξη
- Συζήτηση και ανάλυση εννοιών (π.χ. βιολογικός κήπος, κομποστοποίηση, συγκομιδή)
- Συμπλήρωση φύλλου εργασίας.

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ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ
ΤΑΞΗ Α'
ΟΝΟΜΑ: Δέσποινα Ιωαννίδου Α7

Ο ΒΙΟΛΟΓΙΚΟΣ ΜΑΣ ΚΗΠΟΣ

Γιατί ο κήπος μας είναι βιολογικός:

Ο κήπος μας είναι βιολογικός γιατί δεν έχει φαρμακα. Χωρίς τα φαρμακα τα λαχανικα είναι πιο υγιεινά και νοστιμα.

Γράφω τα παρακάτω βήματα με τη σειρά που πρέπει να γίνουν.

- Μαζεύω τα φυτά μου
- Βγάζω τους σπόρους
- Προετοιμάζω τα εδάφη
- Φροντίζω τα φυτά και τα παρατηρώ μου

1. Προετοιμάζω τα εδάφη.
2. Φυτεύω τους σπόρους.
3. Φροντίζω τα φυτά και τα παρατηρώμου.
4. Μαζεύω τα φυτά μου.

Σκέφτομαι και γράφω...

Τι χρειάζονται τα φυτά για να μεγαλώσουν:

Τα φυτά χρειάζονται ήλιο, χώμα, νερό, αγάπη και φροντίδα. Τους αρέσει η μουσική.

Πώς θα φροντίσω τα φυτά μου:

Θα τους ρίχνω νερό. Θα φροντίζω να τα βλέπει ο ήλιος. Θα καθαρίζω το χώμα από πέτρες και χόρτα.

Τι υλικά και τι εργαλεία θα χρειαστώ για τον κήπο μου:

Θα χρειαστώ φτυάρι, τσουγκράνα, γάντια, ποτιστήρι με νερό και τους σπόρους που θα φυτέψω.

Δράση 2. Προετοιμασία της εργασίας στον κήπο

- Σχολική τάξη
- Διαχωρισμός ομάδων ανάλογα με τους σπόρους-βολβούς και ανάθεση καθηκόντων.
- Συμπλήρωση φύλλου εργασίας.

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ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ
ΤΑΞΗ Α΄
ΟΝΟΜΑ: Ασημακοπούλου Έρση Α7

Ώρα να φυτέψουμε!

Οι κηπουροί της ομάδας μου
- Δεληνίδης
- Αλεξάρχου
- Νίκος Μ.
- Μιχάλης
- Δέσποινα
- Έρση
- Ηλίας

Ημερομηνία σποράς: Τρίτη 17 Μαρτίου

Φυτό: Παπάκι

Είδος φυτού: Σπόρος

Βολβός

Δράση 3. Δημιουργία του κήπου

- Επίσκεψη στον κήπο.
- Οριοθέτηση παρτεριών, προετοιμασία του εδάφους με καθαρισμό, εμφύτευση σπόρων-βολβών, πότισμα.
- Χρήση κατάλληλων εργαλείων.
- Συμπλήρωση φύλλου εργασίας.

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- Τα οργανικά απορρίμματα αξιοποιήθηκαν και μετατράπηκαν σε ωφέλιμο λίπασμα για το κήπο μας, με τη χρήση του κομποστοποιητή.

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Δράση 4. Φροντίδα των φυτών

- Επισκέψεις στον κήπο
- Τακτικές μετρήσεις, παρατήρηση της ανάπτυξης των φυτών
- Καταγραφή των παρατηρήσεων στο φύλλο εργασίας.
- Σύγκριση με προηγούμενες καταγραφές





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ΤΑΞΗ Α'
ΟΝΟΜΑ:

3η επίσκεψη στον βιολογικό κήπο:

Παρατηρώ - Μετρώ - Καταγράφω

A Πώς είναι τα φυτά στα παρτέρι μου:
Είναι όλα ζωντανά
Είναι όλα ξερά
Είναι μερικά ξερά και μερικά ζωντανά

A1. Αν είναι όλα ξερά, τι μπορεί να φταίει που μαράθηκαν;

A2. Αν είναι όλα ζωντανά
• Έχουν μεγαλώσει από την προηγούμενη επίσκεψη; Ναι Όχι
• Έχουν όλα τα φυτά τα ίδια ύψος; Ναι Όχι
• Χρειάζονται πότισμα; Ναι Όχι
• Χρειάζεται καθάρισμα το παρτέρι μου; Ναι Όχι

B **Παρατηρώ το φυτό μου και καταγράφω**

B1. Μετρώ με τον χάρακα το ύψος του

Φυτό	Ύψος
Κρεμμύδι	10 εκ.

B2. Πόσο μεγαλύτερο είναι το φυτό μου:
Αρκετά.

B3. Έχει φύλλα; Ναι Όχι

B4. Τι χρώμα έχουν τα φύλλα του: Πράσινο Κίτρινο

Γιώργος Γαβάνας



B5. Αγγίζω με προσοχή το φυτό μου.
Είναι: χλωρό
ξερό

Γ **Μελετώ - Συγκρίνω**

Μελετώ τις αλλαγές μου από τις επισκέψεις μου στον κήπο.

Γράφω τις παρατηρήσεις μου:

Οι πατάτες είχαν ήδη ξεφυτρώσει από το χώμα. Το σιτάρι μας ψηλώνει αρκετά σε σχέση με την προηγούμενη φορά που είχαμε πάει. Τα λουλούδια μας άνθισαν και φτιάξαμε και στεφάνια.

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Δράση 5. Συγκομιδή των προϊόντων.





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- Οι κόποι μας ανταμείφθηκαν! Επιστροφή στο σπίτι με γεμάτα τα χέρια!!



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Προβληματισμοί:



- ✓ Η σωστή διατροφή είναι ένα κοινωνικό θέμα που σχετίζεται με τον σύγχρονο τρόπο ζωής
- ✓ Η παιδική παχυσαρκία έχει γίνει κοινωνική μάστιγα

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Στόχοι προγράμματος:

- ✓ Να εντάξουν οι μαθητές στην καθημερινότητά τους ένα υγιές μοντέλο διατροφής που θα βασίζεται στην κριτική σκέψη και στη δημιουργία σωστών καταναλωτών
- ✓ Να ανακαλύψουν και να μάθουν να εφαρμόζουν οι μαθητές τους κανόνες υγιεινής διατροφής, επιλέγοντας σωστά προϊόντα ανάλογα με τα συστατικά τους
- ✓ Να εξοικειωθούν οι μαθητές με την διαδικασία της έρευνας (έρευνα με ερωτηματολόγιο)

Γνωστικοί στόχοι

- ✓ Είδη τροφών –διατροφική αξία
- ✓ Διαχωρισμός υγιεινών κι ανθυγιεινών τροφών (οφέλη κι επιπτώσεις στην υγεία)
- ✓ Υγιεινή διατροφή – καθημερινές συνήθειες



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Καλλιέργεια δεξιοτήτων

- ✓ Ερευνητικές δεξιότητες (σχεδιασμός ερωτηματολογίου, ανάλυση και παρουσίασης δεδομένων με διαγράμματα)
- ✓ Συνεργατικές δεξιότητες
- ✓ Αξιοποίηση Η/Υ





Στάσεις:

- ✓ Επιλογή μιας σωστής στάσης διατροφής κι άθλησης
- ✓ Σεβασμός ατόμων με προβλήματα βάρους

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Προσέγγιση του θέματος

- ✓ Κληρώσαμε τις ομάδες μας (τις οποίες αλλάζαμε σε τακτά χρονικά διαστήματα) και φτιάξαμε τους κανόνες συν-εργασίας μας
- ✓ «Ζυγίσαμε» τις καλές και κακές καθημερινές μας συνήθειες, γράφοντας τες πάνω σε πράσινα και κόκκινα post-it και τοποθετώντας τες σε μια ζυγαριά, σχεδιασμένη σε χαρτόνι πάνω στο ταμπλό της τάξης





Προσέγγιση του θέματος



- ✓ Παρακολουθήσαμε ένα εκπαιδευτικό διαδραστικό πρόγραμμα στο Μουσείο Πειραμάτων
- ✓ Με αφορμή το βιβλίο «Πάνω η υγεία, κάτω η παχυσαρκία» φτιάξαμε πρωτοσέλιδα εφημερίδων με θέμα τη διατροφή

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Έρευνα Δράσης

- ✓ Καταγράψαμε για 15 μέρες σε ειδικά διαμορφωμένα φύλλα τα γεύματά μας
- ✓ Επεξεργαστήκαμε και συζητήσαμε τις καταγραφές μας …
- ✓ Γίναμε «της διατροφής μας οι κριτές» και τελικά… *όλοι χρειάστηκε να αλλάξουμε κάτι στη διατροφή μας".*



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Έρευνα στους μαθητές της Γ και Δ δημοτικού με θέμα για τη διατροφή με θέμα : «Τι ξέρω – Τι εφαρμόζω».

- ✓ Σχεδιάσαμε ερωτηματολόγια
- ✓ Μοιράσαμε και εξηγήσαμε στους μαθητές της Γ και Δ
- ✓ Κωδικοποιήσαμε και επεξεργαστήκαμε τα δεδομένα
- ✓ Παρουσιάσαμε τα αποτελέσματα με διαγράμματα
- ✓ Προτείναμε τον «Δεκάλογο» της υγιεινής διατροφής.

- ✓ Διαμορφώσαμε και μοιράσαμε ένα σύντομο ερωτηματολόγιο για τους γονείς μας, για να ελέγξουμε τις γνώσεις και τις συνήθειές του.

















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Φτιάξαμε παιχνίδια

- ✓ παιχνίδι με κάρτες ερωτήσεων πολλαπλής επιλογής,
- ✓ μαγνητικό και
- ✓ επιδαπέδιο, που παίξαμε στο αίθριο του σχολείου μας.





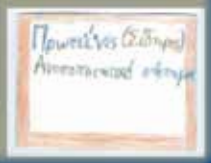


- ✓ «Ταξιδέψαμε» στα γεωγραφικά διαμερίσματα της Ελλάδας, μαθαίνοντας τα προϊόντα του κάθε νομού και σχεδιάζοντάς τα στον χάρτη.









Τα πρωινά του κόσμου

- ✓ Διαλέξαμε επτά από τα πιο γνωστά πρωινά του κόσμου, τα φτιάξαμε με τα χεράκια μας μέσα από μια τρισδιάστατη αναπαράσταση και τα «σερβίραμε».







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✓ **Γράψαμε συνθήματα** και φτιάξαμε το κάθε τμήμα τη δική του **αφίσα**, για να προωθήσουμε το μήνυμα της υγιεινής διατροφής.





✓ **Κατασκευάσαμε πυραμίδες** με αποκόμματα περιοδικών και φυσι





✓ Καταγράψαμε και συγκεντρώσαμε **παραδοσιακές συνταγές** από όλη την Ελλάδα και στη συνέχεια «με μια αλλαγή στα υλικά» τις κάναμε πιο υγιεινές.

✓ Ως «μικροί δημοσιογράφοι» αναλάβαμε διατροφικές αποστολές καθώς **πήραμε συνεντεύξεις** από γνωστούς και φίλους που δραστηριοποιούνται στον τομέα των τροφίμων.





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✓ Είχαμε επίσης την ευκαιρία να γνωρίσουμε τα βασικά σημεία της **Πυθαγόρειας Διατροφής**, φτιάχνοντας έναν άνθρωπο που στη θέση των οργάνων του σώματός του είχε αντίστοιχα τροφές που ωφελούν το κάθε όργανο και μοιάζουν με αυτό.





✓ Στο μάθημα της Μουσικής **φτιάξαμε στίχους που έγιναν τραγούδια** κι αρχίσαμε τα «ηχό – μαγειρέματα», παράγοντας μελωδίες από διάφορα καθημερινά αντικείμενα οικιακής χρήσης της κουζίνας. Μέχρι φλογέρα από καρότο κατασκευάσαμε!





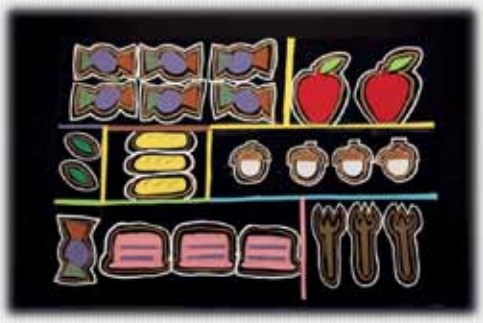




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✓ Αλλά και στο μάθημα των Εικαστικών τα μαχαιροπίρουνα έγιναν **έργα τέχνης** και τα φρούτα και λαχανικά πήραν τη θέση τους σε πίνακες νεκρής φύσης











✓ Οι δράσεις όμως συνεχίστηκαν κι εκτός σχολείου, όταν επισκεφτήκαμε ένα μεγάλο Super Market και χρησιμοποιώντας την εκπαιδευτική πλατφόρμα (collage) του σχολείου μας, πραγματοποιήσαμε το πρόγραμμα «Διαδρομές Δράσης – Επιλογές Ζωής», ώστε να αποκτήσουμε καταναλωτική συνείδηση.







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✓ Τέλος με κέφι και περηφάνια οργανώσαμε μια διαδραστική έκθεση για να μοιραστούμε τις εμπειρίες και τις γνώσεις μας και να παρουσιάσουμε τις εργασίες μας.























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Preparing the colonization of Mars. Design, construction and testing of a shelter

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ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ

Προετοιμάζοντας την αποίκηση στον Άρη

Σχεδίαση, κατασκευή και δοκιμή ενός καταφυγίου

Θάλεια Τσακνιά

ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ

Αντί προλόγου..

- «Έχουμε θέσει έναν σαφή στόχο: να στείλουμε ανθρώπους στον Άρη μέχρι το 2030 και να επιστρέψουν με ασφάλεια στη Γη. Βασική φιλοδοξία μου είναι κάποια μέρα οι αστροναύτες να μπορούν να ζήσουν στον κόκκινο πλανήτη για μεγάλο χρονικό διάστημα»
- Κάποια μέρα ελπίζω να κρατάω στους ώμους μου τα δικά μου εγγόνια. Θα κοιτάμε τα αστέρια, όπως έκαναν πάντα οι άνθρωποι από την αρχή του κόσμου. Αλλά αντί να περιμένουμε να επιστρέψουν στη Γη οι εξερευνητές μας, θα ξέρουμε ότι θα πηγαίνουν στο διάστημα, όχι απλά για να το εξερευνούν, αλλά για να μείνουν. Και με αυτό τον τρόπο θα κάνουμε τη ζωή μας στη Γη καλύτερη.

Οκτώβριος 2016



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ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ



"Αποτελεί ένα σημαντικό κομμάτι του χαρακτήρα μας, η περιέργεια, η εξερεύνηση, η καινοτομία, η εφευρετικότητα, η ώθηση να κάνουμε κάτι πριν από οποιοδήποτε άλλον. Η διαστημική κούρσα όχι μόνο συνέβαλε στο να δρομολογηθούν σημαντικές τεχνολογικές και ιατρικές εξελίξεις, αλλά ενέπνευσε μία νέα γενιά επιστημόνων και μηχανικών." Barack Obama

ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ

Περιγραφή δραστηριότητας

- Σχεδιασμένη έτσι ώστε να:
- ακολουθεί τις εξελίξεις και ανάγκες της εποχής,
- ικανοποιεί το όραμα του σχολείου για εκπαίδευση και προετοιμασία των αυριανών ενεργών, ενημερωμένων πολιτών, επαγγελματιών και επιστημόνων.
- Ενταγμένη στο διαθεματικό πρόγραμμα της Ε' Δημοτικού με θέμα το διάστημα.
- Οι μαθητές χωρισμένοι σε ομάδες μελετούν, σχεδιάζουν και κατασκευάζουν από απλά υλικά ένα μοντέλο για ένα μελλοντικό καταφύγιο στον Άρη.

Preparing the colonization of Mars. Design, construction and testing of a shelter

Tsaknia T
Ellinogermaniki Agogi

ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ

Στόχοι δραστηριότητας

- Προώθηση της ενεργής, βιωματικής μάθησης.
- Ανάπτυξη μαθητών σε πολλαπλά επίπεδα:

  - σε γνωστικό επίπεδο

(αναγνωρίζω, διακρίνω, ερμηνεύω, περιγράφω, επιλέγω, κατατάσσω, ταξινομώ, κατηγοριοποιώ, συντάσσω, συγκρίνω, συσχετίζω, συνθέτω, αναλύω)

  - σε επίπεδο ικανοτήτων

(επιδεικνύω, κατασκευάζω, μετατρέπω, μετρώ, συντάσσω, οργανώνω, σχεδιάζω, υπολογίζω, διορθώνω, ελέγχω, επαληθεύω, επιλύω, εφαρμόζω, χρησιμοποιώ, επιλέγω)

  - σε επίπεδο στάσεων

(αποδέχομαι, εκτιμώ, απορρίπτω, διερωτώμαι, προτιμώ, υποστηρίζω, ενθαρρύνω, παροτρύνω, υιοθετώ, εφαρμόζω, σέβομαι, προτίθεμαι)

- Εξοικείωση και εφαρμογή της επιστημονικής μεθοδολογίας.

ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ

Στάδια δραστηριότητας

Προσέγγιση θέματος

- Χωρισμός ομάδων και μελέτη των συνθηκών που επικρατούν στον Άρη.

- *Συζήτηση / έρευνα στο διαδίκτυο / παρουσίαση συνθηκών στον Άρη*
- *«Γιατί να φτιάξουμε ένα καταφύγιο; Γιατί στον Άρη;»*



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Στάδια δραστηριότητας

Σχεδιασμός έρευνας

- Καταγραφή υποθέσεων για τις προϋποθέσεις που πρέπει να πληροί ένα καταφύγιο στον Άρη.
- Συζήτηση για την ανάγκη δημιουργίας μοντέλου.
- Παρουσίαση τεχνικών προδιαγραφών.



ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ

Στάδια δραστηριότητας

Κατασκευή

- Σχεδιασμός και κατασκευή καταφυγίων χρησιμοποιώντας απλά υλικά.





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Στάδια δραστηριότητας

Συμπεράσματα

- Καταγραφή σταδίων της έρευνας και εξαγωγή συμπερασμάτων.
- Επέκταση μελέτης.



ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ

Στάδια δραστηριότητας

- Παρουσίαση και υποστήριξη των εργασιών σε εξωτερική επιτροπή αξιολόγησης.



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Ευχαριστώ!

- tsaknia@ea.gr



Schools: Future labs. Connecting science and foreign language education

Anna Slavi
Goethe-Institut Athen

Schools:Future Labs

Connecting Science and Language education

Anna Slavi

Goethe-Institut Athen, Greece

Erasmus+

schools: future Labs

The project:

Schools: Future Labs is an Erasmus+ project (KA2) and has been funded with the support of the European Commission. It aims to unite creativity in Science (Physics, Biology, Chemistry) and language in years of primary education. It implements a new approach wherein language learning (German / Spanish) and STEM subjects are combined, by applying the STEM/CLIL methodology in the 5th and 6th grade.

Duration:

Three years (01.09.2014- 31.08.2017)

Countries involved:

Bulgaria, Greece, Poland, Rumania

Erasmus+

schools: future Labs

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Goethe-Institut Athen

The aims of the project:

Get the students interested in **STEM subjects** and in the habit of using a **foreign language**.

Make a **successful transition** to employment in areas vital that ensure competitiveness of the European economies

Possess **transversal skills** adaptive to any employment situation

Encourage **student engagement**

Ensure a **social** and **collaborative** way of learning and change classroom practice

Train the trainers and the teachers

Erasmus+ schools: future Labs

Partners:

Goethe Institut Athen, Greece

Instituto Cervantes, Athens, Greece

National and Kapodistrian University of Athens, Greece

University of Shumen (Department for Information, Qualification and Lifelong Learning), Varna BG

Mazowieckie Samorzadowe Centrum Doskonalenia Nauczycieli (MSCDN), Poland

Ministerio de Educacion, Cultura y Deporte, Spain

Ministerul Educației și Cercetării Științifice, Romania

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Partners:

Uwekind International School, Bulgaria

49th Primary School "Benito Juarez ", Bulgaria

Colegiul National Ion Maiorescu, Romania

Liceul Teoretic Bilingv Miguel de Cervantes, Romania

Społeczna Szkoła Podstawowa nr 4 STO, Romania

Ellinogermaniki Agogi S.A., Greece

Erasmus+ schools: future labs

What we do:

Goethe-Institut Athen: General management

Instituto Cervantes: responsible for the communication with schools

University of Athens: responsible for the evaluation of the project and the development of an E-learning portfolio.

University of Shumen: responsible for producing the deliverable of the Lesson Plans

Mazowieckie Samorzadowe Centrum Doskonalenia Nauczycieli MSCDN: responsible for producing and implementing the Teacher Training Course

Ministries of Education (ES, RO): responsible for accrediting the methodology and disseminating the project

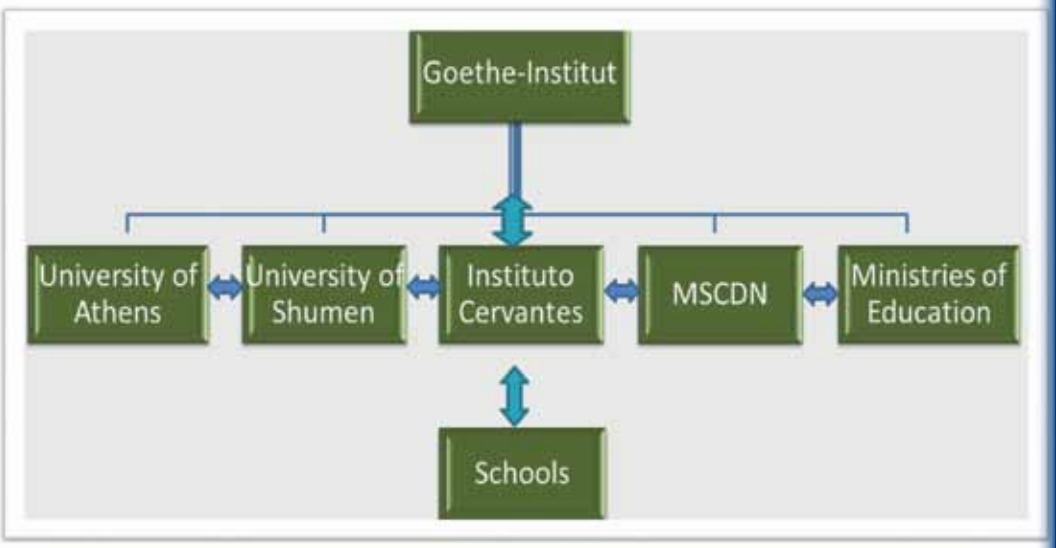
Schools: responsible for the implementation of the methodology.

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Internal Communication:



The outputs of the project:

A teacher training Course for the *Schools: Future Labs* methodology
(Output 01: Teacher training Course)

A series of "plug-and-play" STEM-CLIL teaching modules, applied to a variety of STEM subjects and applicable to any foreign language
(Output 02: Lesson Plans)

A virtual student learning portfolio which will document each student's learning outcomes (Output 03: E-Learning Portfolio)
www.schoolsfuturelabs.eu

Erasmus+

schools: Future Labs

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What we have achieved:

Train the trainers seminar

Five teacher trainings (the trainers trained the teachers involved in the project)

Purchase of Mobile Labs (Mobile tool kits for carrying out experiments)

Three partner meetings

Two Joint Trainings (all teachers and trainers meet to compare results and decide the next steps)

National School Fairs (the students present an SFL experiment)

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External Communication:



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External communication : Dissemination

The purpose of communicating our project results will be two-fold:

Promote the exploitation results in the **participating** countries by targeting:

- The national teaching communities in each country (school directors, science and foreign language teachers' associations)
- Teacher Training Centers and Universities should offer the teacher training
- The National ministries and authorities responsible for STEM and foreign language curricula, with the aim of obtaining their moral, financial and/or regulatory support for the dissemination of the project outputs.

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External communication: Dissemination

To promote the further dissemination in **non-participating** countries.

- In order to achieve this, we will base ourselves on the project results (including the Project Evaluation and a video showing classroom outcomes) in order to raise interest for the project, and to assemble the partnerships and the funding necessary to implement the pilot in other countries.

Communication at **international level** will be targeted at:

- The teaching communities (school directors, science and foreign language teachers' associations)
- Teacher Training Centers and Universities specialized in teacher training and teaching methodologies
- The National ministries and authorities are responsible for STEM and foreign language curricula.

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Dissemination activities 1/4

Development of the project's visual identity

Management and regular updating of the project web site, social networking and other on-line outreach activities which will showcase project progress and results
www.sflabs.eu

Development, translation and printing of project presentation brochure available in five languages (PL/BG/RO/EL/EN).

Presentation of the project in bilateral and multilateral meetings outside of the project (e.g. European Committee of Representatives of FL teaching), especially by the RO and ES Ministries of Education;

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Dissemination activities 2/4

Presentation of the project in conferences, meetings and trainings organized and attended by the Cultural Institutes, the Ministries and the Teacher Training Institutes (GI will provide to partners presentation materials e.g. PPTs for this purpose)

Quarterly newsletters to public and private sector organizations involved or interested in foreign language, STEM and CLIL education (drafted by GI, disseminated through each partners' networks and contacts, at national, European and also international level)

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Dissemination activities 3/4

Creation of a "promotional video" using footage from classroom activities and the science fairs, which will show the project implemented live as well as a showcase of the results and opinions/perceptions by teachers, students and school directors (ready in December 2016)

Organization of joint Science Fairs, by the participating schools in all four countries, at the end of the 2015/2016 and 2016/2017 school years

The participating teachers and school directors will act as "ambassadors" for this project in their local and professional community:
- ❖invite teachers from other schools to the science fairs,
- ❖talk about the project to local and professional colleagues,,
- ❖organize open SFL classes by inviting colleagues into their classrooms to observe and experience methodology

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Dissemination activities 4/4

The participating teacher training institutes will communicate about the project to their counterparts in their own countries and abroad

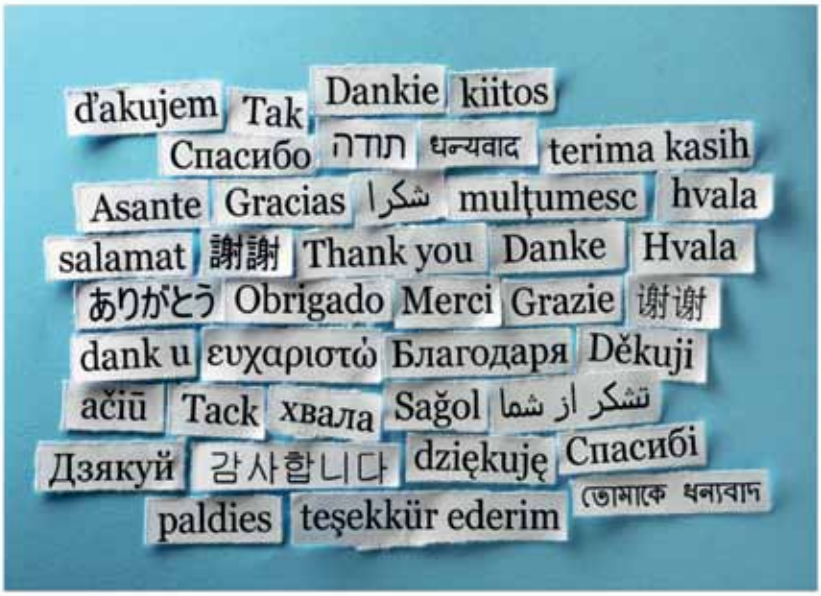
Communication by each partner to their own audiences through their regular channels (involving web sites, social media, regular as well as ad-hoc paper and electronic newsletters, use of TV and radio, articles in the specialized press)

Project closing conference (June 2017)

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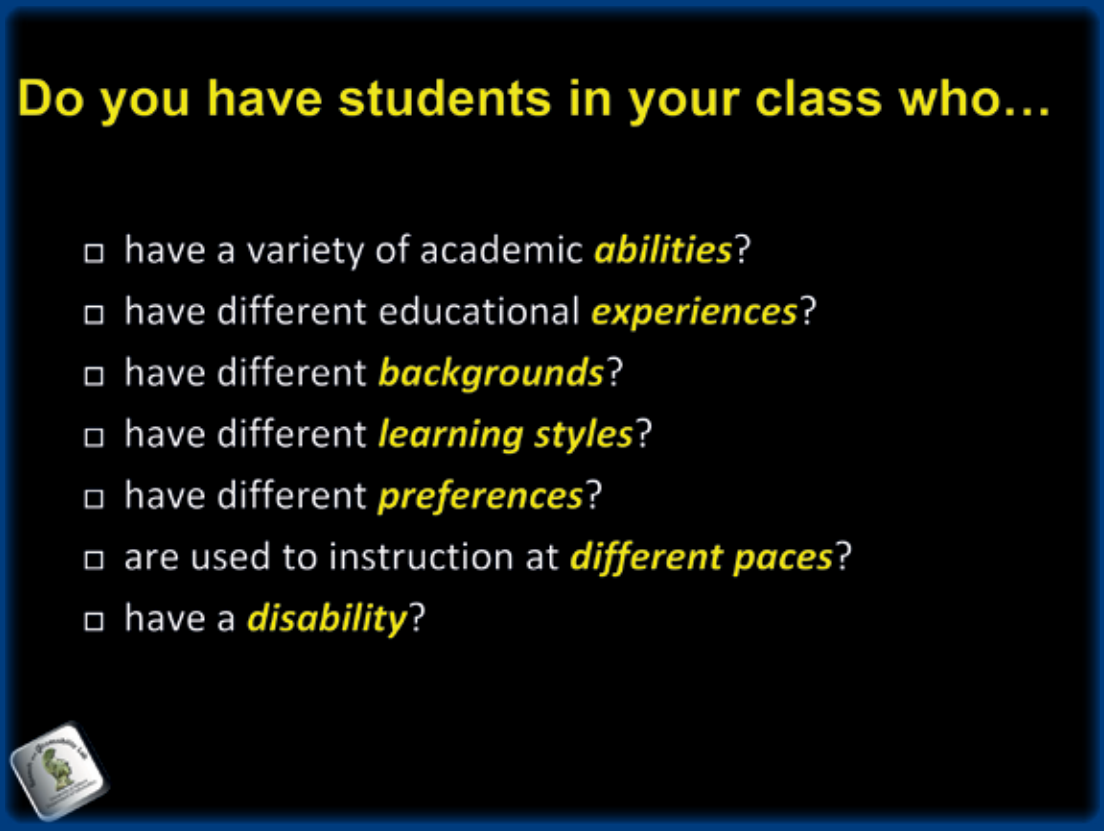
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Using the UDLnet services and tools to prepare learning experiences

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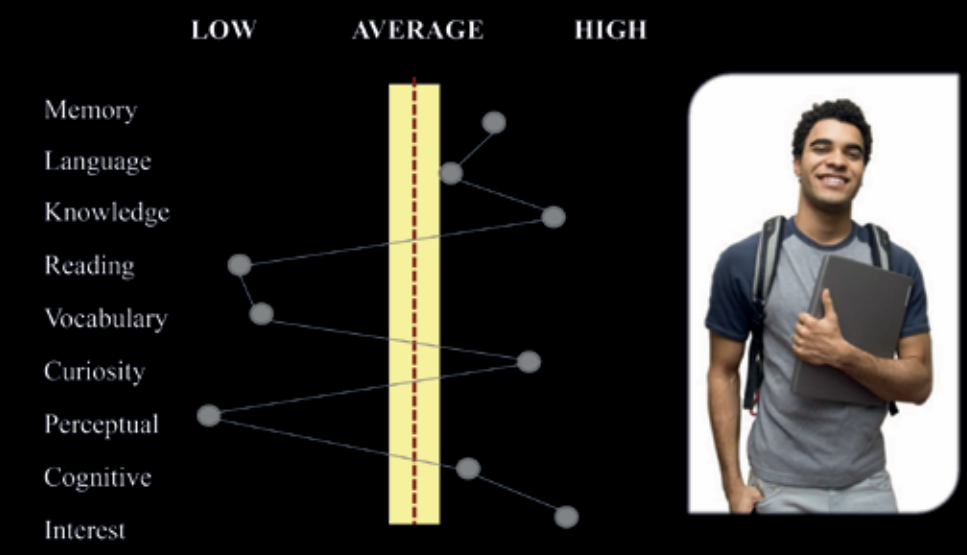




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The average student is a myth



Universal Design for Learning (UDL)

- an educational framework to guide development of flexible learning environments to accommodate individual learning differences
- seeks to increase access to learning by reducing physical, cognitive, intellectual and organisational barriers

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The two aspects of UDL

- a conceptual model from which a set of principles and practices are derived
- a set of specific practices and guidelines by which universal design is actually accomplished

UDL Principles and Guidelines

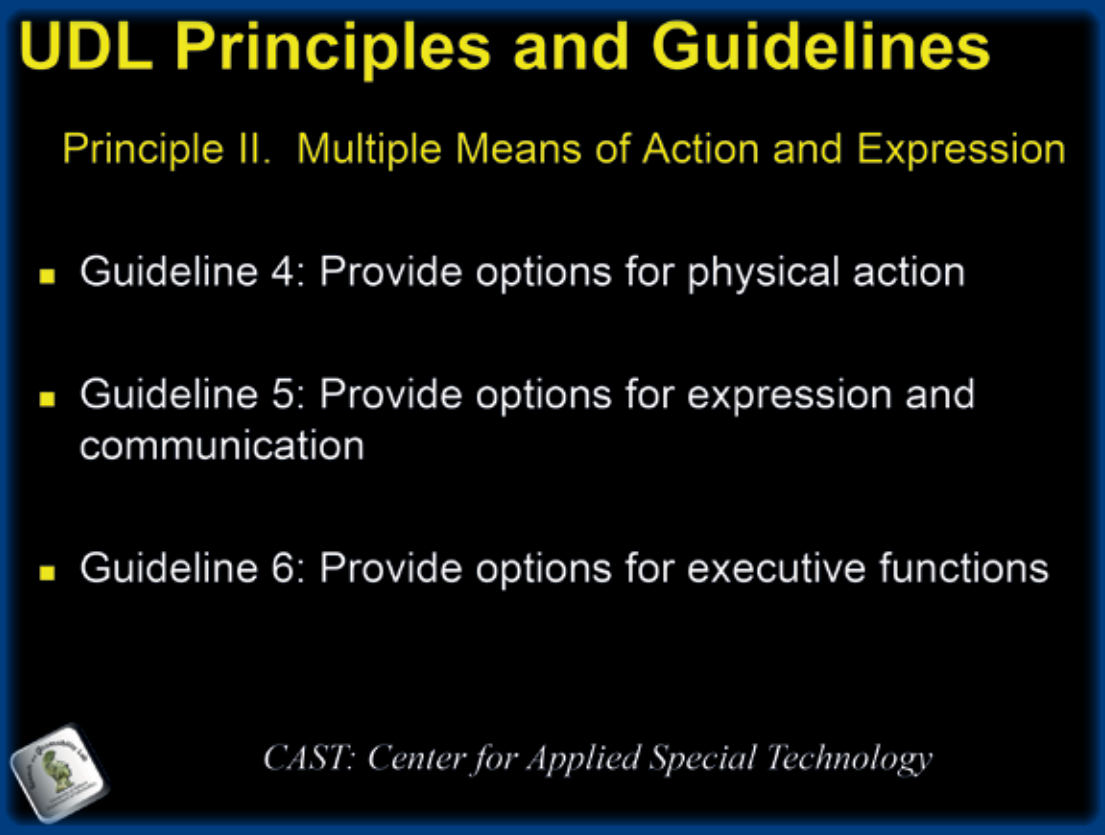
Principle I. Multiple Means of Representation

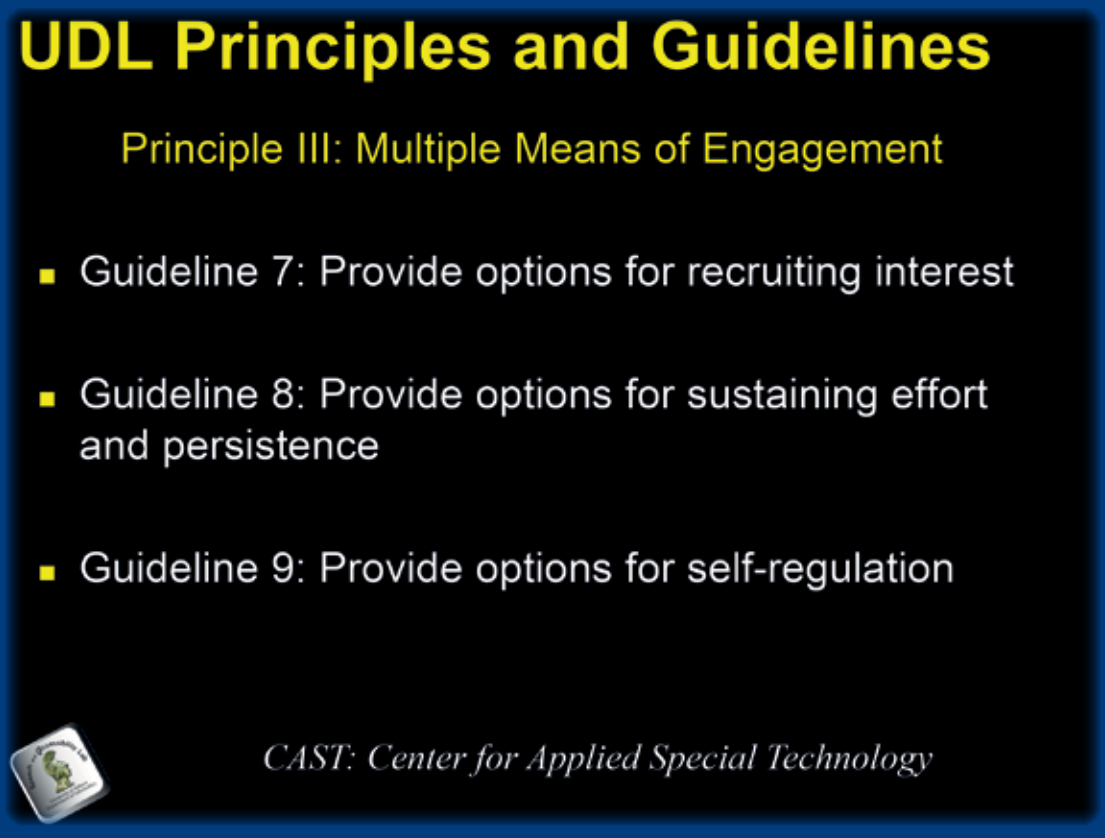
- Guideline 1: Provide options for perception
- Guideline 2: Provide options for language, mathematical expressions, and symbols
- Guideline 3: Provide options for comprehension

CAST: Center for Applied Special Technology

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UDL, but.....

- Few studies have provided a comprehensive framework to put the UDL pieces together, in a **practical**, research grounded & **efficient** way [1]
- UDL is **much more complex** than we originally thought [2]

[1] Katz, J. (2013), *Canadian Journal of Education*, 36, 153-194
[2] Edyburn D. (2010) *Learning Disability Quarterly*, 33, 33-41

The UDLnet project



Aims:

- to bridge the gap between policy and practice in applying UDL
- to address the necessity of collecting and creating UDL good practices from a wide range (educational, cultural, language, etc.)

UDLnet targets 2.000 users all around Europe and internationally

http://www.udlnet-project.eu/

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Inventory of UDL Good practices (1/2)

- developed under the UDLnet project
- a collection and categorization of UDL:
  - Good Practices,
  - Media Resources,
  - Collections

Inventory of UDL Good practices (2/2)

aims to support diverse learning communities to:

a) find,
exchange,
adapt,
teaching or learning practices

b) feedback from actual UDL implementation in classrooms

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UDLnet Inventory includes:

Media Resources: complement the UDL Good Practices and relate to the pedagogical approach applied by the educationalist and the instructional material used

Collections: provide UDLnet users with the facility to gather, link, and organise different Good Practices and Media Resources together to meet their specific needs around a particular topic, theme, or class

Basic facilities of UDLnet Inventory

browse / search (by topic, keyword, edu level, language),

create,

adapt,

assess / evaluate:

- UDL practices,
- UDL media resources,
- UDL collections,
- UDL based lesson plans,
- UDL educational scenarios.

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UDLnet Inventory

target users:

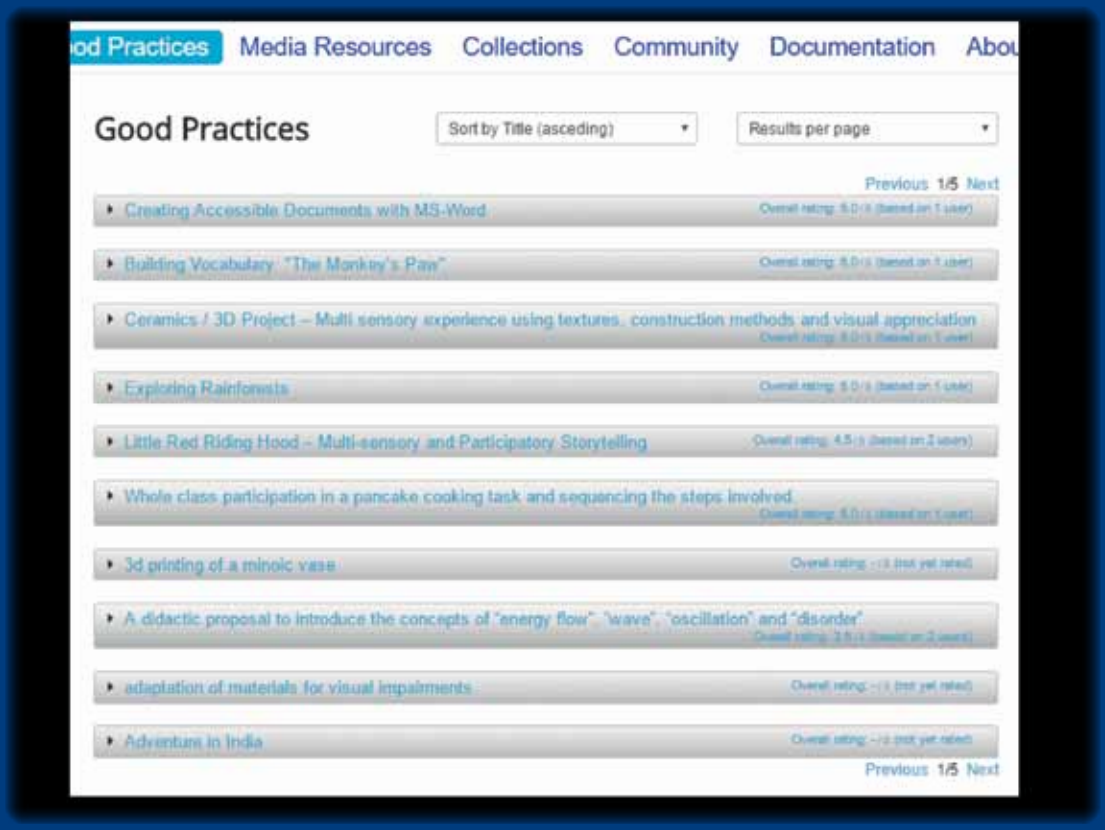
- teachers,
- teacher educators,
- educationalists,
- professors,
- practitioners,
- policy makers,
- .....





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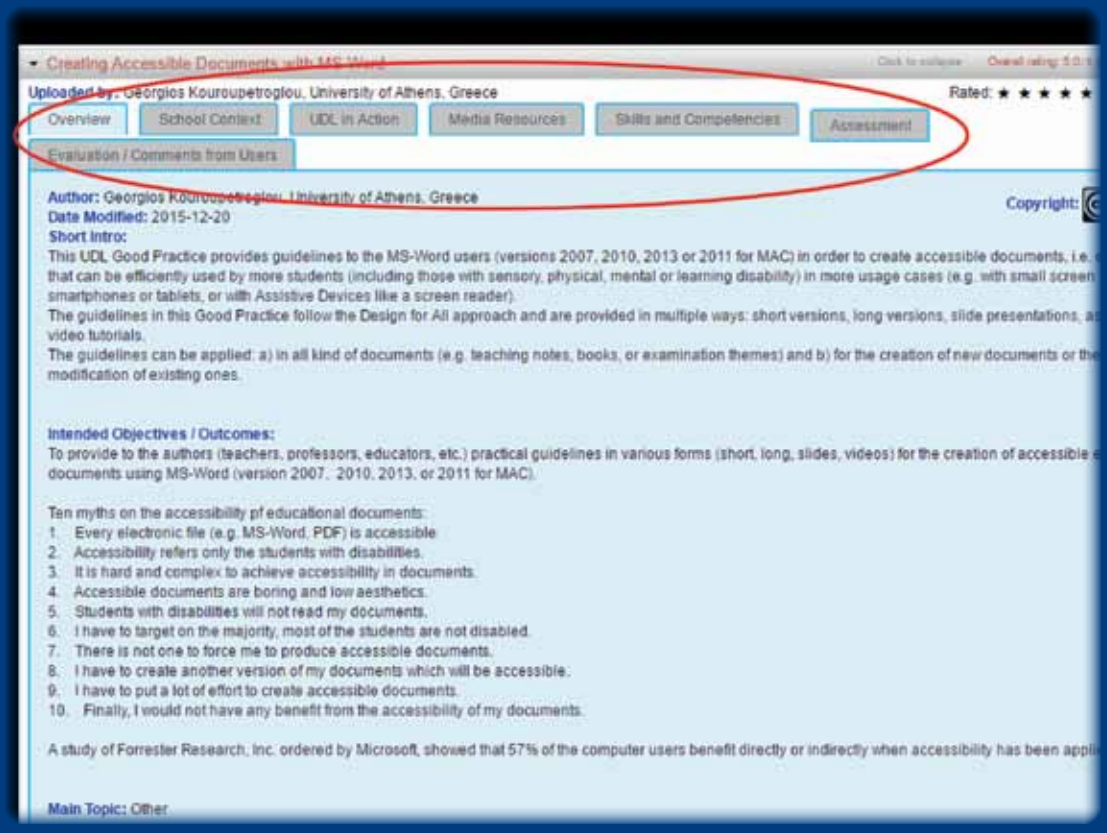
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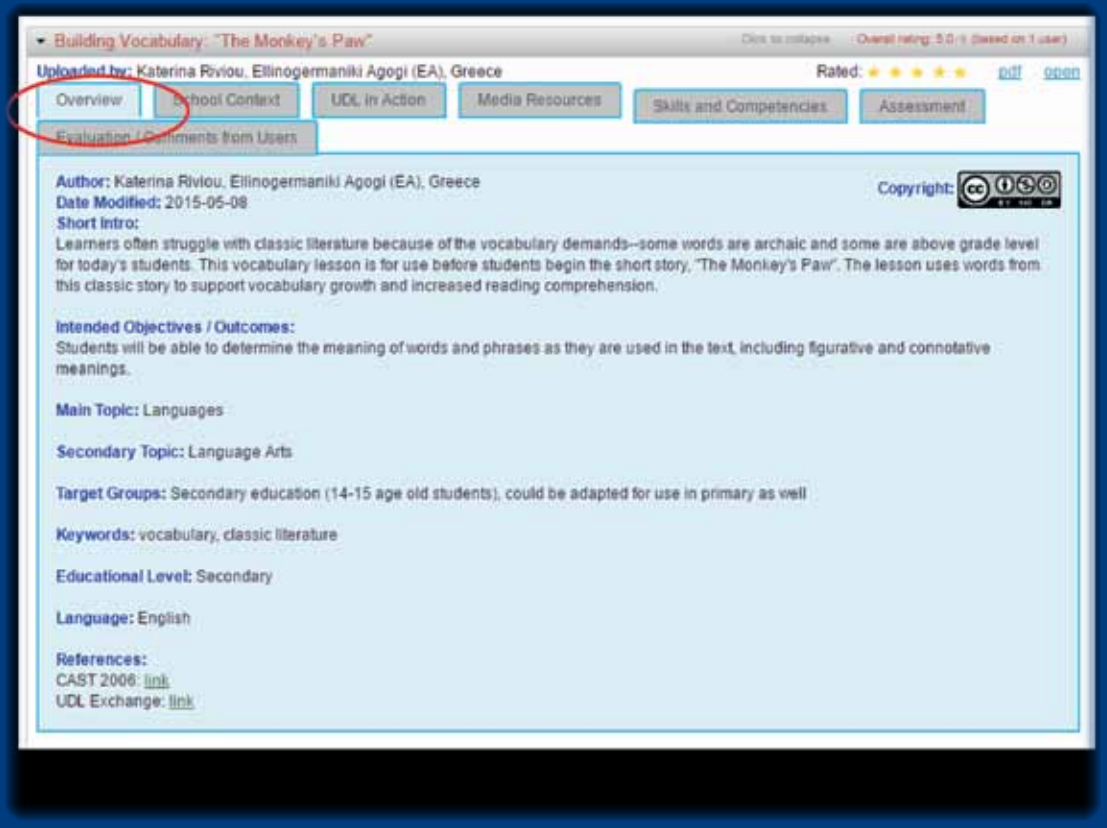




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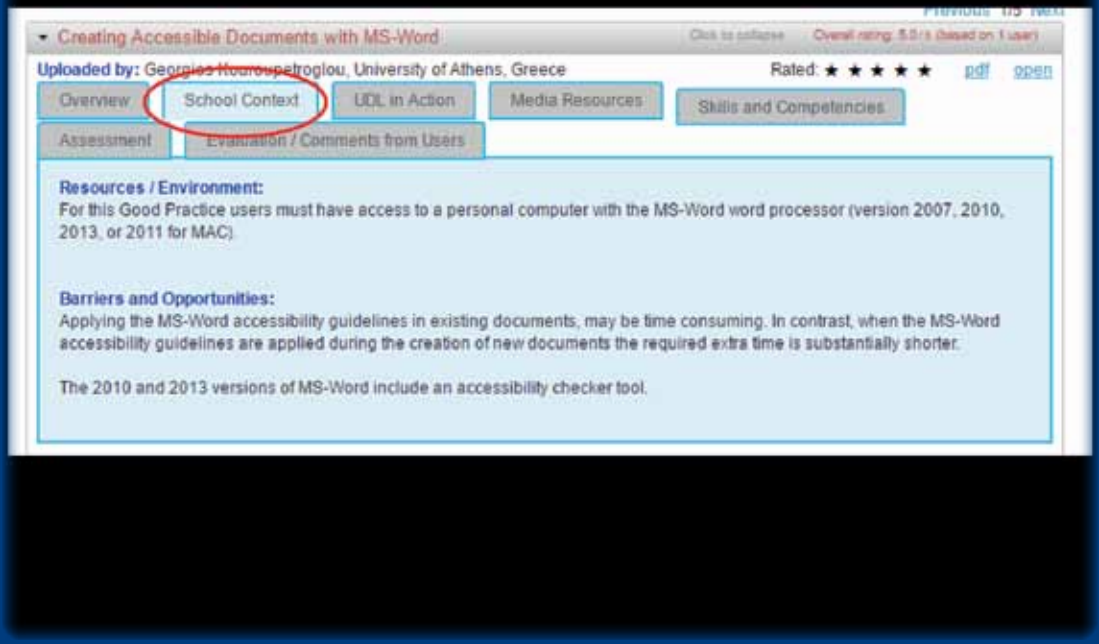
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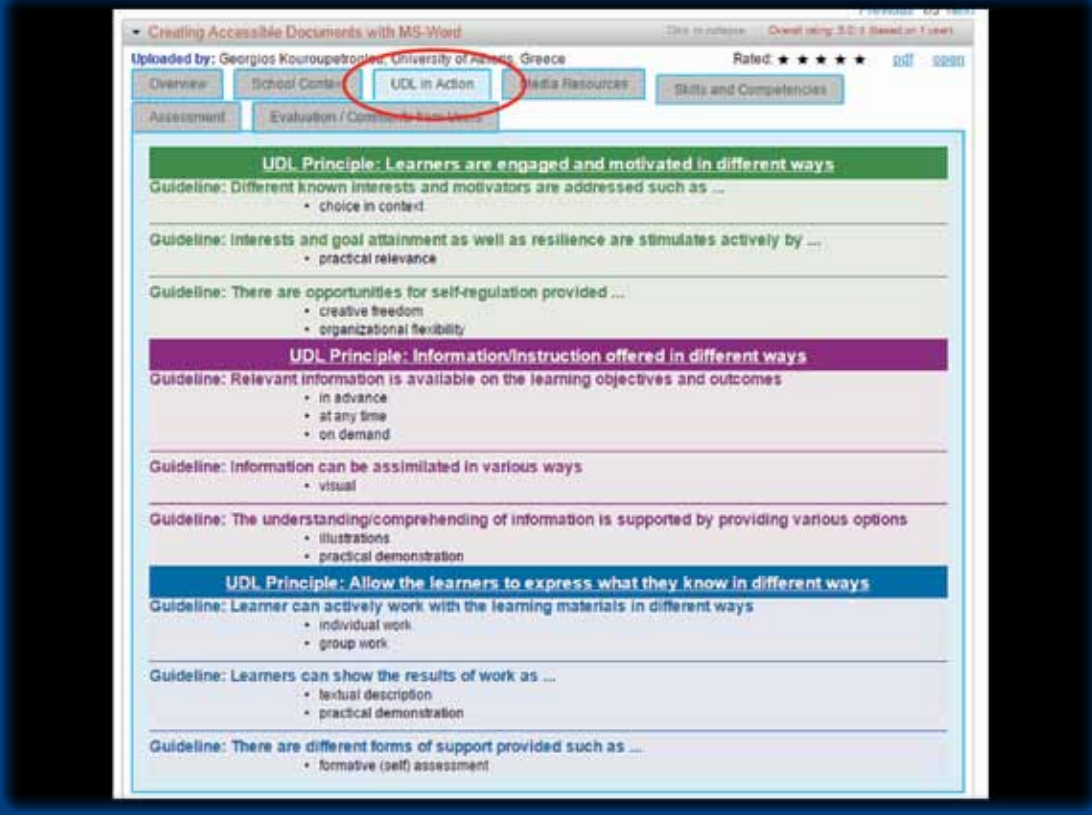




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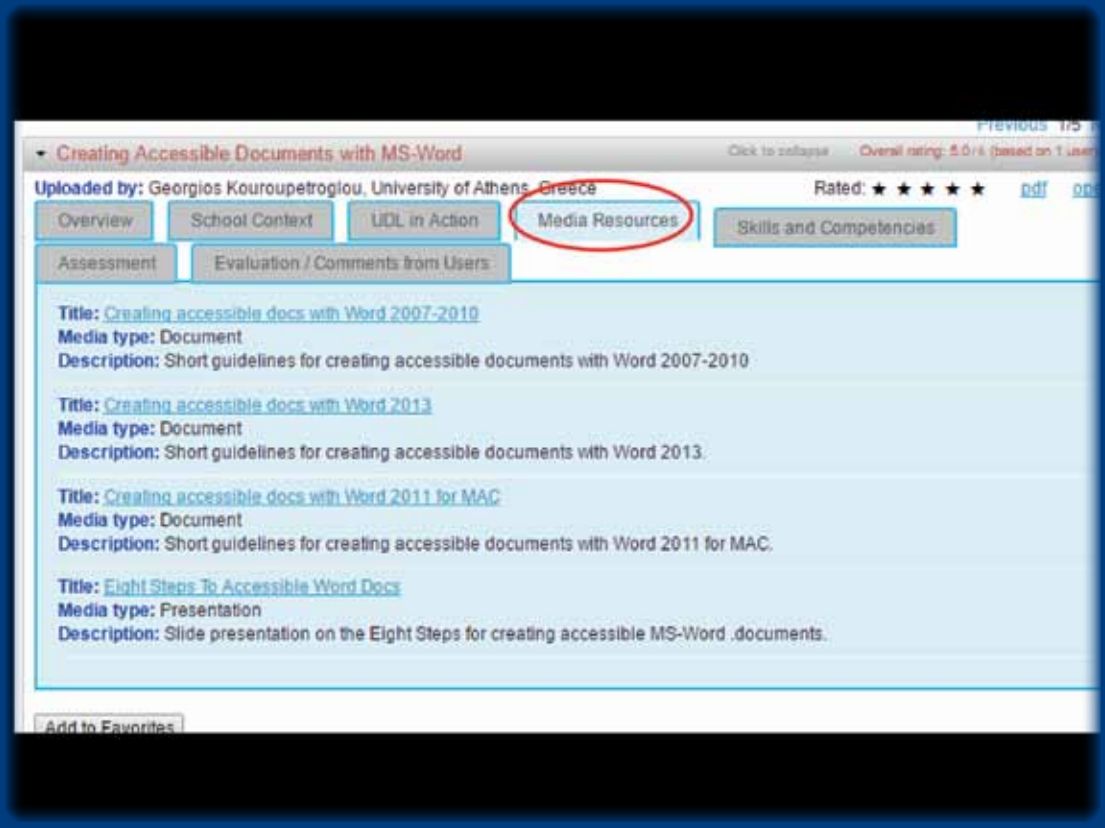
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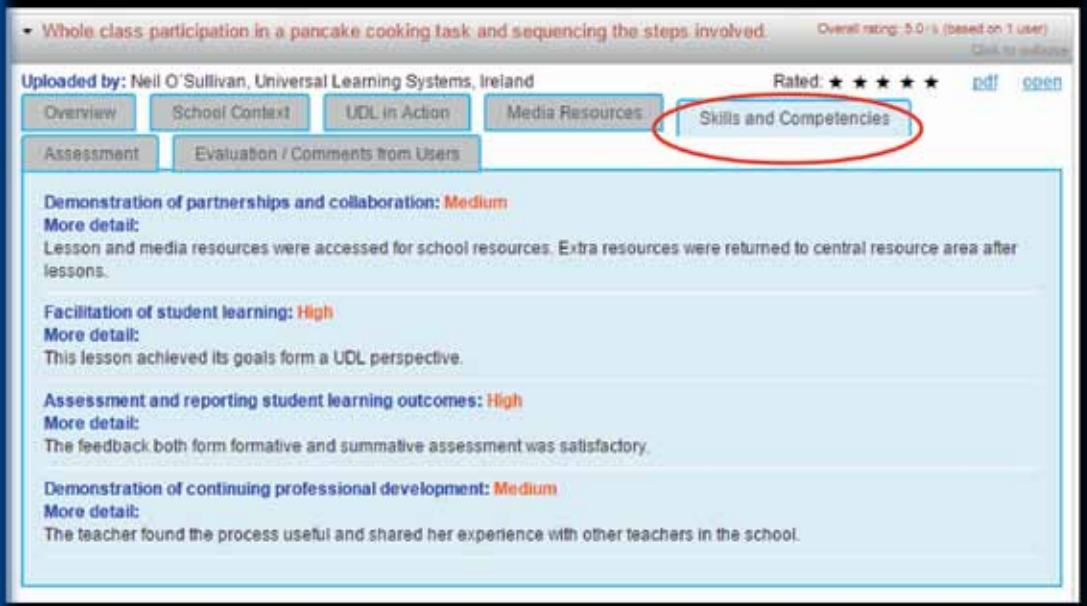




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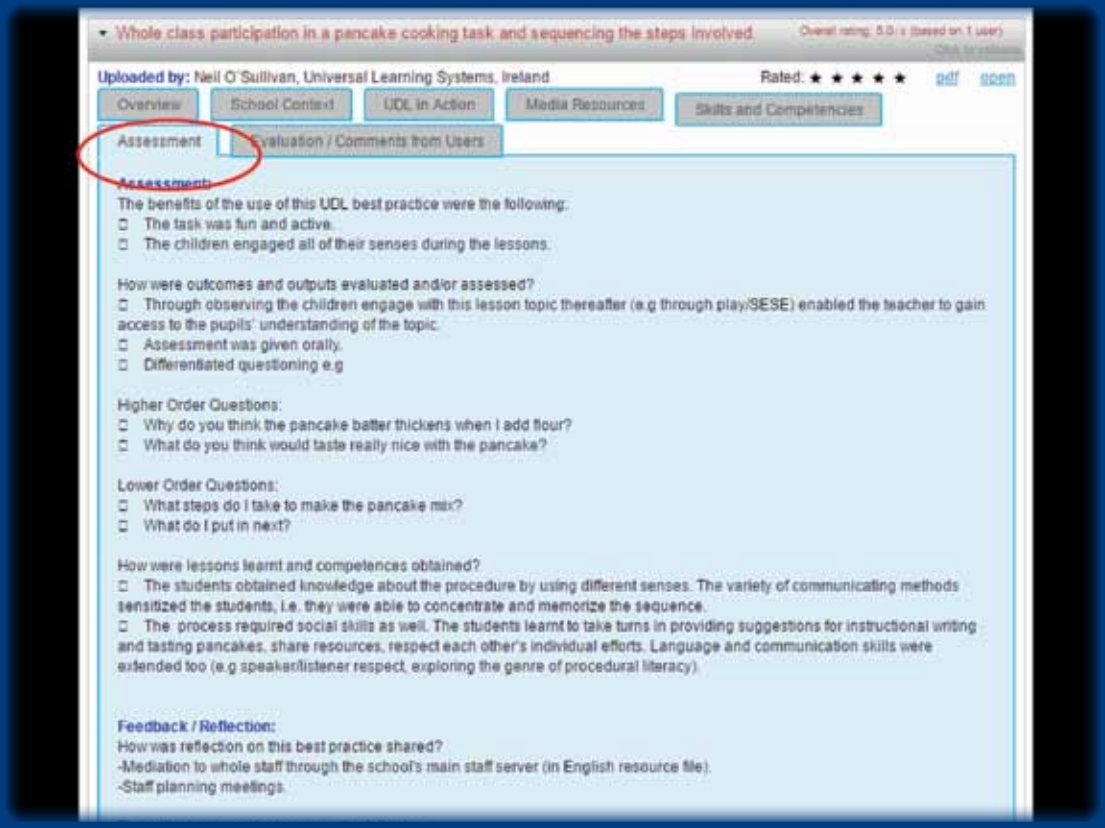
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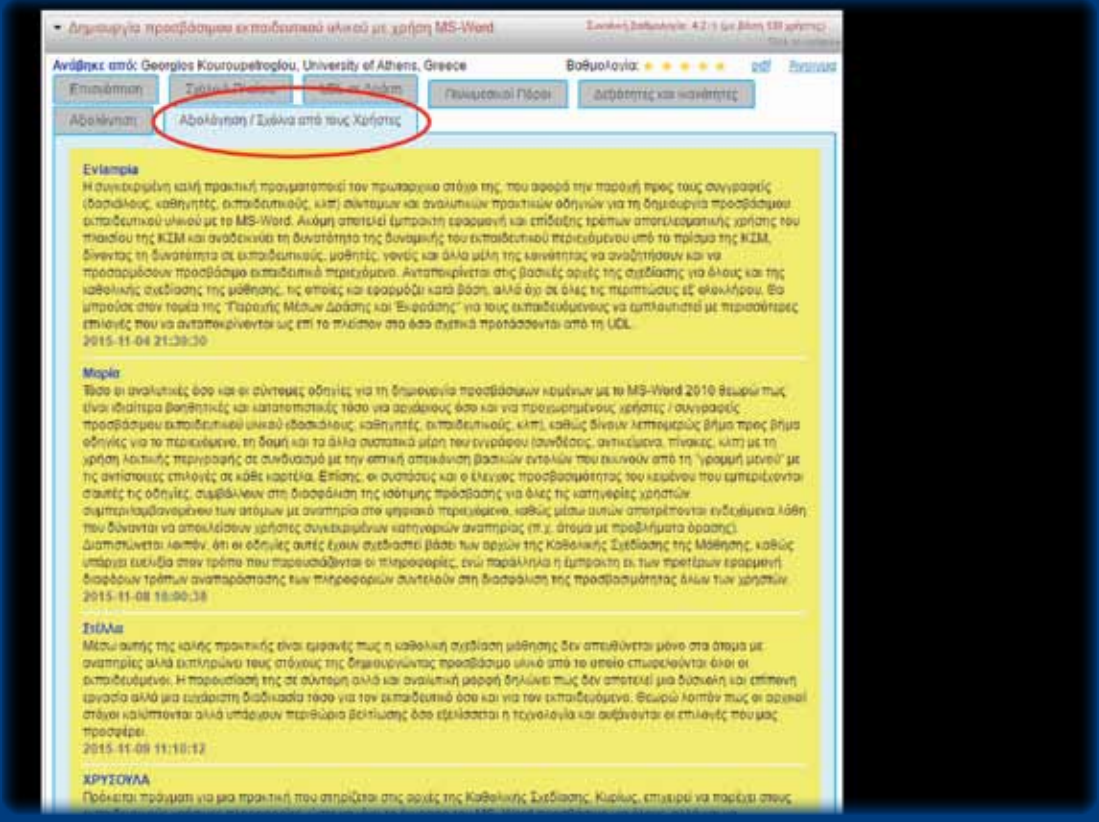




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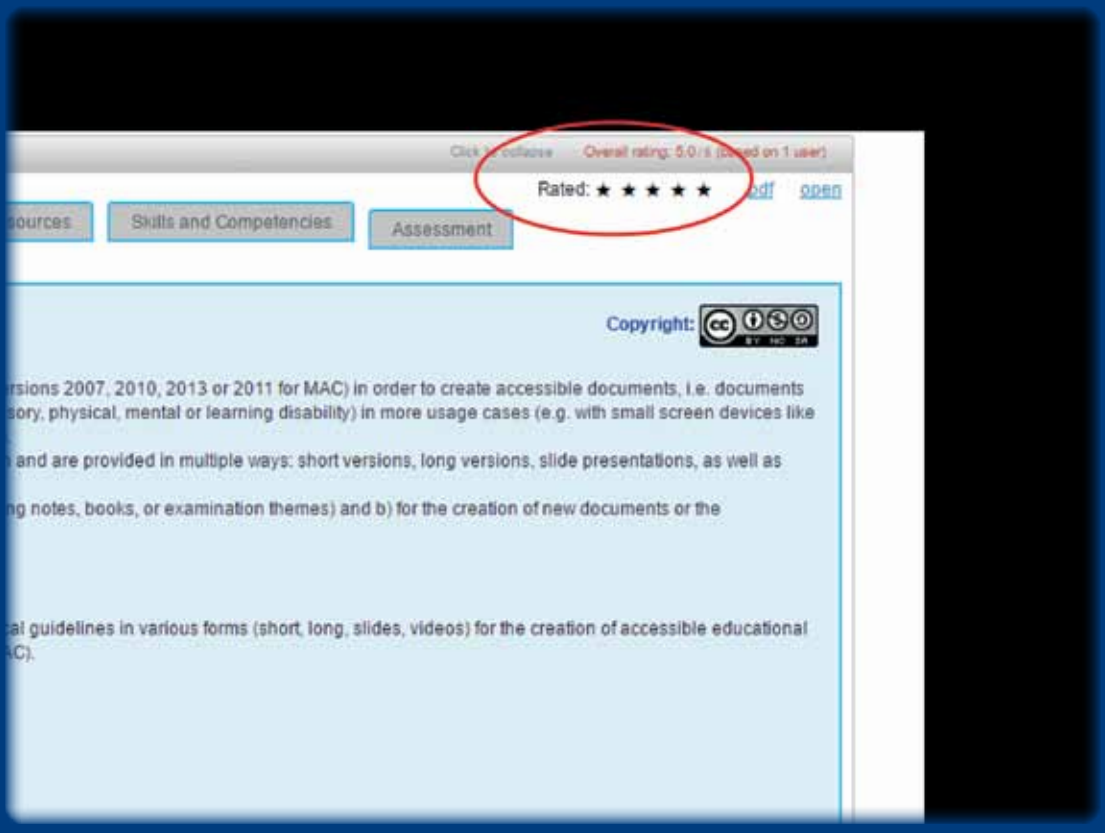
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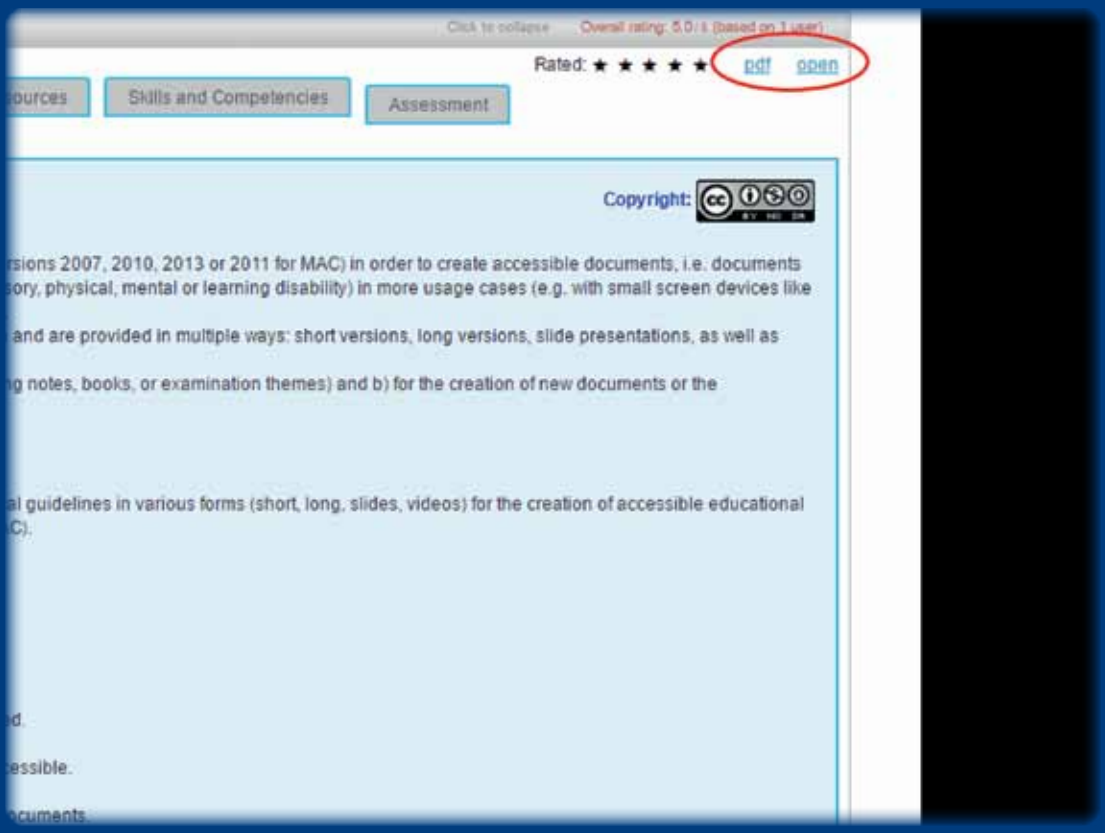




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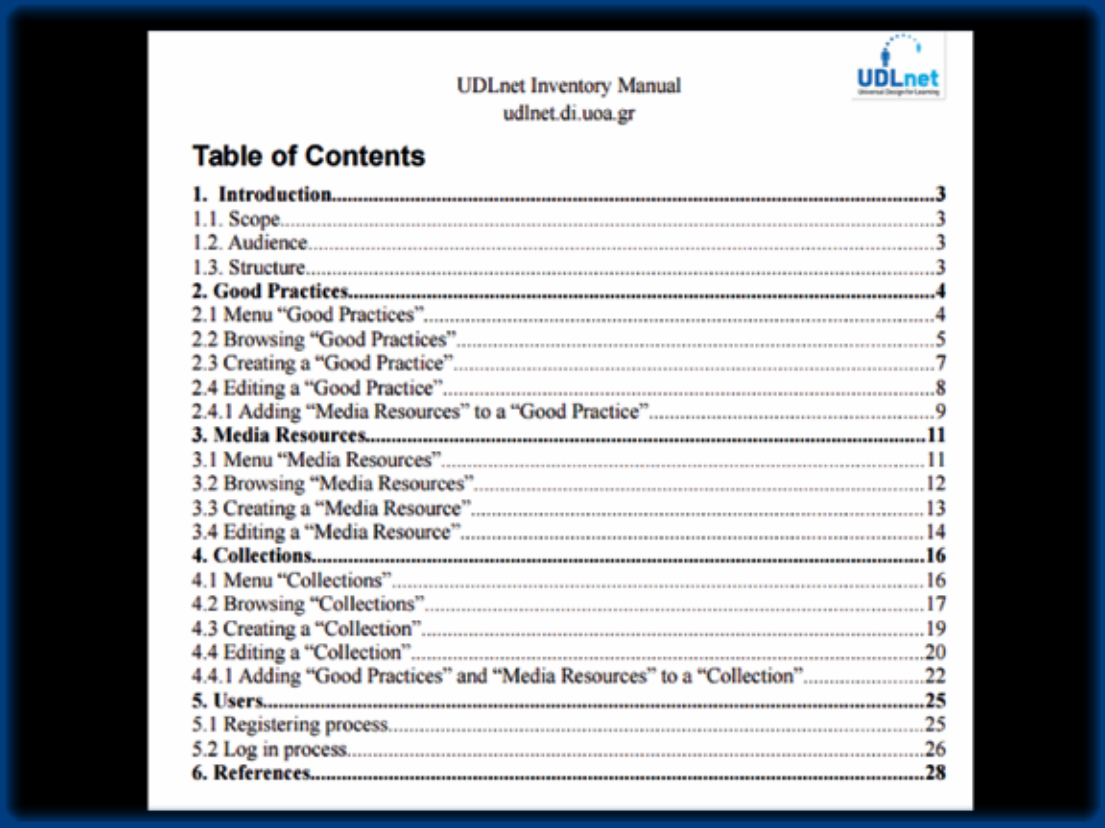
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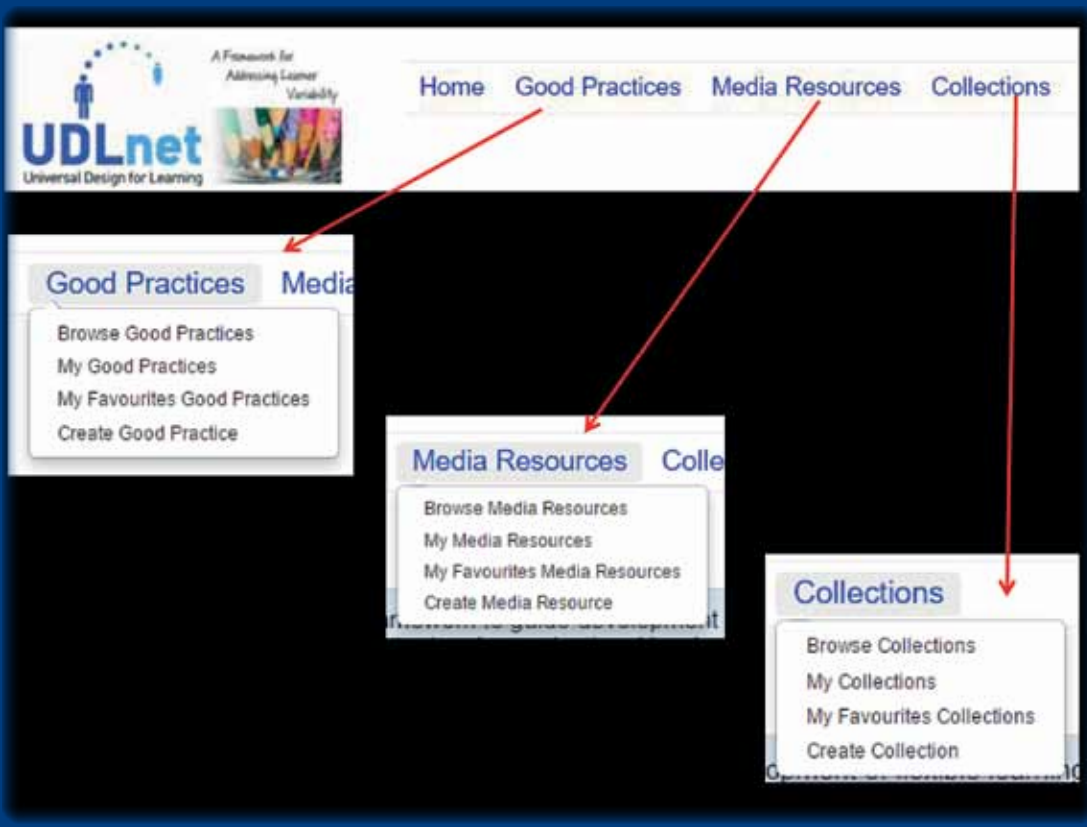
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UDLnet Inventory Manual
udlnet.di.uoa.gr

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Basic selection criteria for a UDLnet Good Practice

- transferable
- adaptable
- flexible
- effective

Other UDLnet Inventory facilities

- my UDL Good Practices
- my favorites UDL Good Practices
- my UDL Media Resources
- my favorites UDL Media Resources
- my Collections of UDL Good Practices
- my favorites collections of UDL Good Practices

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Inventory offers to the UDL newcomer

- UDL online course (*free*)
- UDL multimedia book (*free*)
- Quick reference UDL card
- Reference publication
- Link to UDL Guidelines Ver. 2.0
- **Myths and Misconceptions about UDL**

Benefits of using the UDLnet Inventory (1/2)

- Diverse UDL techniques, methods and resources available as a comprehensive and growing repository.
- Users can access and modify concrete examples of UDL Good Practices on a range of topics.
- Support and supply enough scaffolding to newbies in the field of UDL and inspire more advanced users.

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Benefits of using the UDLnet Inventory (2/2)

- Users can be connected and collaborate with peers on UDL, even for a specific Good Practice or at a national level.
- Decreasing preparation time for UDL based lessons, while keeping high quality.
- Bottom-up Continuing Professional Development.

The UDLnet Inventory of Good Practices

- has not been designed as a destination but as a forum for self-reflection and critical thinking
- it is rather an evolving space where:
  - practices > mutate, shaped and altered,
  - results > are fed back into the qualitative learning loop

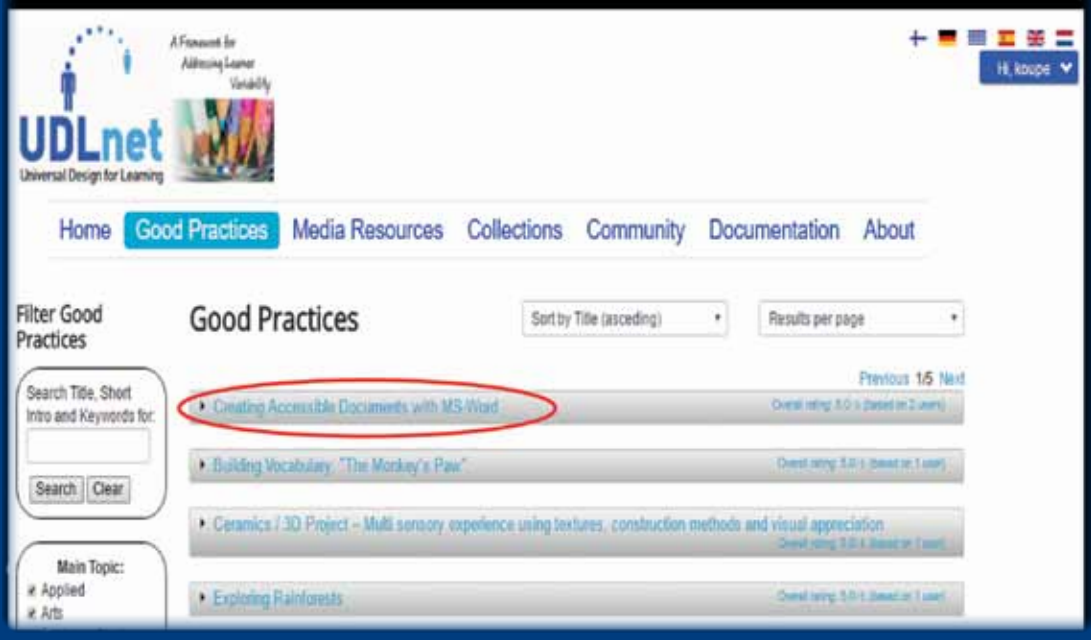
Using the UDLnet services and tools to prepare learning experiences

Prof. George Kouroupetroglou
National and Kapodistrian University of Athens, Greece

The UDLnet Inventory of Good Practices

- not static,
- a growing and dynamic space whose main purpose is to:
  - stimulate new reasoning on UDL practicies,
  - challenge existing UDL practices.

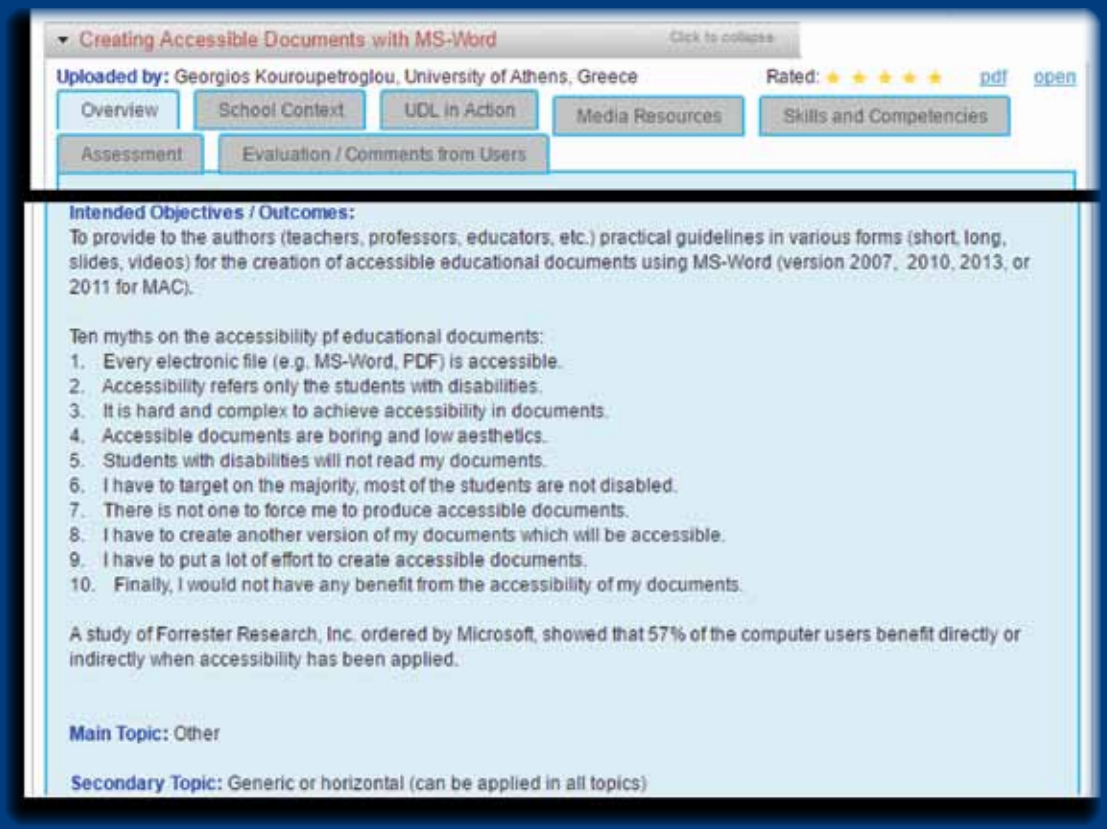
Example of a UDLnet good practice



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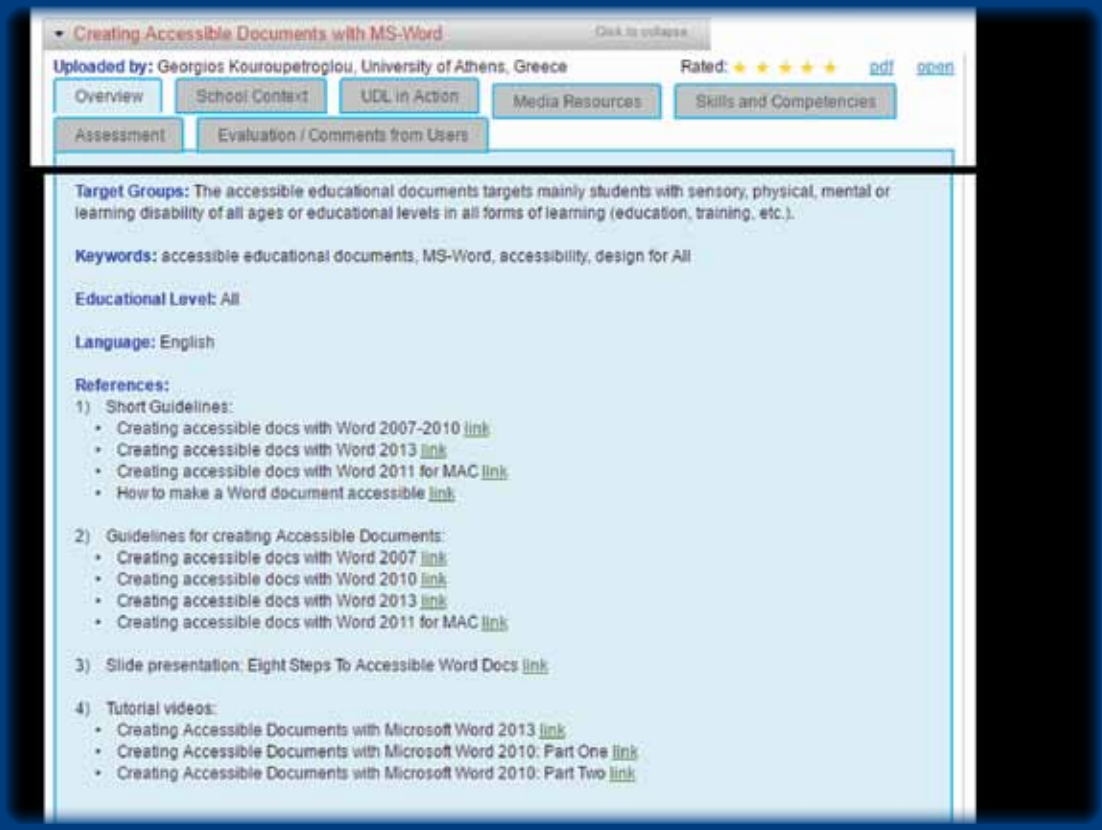
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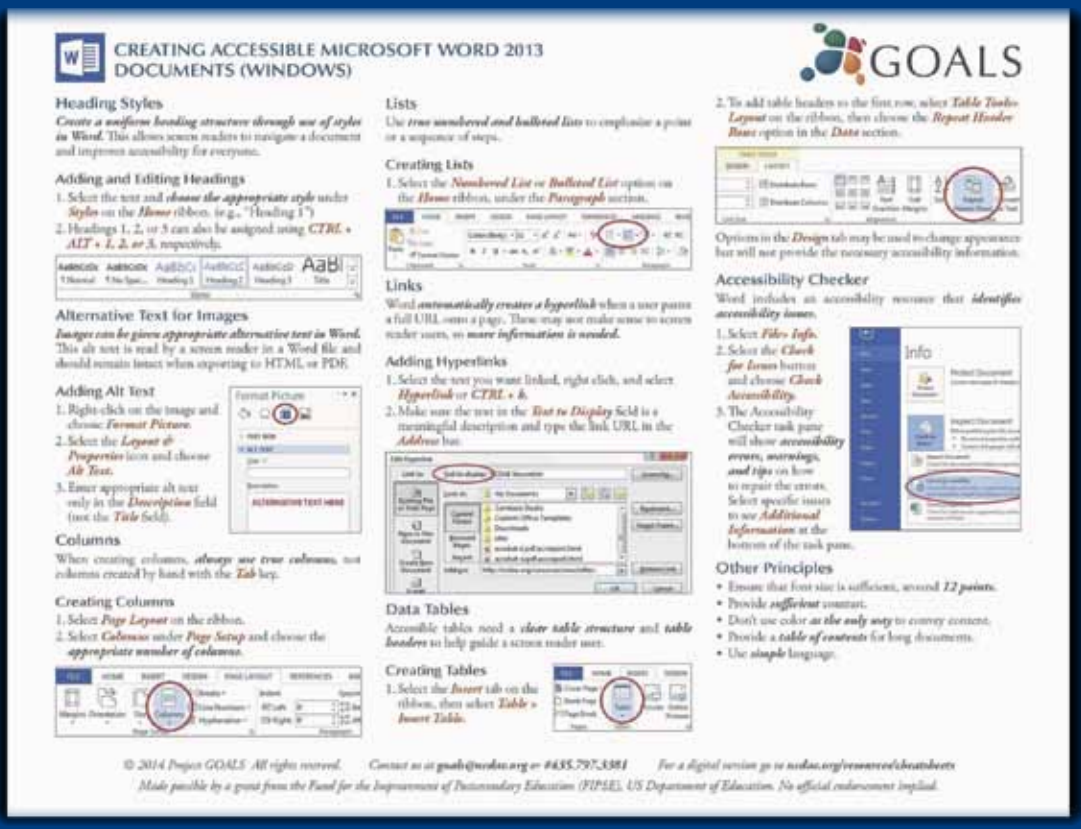




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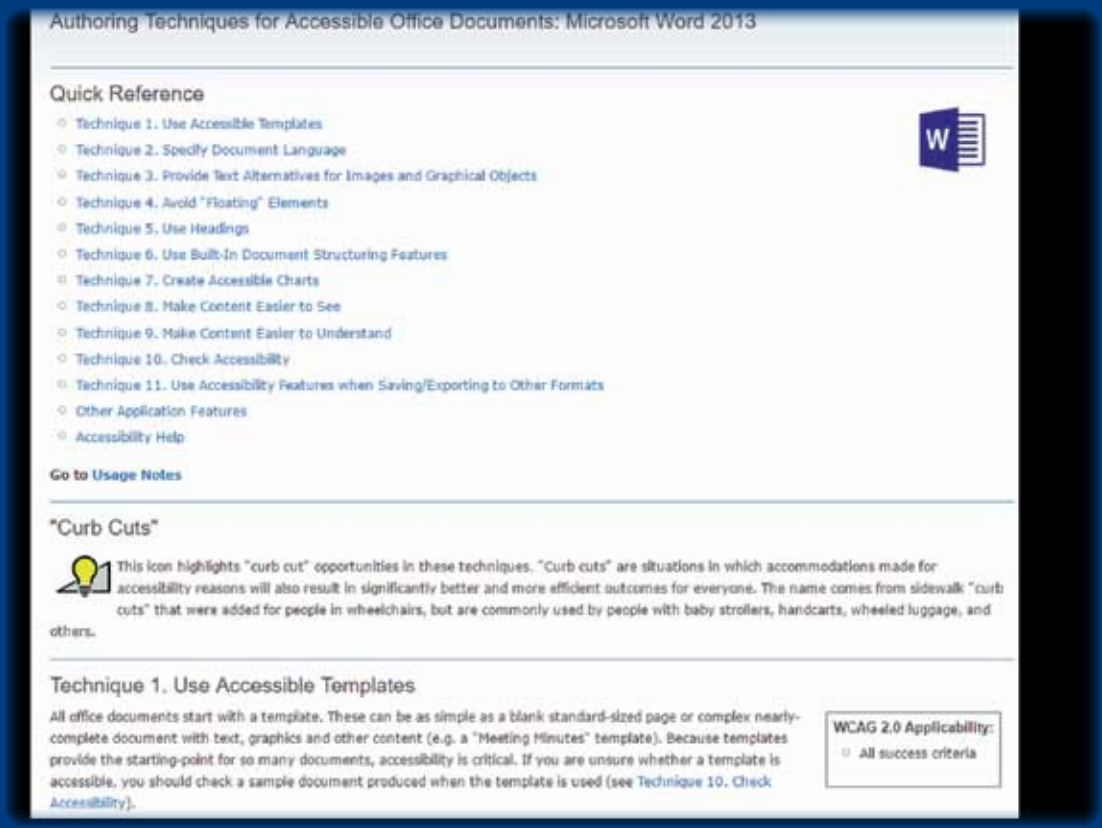
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Authoring Techniques for Accessible Office Documents: Microsoft Word 2013

Quick Reference

- Technique 1. Use Accessible Templates
- Technique 2. Specify Document Language
- Technique 3. Provide Text Alternatives for Images and Graphical Objects
- Technique 4. Avoid "Floating" Elements
- Technique 5. Use Headings
- Technique 6. Use Built-In Document Structuring Features
- Technique 7. Create Accessible Charts
- Technique 8. Make Content Easier to See
- Technique 9. Make Content Easier to Understand
- Technique 10. Check Accessibility
- Technique 11. Use Accessibility Features when Saving/Exporting to Other Formats
- Other Application Features
- Accessibility Help

Go to Usage Notes

"Curb Cuts"

This icon highlights "curb cut" opportunities in these techniques. "Curb cuts" are situations in which accommodations made for accessibility reasons will also result in significantly better and more efficient outcomes for everyone. The name comes from sidewalk "curb cuts" that were added for people in wheelchairs, but are commonly used by people with baby strollers, handcarts, wheeled luggage, and others.

Technique 1. Use Accessible Templates

All office documents start with a template. These can be as simple as a blank standard-sized page or complex nearly-complete document with text, graphics and other content (e.g. a "Meeting Minutes" template). Because templates provide the starting-point for so many documents, accessibility is critical. If you are unsure whether a template is accessible, you should check a sample document produced when the template is used (see Technique 10. Check Accessibility).

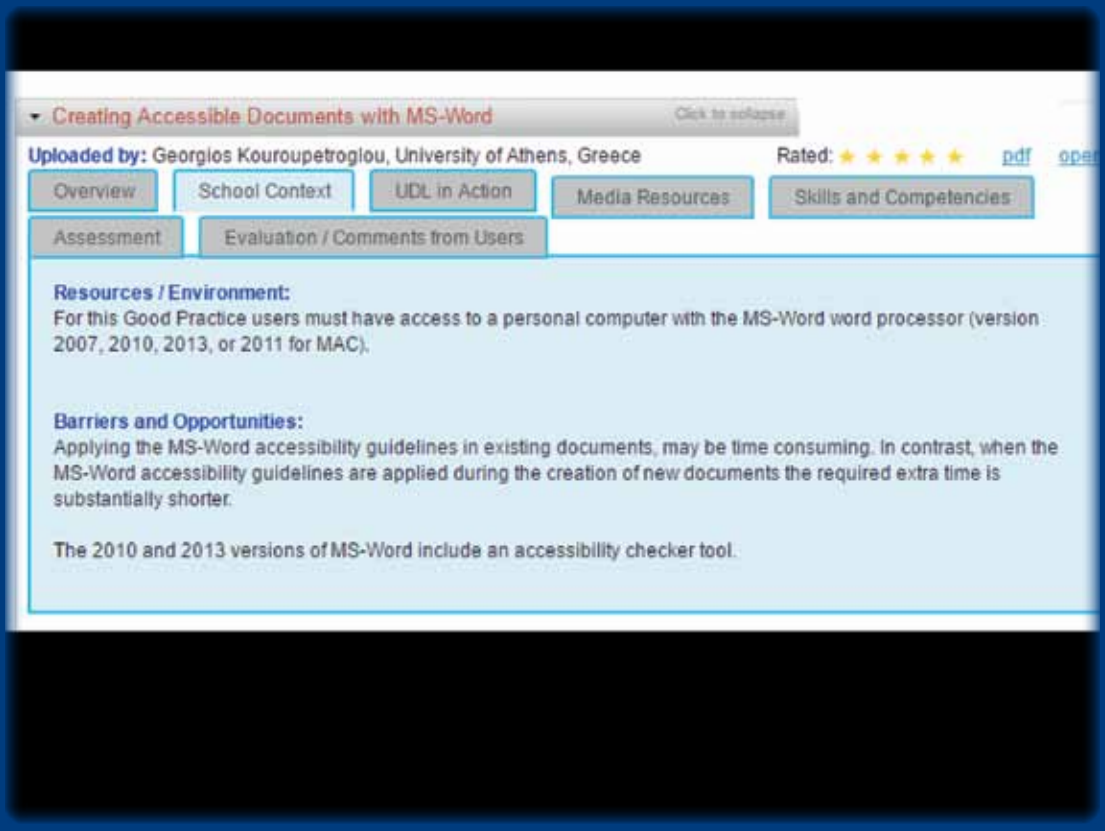
WCAG 2.0 Applicability:
- All success criteria



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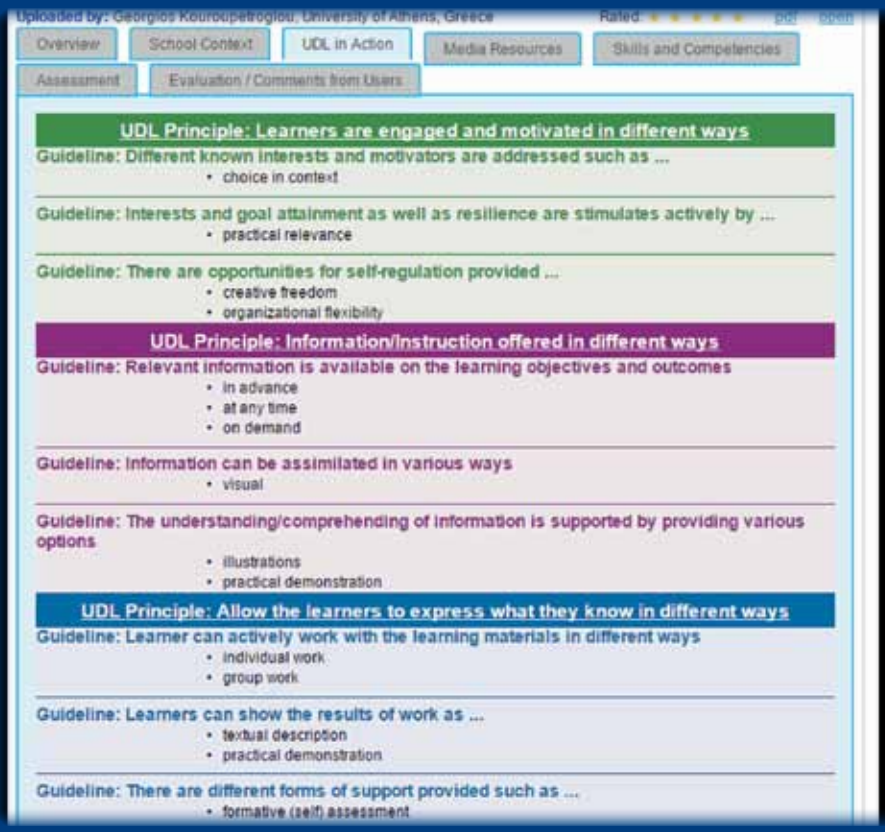
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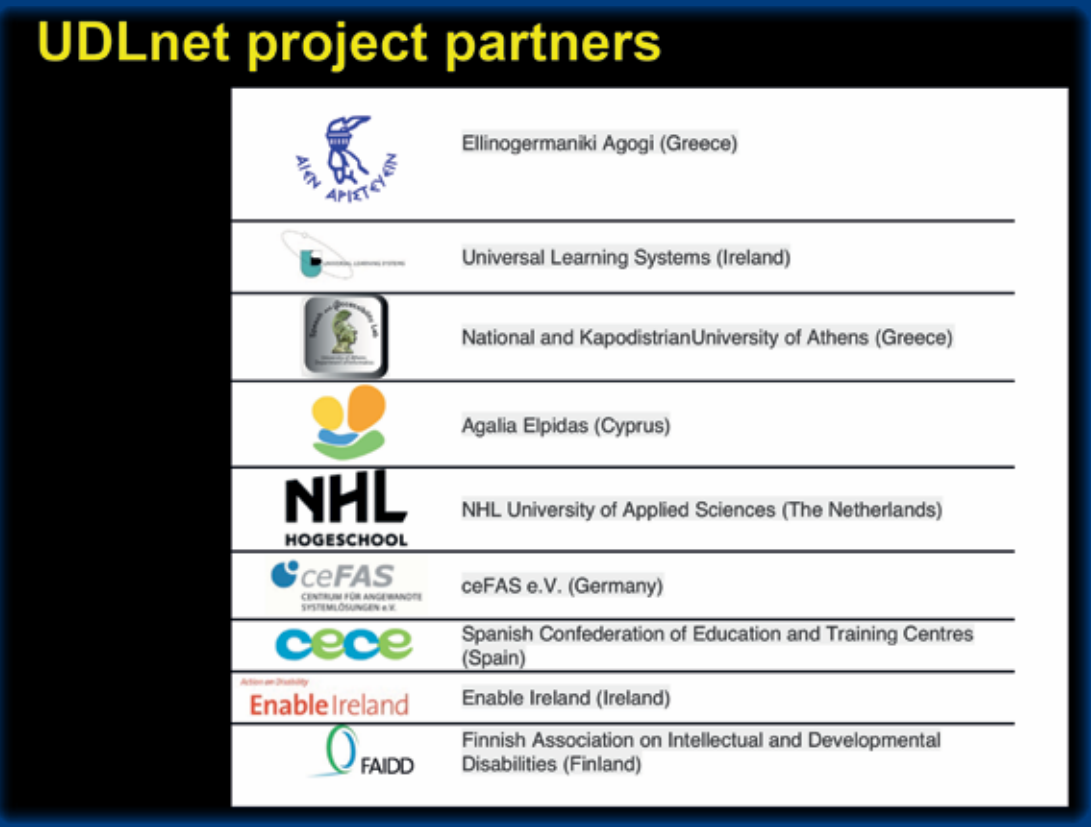




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Stephanie Cloonan, ***Enable Ireland***

UDLnet
Universal Design for Learning

Reference Card Workshop

enable ireland

Dr. Gabriele Lau, ceFAS Germany
Stephanie Cloonan, Enable Ireland

Ellinogermaniki Agogi
05 November 2016

Class Room Management - UDLnet



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UDLnet Consortium

- 9 Project Partners across 7 EU countries
  - Greece, Ireland, Cyprus, Germany, The Netherlands, Spain & Finland
- Our website: udlnet-project.ea.gr/
- Our Inventory: udlnet.di.uoa.gr/
- Our Community: @portal.opendiscoveryspace.eu/

In summary UDLnet is

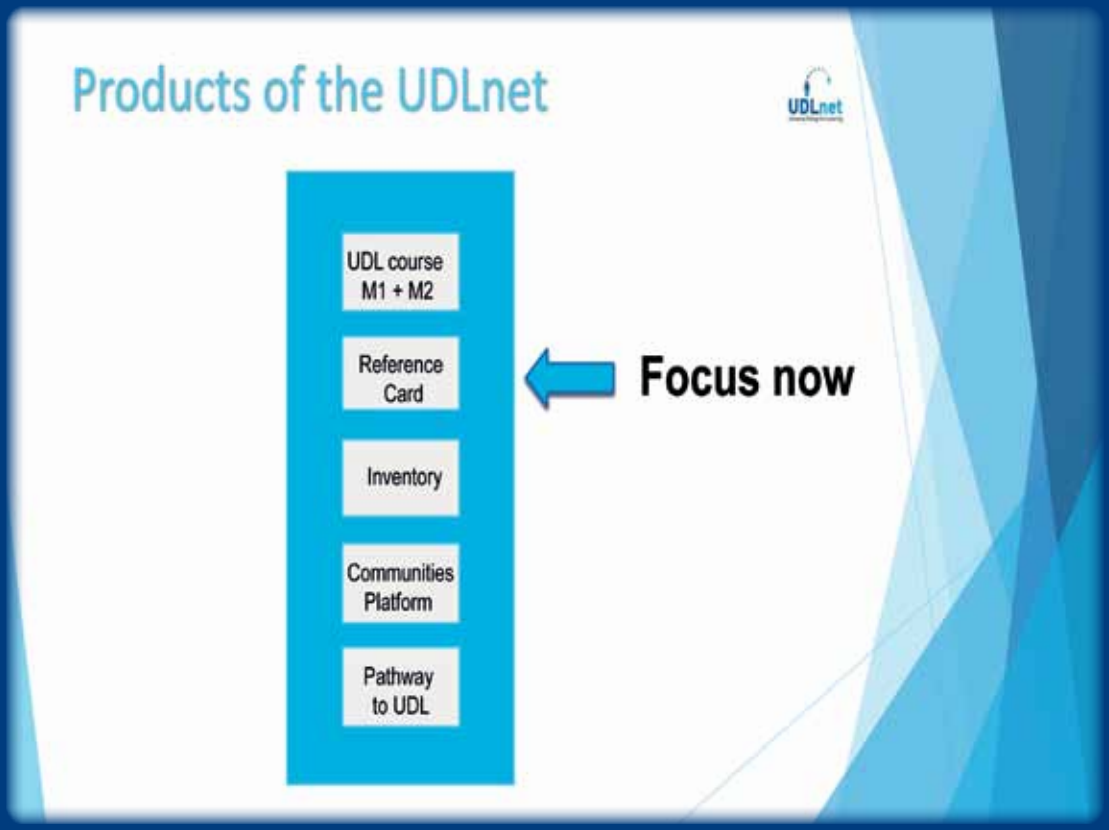


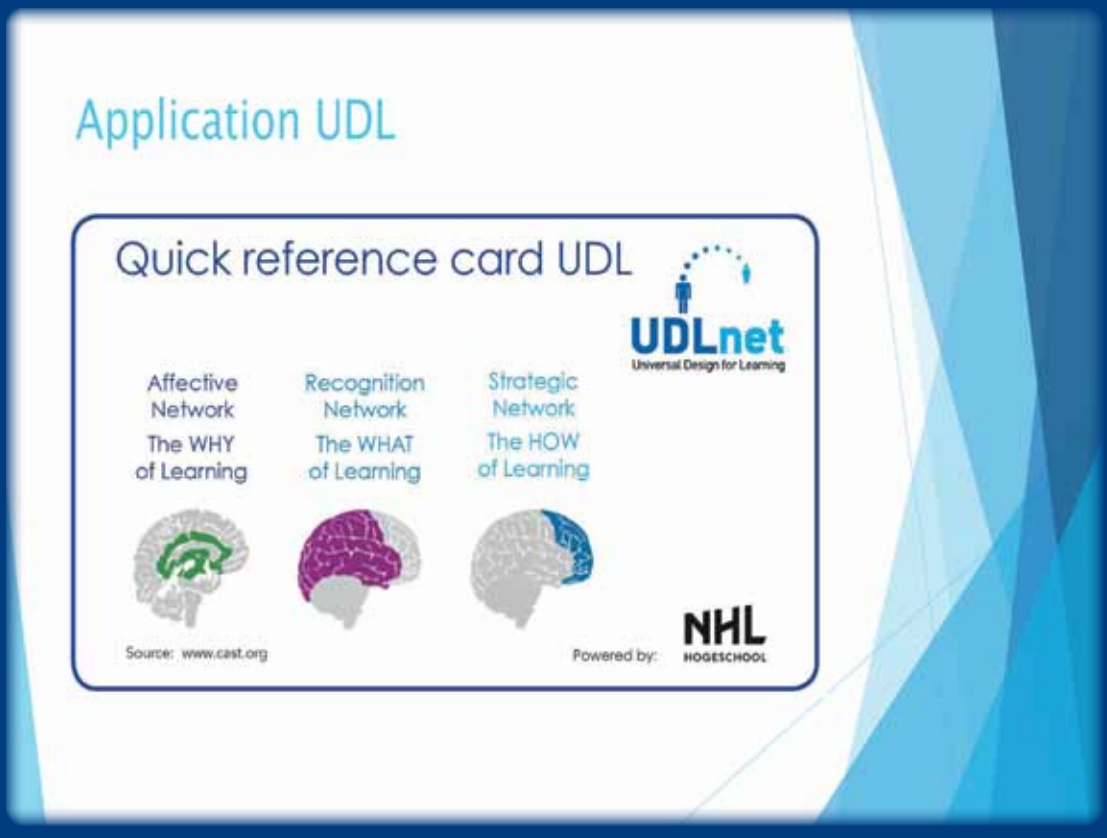
- A network that brings together:
  - Educators
  - Learners
  - Stakeholders
- A network that offers a platform for:
  - Exchange of good practices
  - Sharing resources
  - Continued professional development
- A network that publishes and promotes:
  - Publications
  - Research
  - Webinars

(Enable Ireland & UILS, Workshop 2015)

Using the UDLnet services and tools to prepare learning experiences

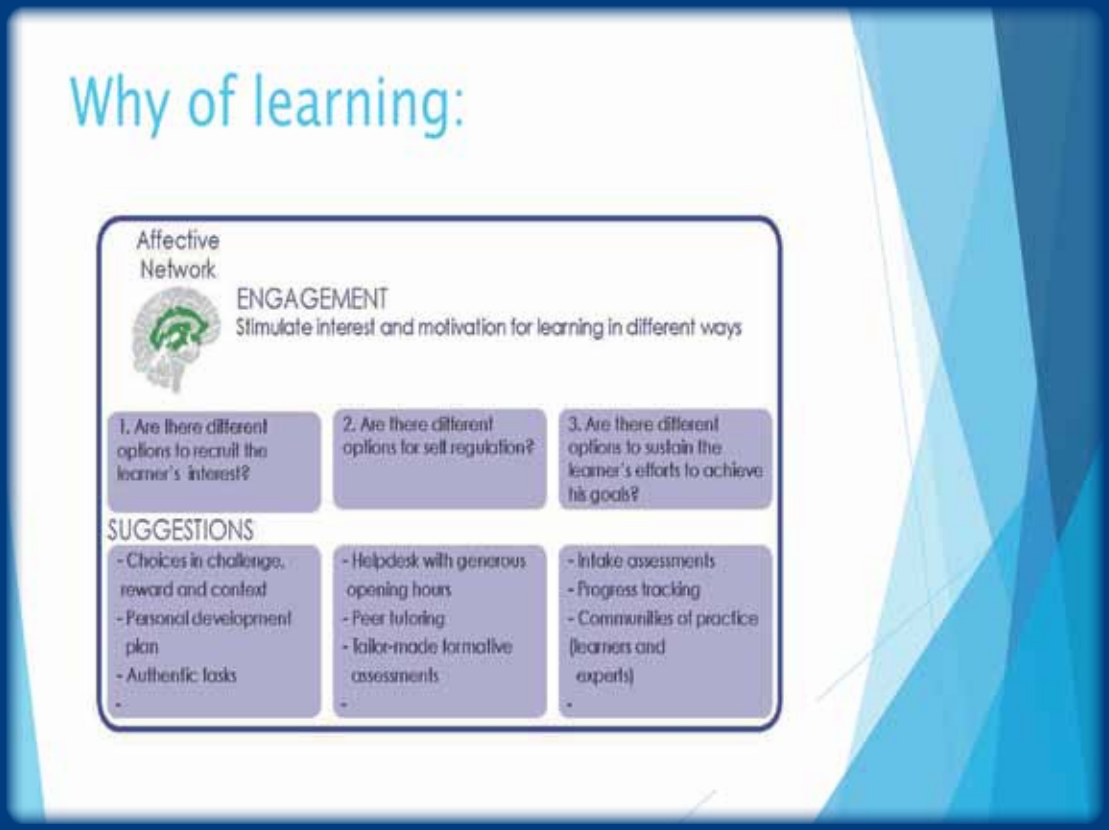
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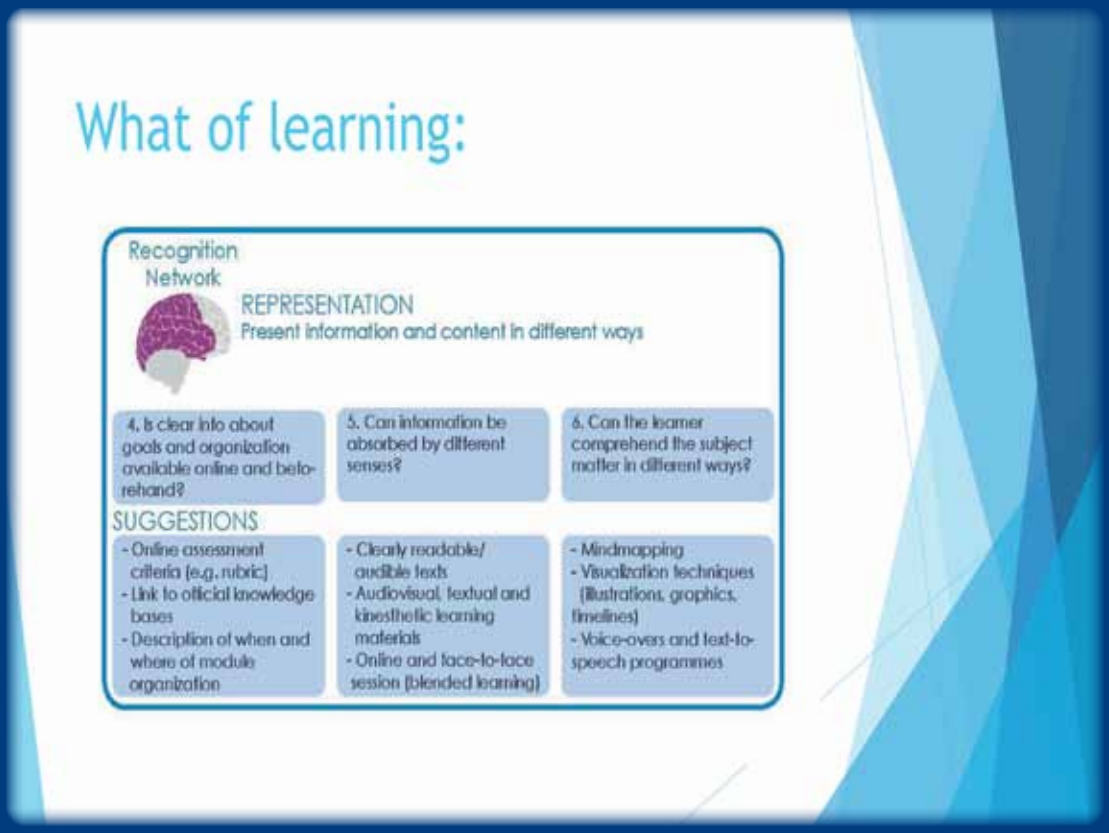




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How of learning:

Strategic Network

ACTION AND EXPRESSION
Differentiate the ways that learners can express what they know

7. Can the learner work actively with the subject matter in different ways?	8. Can the learner show what he has learned or achieved in different ways?	9. Are there various options for goal-setting and prioritizing?
SUGGESTIONS		
- Differentiated group work - Gamification and serious games - Interactive and responsive software (Socrative, Kahoot etc.)	- Formative and summative testing - Formal presentations and simulations, games or drama - Article writing, group presentations	- Tailor-made mentoring and tutoring - Timely and specific feedback - Scaffolding

Good Practice & Reference Card

UDLnet



History Lesson

The Role of the King in the French Revolution

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Stephanie Cloonan, ***Enable Ireland***

Goal: Understand the role of the King during the French Revolution

Things to remember: How do we manage diversity? Need to understand students

Questions for student: 1) what can I do best?
2) How can I illustrate my strengths?

Role of the teacher: Act as manager / mentor / coach to all learners

****Students know they have to choose one of the tasks according to their interests and abilities of speaking, writing or role play.*

The Why

Affective Network



- Motivation (learner feedback)
- This kind of presentation allows the learner engage with modern learning techniques versus traditional lecture teaching styles
- Learners can contribute their own strengths and feel much more confident
- The game-like effect supports the engagement and is at the same time an additional input of emotional and social competences in the overall performance.

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The What

Recognition Network



Students have choice for the types of materials used and location of sources

- Books in the library
- Information via internet
- CD and documentaries available from school library
- Hand-outs prepared by the teacher

The How

Strategic Network



Create a fictional dialogue between Louis XVI and his wife Marie Antoinette in prison reflecting and assessing their political lives and actions - **role play**

Make a timeline showing the major events in king's life - **poster or power point**

Write an article for a wide spread newspaper the day before the execution - **text on paper**

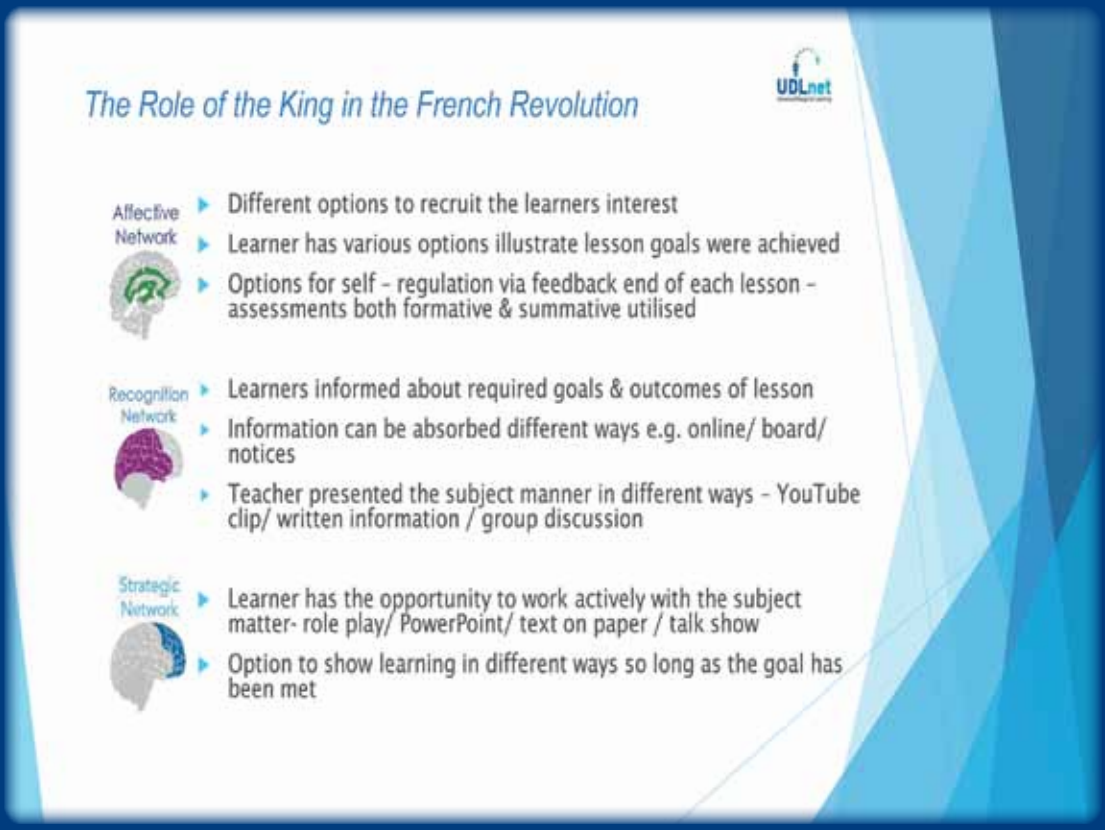
Act out a talk between a peasant, an aristocrat, a rich citizen, a clergy man - **hosted talk show**

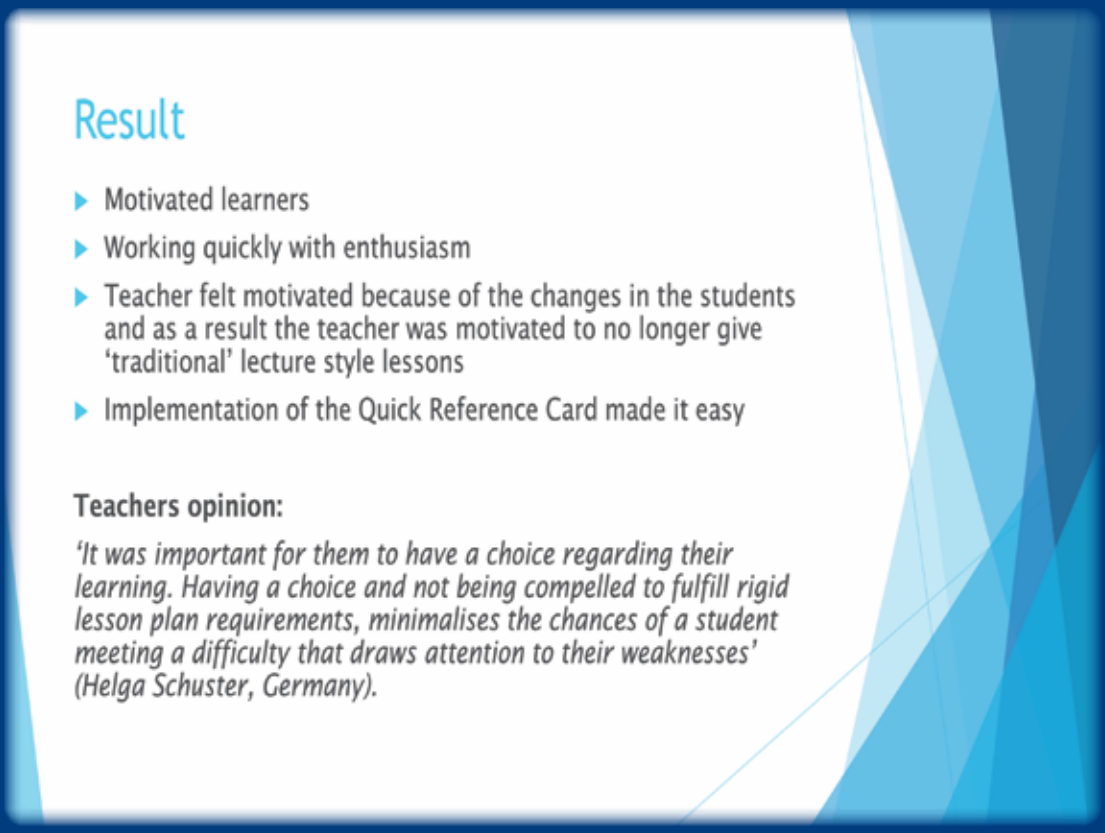
Work out a profile of Louis XVI based on your knowledge and written sources of biographical information (Template) - **structured description**

For more see the inventory www.udlnet.di.uoa.gr

Using the UDLnet services and tools to prepare learning experiences

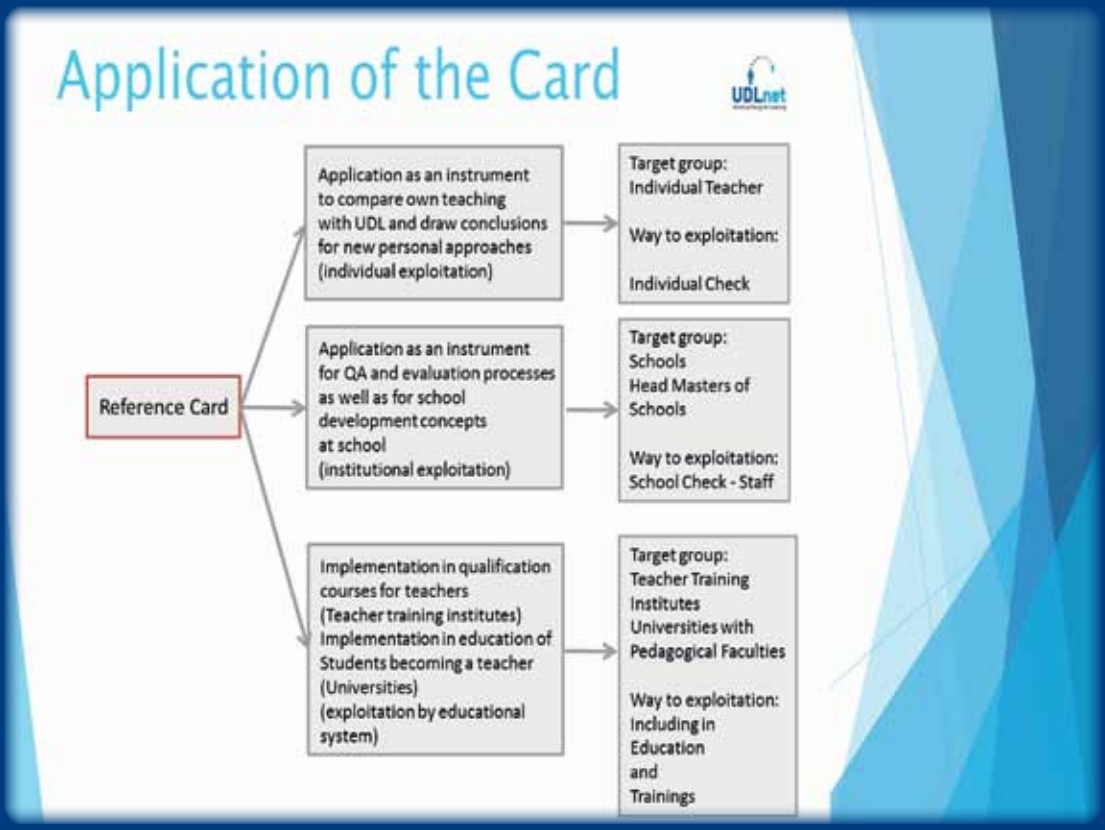
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UDLnet

UDLnet

Inventory



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Promoting prosocial skills through games

Dr. Lilia Dimaraki
Ellinogermaniki Agogi





Promoting prosocial skills through games

Σχεδιάζοντας παιγνίδια για την καλλιέργεια της προκοινωνικότητας

Τι είναι η προκοινωνικότητα;

- Μια πράξη είναι προκοινωνική όταν επικεντρώνεται στο κοινό καλό, στην ευημερία της κοινωνικής ομάδας, και όχι στο στενό ατομικό συμφέρον
- Η προκοινωνικότητα περιλαμβάνει καθημερινές πρακτικές όπως: αλτρουισμός, πνεύμα συνεργασίας, ενδιαφέρον για τους άλλους, βοήθεια, συμπαράσταση, συμπόνια
- Η προκοινωνικότητα είναι επιλογή, ανεξάρτητα από το αν θα είναι επωφελής για το ίδιο το άτομο
- Βοηθάς, μοιράζεσαι, παρηγορείς, συνεργάζεσαι γιατί αυτό συνιστά αυταξία, όχι γιατί περιμένεις ανταπόδοση ή ανταμοιβή

Προκοινωνικός ≠Αντικοινωνικός

2

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Τομείς Προκοινωνικότητας: Ενσυναίσθηση και Συμπόνια



Ενσυναίσθηση (Empathy)

Πώς μπορώ να αναγνωρίσω τα συναισθήματα και τις εμπειρίες των άλλων, να μπω στη θέση τους και να ανταποκριθώ με ευαισθησία;

Ευσπλαχνία- Συμπόνια (Compassion)

Μπορώ να αποφύγω την υπερβολική αυστηρότητα και κριτική, αναγνωρίζοντας ότι τα λάθη και οι αποτυχίες είναι κοινή ανθρώπινη εμπειρία;

Πώς εκφράζω στους άλλους τη συμπαράστασή μου; τι κάνω για να ελαφρύνω τις δυσκολίες που αντιμετωπίζουν;

Μπορώ να μάθω να δέχομαι τη συμπόνια των άλλων και να δείχνω συμπόνια στον εαυτό μου, όταν κάνω λάθη ή όταν αντιμετωπίζω την αποτυχία;

3

Τομείς Προκοινωνικότητας: Εμπιστοσύνη και Συνεργασία



Εμπιστοσύνη (Trust)

Πώς κρίνω πότε και ποιον να εμπιστευτώ;

Πώς μπορώ να γίνω εγώ άξιος εμπιστοσύνης;

Συνεργασία (Cooperation)

Πώς αναπτύσσω κοινούς στόχους με άλλους ανθρώπους;

Πώς σχεδιάζω μαζί με άλλους την επίτευξη κοινών στόχων;

Πώς συντονίζω τις ενέργειές μου με άλλους για την ολοκλήρωση μιας δύσκολης εργασίας;

4

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Τομείς Προκοινωνικότητας: Δικαιοσύνη και Γενναιοδωρία



Δικαιοσύνη-Αίσθημα Δικαίου (Fairness)

Πώς κάνω δίκαια μια μοιρασιά ή έναν καταμερισμό εργασίας;

Πώς αντιδρώ όταν βρεθώ αντιμέτωπος με άδικη μεταχείριση απέναντι σε μένα ή σε άλλους;

Πώς διεκδικώ μια δίκαιη λύση;

Γενναιοδωρία (Generosity)

Μπορώ να μάθω να μοιράζομαι πολύτιμα υπάρχοντά μου;

Μπορώ να προσφέρω κάτι (δώρο, χρόνο, βοήθεια), χωρίς να περιμένω αντάλλαγμα;

Μπορώ να υποστηρίζω τους άλλους στην προσπάθεια τους να πετύχουν, χωρίς εγωιστικό κίνητρο;

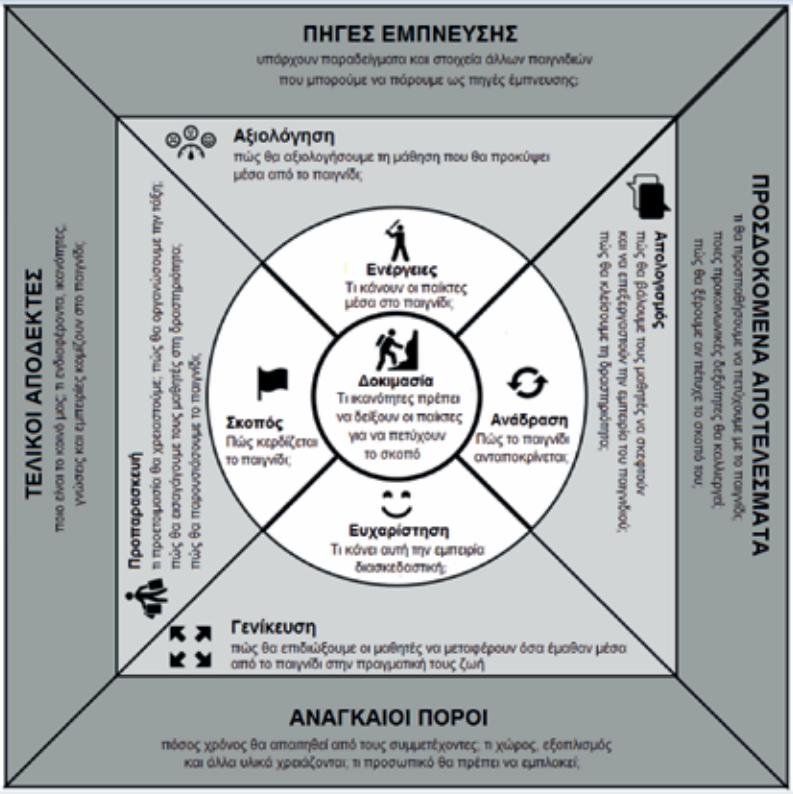
Μπορώ να μάθω να δέχομαι τη γενναιοδωρία των άλλων;

5

	Ενδεικτικοί Μαθησιακοί στόχοι	Ενδεικτικά Στοιχεία Παιγνιδιού
Εμπιστοσύνη (Trust)	δείχνουν εμπιστοσύνη με βάση την ειλικρίνεια, την καλοσύνη και την αξιοπιστία των άλλων αξιολογούν αν η δική τους συμπεριφορά (ειλικρίνεια, καλοσύνη, αξιοπιστία) αξίζει την εμπιστοσύνη μπορούν να εμπιστευτούν τους άλλους για την επίτευξη κοινών στόχων	η εμπιστοσύνη είναι αναγκαία για την ολοκλήρωση του παιγνιδιού (π.χ. συμμαχίες, ανταλλαγές κλπ) ο παίκτης πρέπει να αποφασίσει σε ποιον θα αναθέσει κάτι, αν θα πιστέψει κάτι ή ποιον θα πιστέψει το παιγνίδι δίνει στοιχεία στο παίκτη για να κρίνει την αξιοπιστία κάθε χαρακτήρα που συναντά οι παίκτες κερδίζουν ή χάνουν εμπιστοσύνη ανάλογα με τη συμπεριφορά τους μέσα στο παιγνίδι
Συνεργασία (Cooperation)	επιλέγουν να κάνουν μια εργασία μαζί με τους άλλους και όχι μόνοι τους φροντίζουν για την επιτυχία του συνόλου και όχι μόνο τη δική τους επιλύουν διαφωνίες και καταλήγουν σε συμφωνία για τους στόχους και τα μέσα μιας κοινής προσπάθειας κάνουν καλό καταμερισμό εργασίας και πόρων για την επίτευξη ενός σκοπού συνεισφέρουν στο κοινό καλό	παιγνίδια μεταξύ ομάδων: συνεργασία μέσα στην ομάδα και συναγωνισμός με την 'αντίπαλη' ομάδα οι παίκτες πρέπει να συνεννοηθούν και να συγχρονιστούν για να προχωρήσει το παιγνίδι «κοινό ταμείο» πόρων και αγαθών: συμβάλλουν, για να μπορούν να πάρουν όταν έχουν ανάγκη αλληλεξάρτηση: η επιτυχία ενός παίκτη εξαρτάται από την επιτυχία των άλλων, π.χ. όλοι οι παίκτες χάνουν βαθμούς αν κάποιος μείνει πολύ πίσω κάθε παίκτης έχει από ένα κομμάτι της λύσης και πρέπει να συμφωνήσουν να τα μοιραστούν συνεργατική ανάπτυξη ιστορίας, π.χ. παιγνίδι ρόλων

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Τι παιγνίδι θα σχεδιάσουμε;

επιτραπέζιο παιγνίδι

παιγνίδι στο φυσικό χώρο

παιγνίδι με αντικείμενα ή κατασκευές

ψηφιακό παιγνίδι

ποια είδη παιγνιδιών ξέρουμε;

8

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Στοιχεία του Παιγνιδιού

- κατάσταση - πλαίσιο δράσης
- σκοπός- αποστολή
- κανόνες

πλήθος και ρόλοι των παικτών

συνθήκη τέλους

διάρκεια και επανάληψη

υλικά και αντικείμενα

επίπεδα δυσκολίας

αφήγηση και φαντασία

9

Ανταλλαγή

Μηχανισμοί Παιγνιδιού

Οι παίκτες ανταλλάσουν πόρους, δυνάμεις και άλλα στοιχεία του παιγνιδιού, είτε μεταξύ τους είτε με το παιγνίδι



1. Έχει το παιγνίδι στοιχεία που μπορούν να γίνουν αντικείμενο ανταλλαγής;

2. Τι είδους πόροι μπορούν να γίνουν αντικείμενο ανταλλαγής; Έχουν συγκεκριμένη ανταλλακτική ισοτιμία; Αν υπάρχει διαφορετική κατανομή πόρων μεταξύ των παικτών από την αρχή του παιγνιδιού, αυτό μπορεί να είναι κίνητρο για ανταλλαγές

Μεταβίβαση

Μηχανισμοί Παιγνιδιού

Ο παίκτης έχει τη δυνατότητα να δώσει ένα αντικείμενο, μια ενέργεια ή μια δύναμη σε κάποιον άλλο παίκτη



1. Έχει το παιγνίδι στοιχεία όπως πόρους και δυνάμεις που μπορούν να μεταφερθούν από τον έναν παίκτη στον άλλο;

2. Ποιος ελέγχει τι αποκτά κάθε παίκτης; Το ίδιο το παιγνίδι καθορίζει τι καταφέρνει να αποκτήσει κάθε παίκτης π.χ. νέες δυνάμεις, μονάδες κλπ. Οι παίκτες μοιράζονται αυτά που έχουν, π.χ. με τη μορφή ανταλλαγών, δωρεών κλπ. Μπορούν να γίνουν διάφοροι συνδυασμοί

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Ζωγραφικός Σαλίγκαρος

Τεχνικές Απολογισμού

Επιτρέπει στους μαθητές να εκφράσουν τις σκέψεις, τις ιδέες και τα συναισθήματά τους για το θέμα με δημιουργικό τρόπο



1. Ερώτημα. π.χ. «πώς θα ζωγράφιζες τους φόβους σου;»

2. Ο καθένας διαλέγει μια ελεύθερη θέση πάνω στο σαλιγκάρι με τα λευκά χαρτιά, και ζωγραφίζει κάτι που αντιπροσωπεύει τις σκέψεις και τα συναισθήματά του.

Περιστρεφόμενος κύκλος

Τεχνικές Απολογισμού

Καλλιεργεί την επικοινωνιακή αυτοπεποίθηση



1. Χωρίστε τους μαθητές σε δύο ομάδες. Διαλέξτε το θέμα από το μάθημα που προηγήθηκε

2.. Η μία ομάδα είναι ο εσωτερικός κύκλος και κοιτάζουν προς τα έξω και η άλλη ο εξωτερικός και κοιτάζουν προς τα μέσα. Οι μαθητές έτσι βρίσκονται να κοιτάζονται σε ζευγάρια. Το κάθε ζευγάρι συζητάει το θέμα για ένα λεπτό και μετά ο εσωτερικός κύκλος περιστρέφεται κατά μία θέση και τα ζευγάρια αλλάζουν. Η διαδικασία επαναλαμβάνεται και τα ζευγάρια αλλάζουν πολλές φορές.

παιγνίδι & μάθηση

σύνδεση της γνώσης με ένα πλαίσιο δράσης

απορρόφηση
διάρκεια
ένταση

βιωματικότητα
ταυτότητα
κοινότητα

στόχοι
κίνητρα
νόημα

υψηλή πρόκληση
ασφαλής αποτυχία

φανταστικές συνθήκες
διαφορετικές οπτικές

δραματικότητα
συναίσθημα

παιγνιώδης
διερεύνηση

συναγωνισμός
και συνεργασία

σύνθετα προβλήματα
σύνθετα συστήματα

12

Promoting prosocial skills through games

Dr. Lilia Dimaraki
Ellinogermaniki Agogi

Προκοινωνικότητα: μαθαίνουμε για...

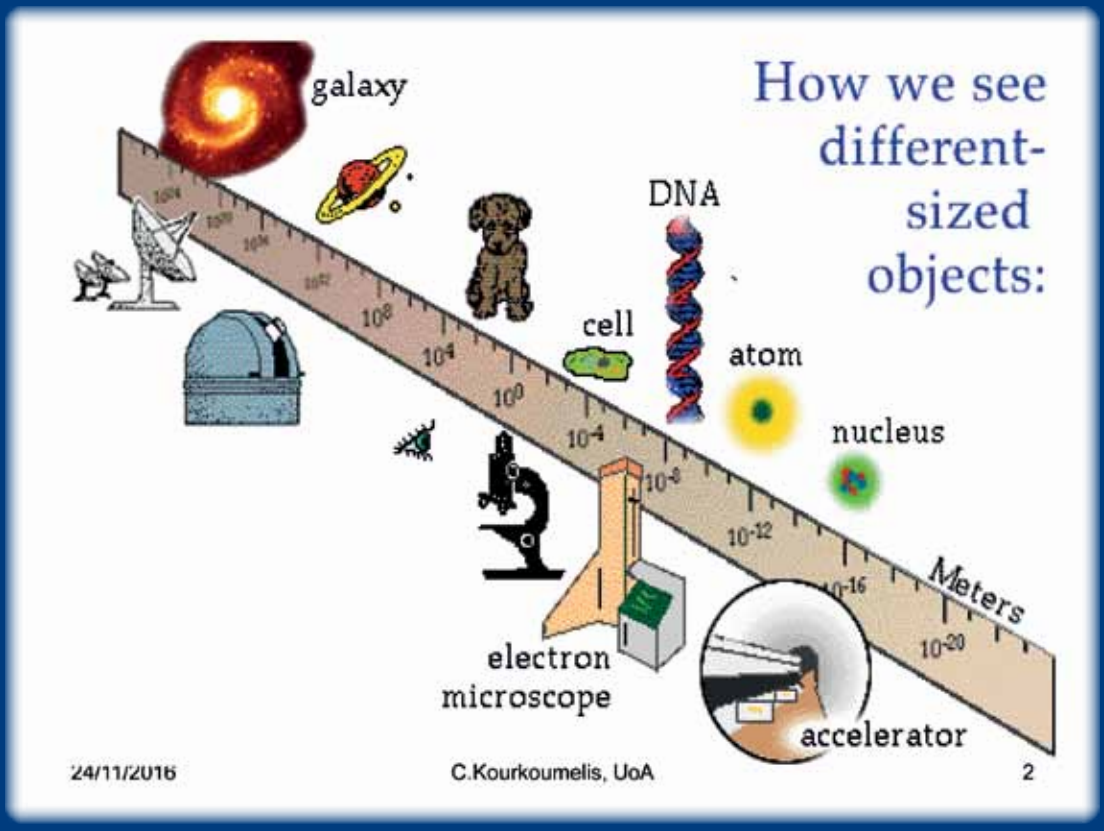
	ενδεικτικές δεξιότητες	αξίες
... τη φιλία	• κάνω γνωριμίες • μπαίνω στο παιγνίδι • μιλάω για τον εαυτό μου • κρατάω μυστικά • ακούω προσεκτικά • μοιράζομαι τα πράγματά μου	Συνεργασία Εμπιστοσύνη Ενσυναίσθηση Γενναιοδωρία
... τα συναισθήματα	• εκφράζω τα συναισθήματά μου • με ενδιαφέρει πώς αισθάνονται οι άλλοι • παρατηρώ εκφράσεις και χειρονομίες • αναγνωρίζω συναισθήματα • διαχειρίζομαι δύσκολα συναισθήματα (θυμός, πλήξη, άγχος)	Ενσυναίσθηση Ευσπλαχνία
... τη συνεργασία	• σκέφτομαι και το δικό μου καλό και το κοινό καλό • ακολουθώ κοινούς κανόνες και κατευθύνσεις • ζητάω βοήθεια • προσφέρω βοήθεια • μοιράζομαι τα πράγματά μου • ακούω προσεκτικά • σέβομαι τις διαφορετικές ιδέες	Συνεργασία Εμπιστοσύνη Δικαιοσύνη Ενσυναίσθηση

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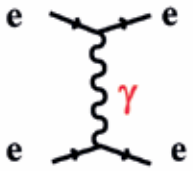


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Τα «υλικά» σωματίδια αλληλεπιδερούν με ηλ/κές, ισχυρές και ασθενείς δυνάμεις.
Αυτές οι δυνάμεις διαδίδονται μέσω της ανταλαγής στοιχειωδών σωματιδίων, των φορέων



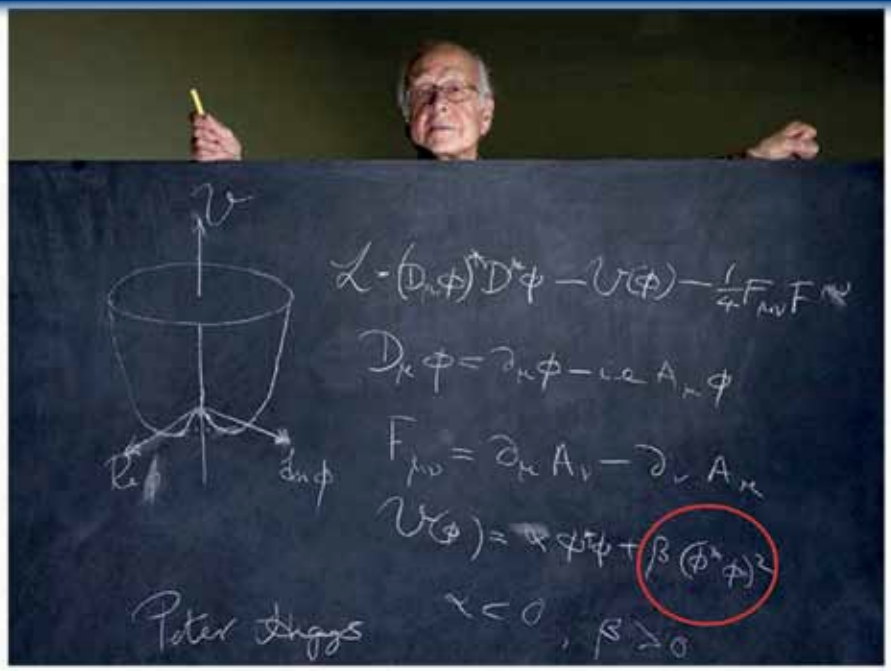


Φορείς δυνάμεων : Μποζόνια, spin=1

Σωματίδιο	Δύναμη		Coupling (E~100 GeV)	Μάζα	Ενταση
γ	EM (charged particles)	e+ e- γ	$\alpha_{EM} = \frac{e^2}{4\pi} \approx 0.008$	0	~ 10^{-1}
$W^{\pm}$, Z	Ασθενής (q, ℓ, $W^{\pm}$, Z)	e- ν_e W^-	$\alpha_W = \frac{g^2}{4\pi} \approx 0.03$	~ 100 GeV	~ 10^{-5}
8 g	Ισχυρή (q, g)	q g q	$\alpha_s = \frac{g_s^2}{4\pi} \approx 0.12$	0	1

Σχετική με την ισχυρή

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Πεδίο Higgs (BEH) → **Σωματίδιο Higgs**

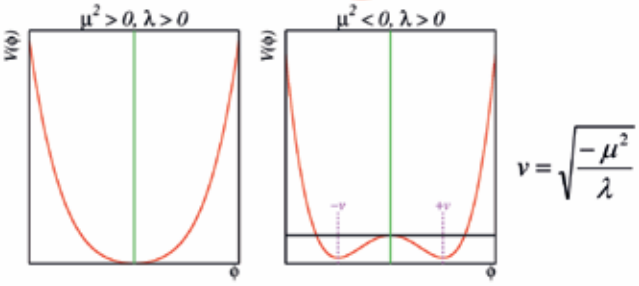
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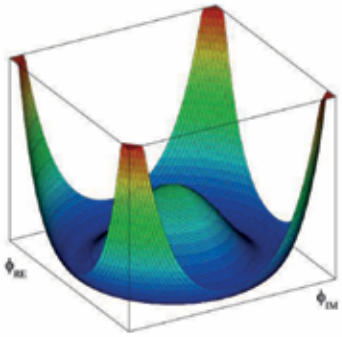
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Στο ΚΠ : Μηχανισμός Higgs ερμηνεύει την ύπαρξη μάζας των σωματιδίων

$$V = \frac{1}{2}\mu^2\phi^2 + \frac{1}{4}\lambda\phi^4$$



$$v = \sqrt{\frac{-\mu^2}{\lambda}}$$

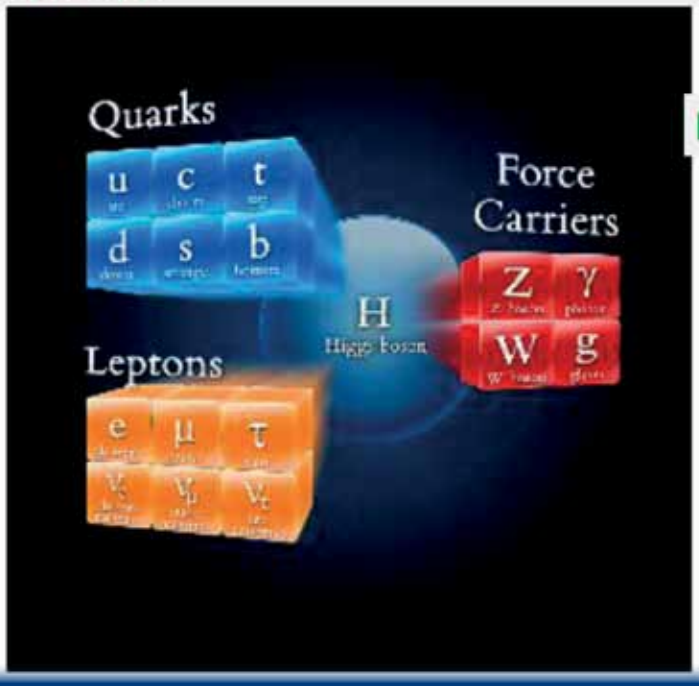


Τα μποζόνια Z, W⁺, W⁻ αποκτούν μάζα
Η μάζα του γ είναι 0

Αλλά, Το πεδίο Higgs οδηγεί στην απαίτηση για την ύπαρξη ενός τουλάχιστον μποζονίου Higgs

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Που είναι το σωματίδιο Higgs στην περιγραφή της φύσης?



Γιατί όμως??

$m_{\gamma}=0$

$m_{Z,W}\sim100$ GeV

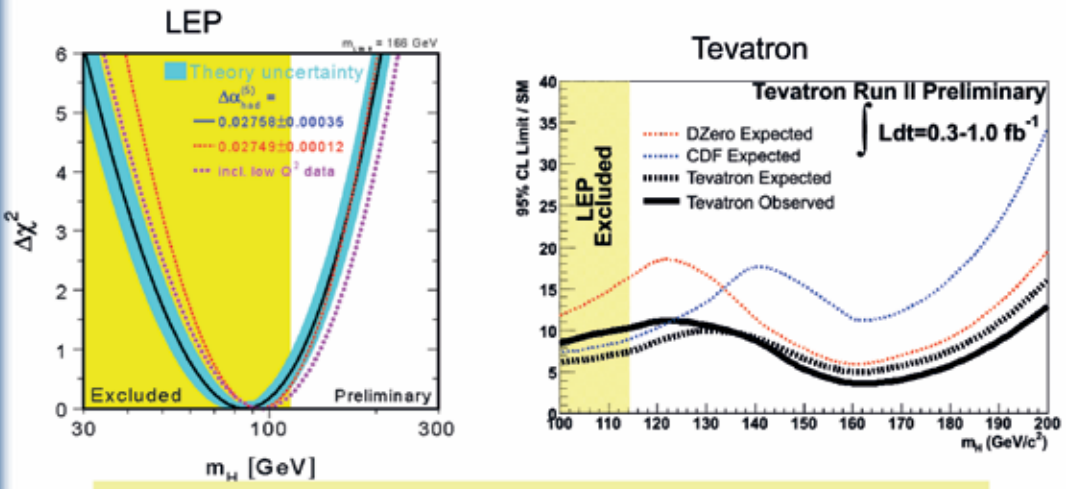
6

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Τι ξέραμε πριν το LHC

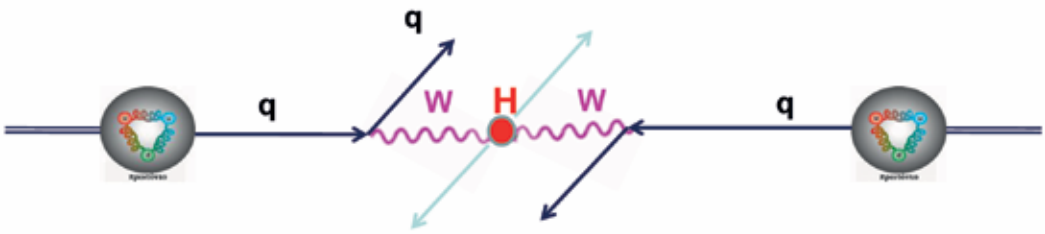
Ομως ο μηχανισμός ΒΕΗ δεν προέβλεπε ποιά ήταν η μάζα του σωματδίου Higgs



m_H>114.4 GeV @95% CL και m_H<1000 GeV

7

Τι χρειαζόμαστε? Επιταχυντή



M_H~1000 GeV

E_W ≥ 500 GeV

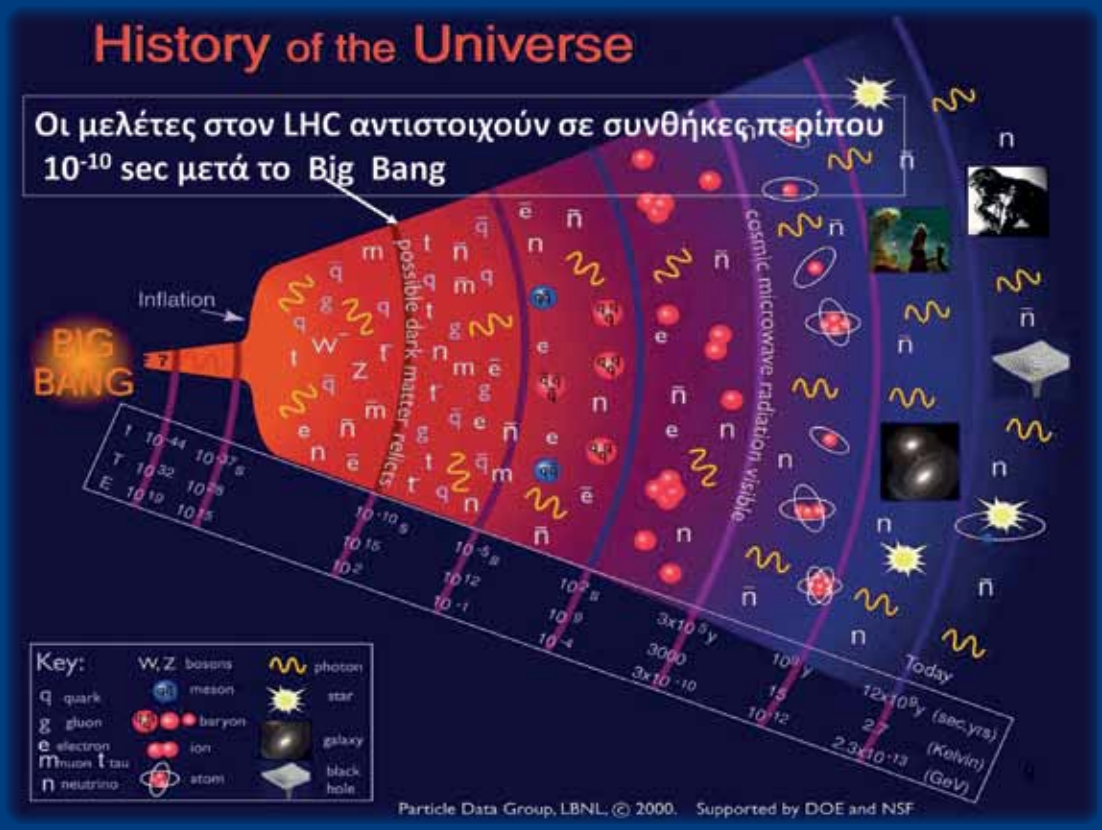
Eq ≥1000 GeV

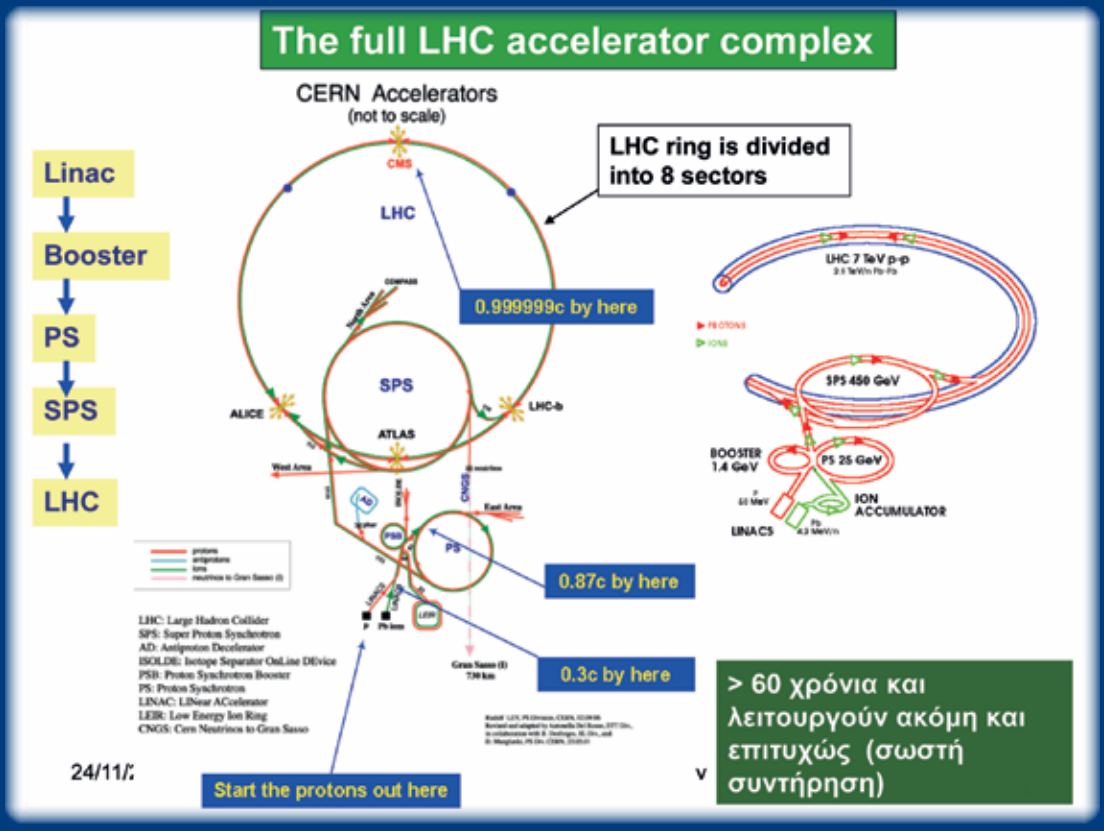
Ep ≥6000 GeV

LHC: Ενέργεια δέσμης το 2011-2012-> 3.5-4 TeV
Ιούνιος 2015- Δεκ 2015 και Μαρτης 2016-> 6.5 TeV

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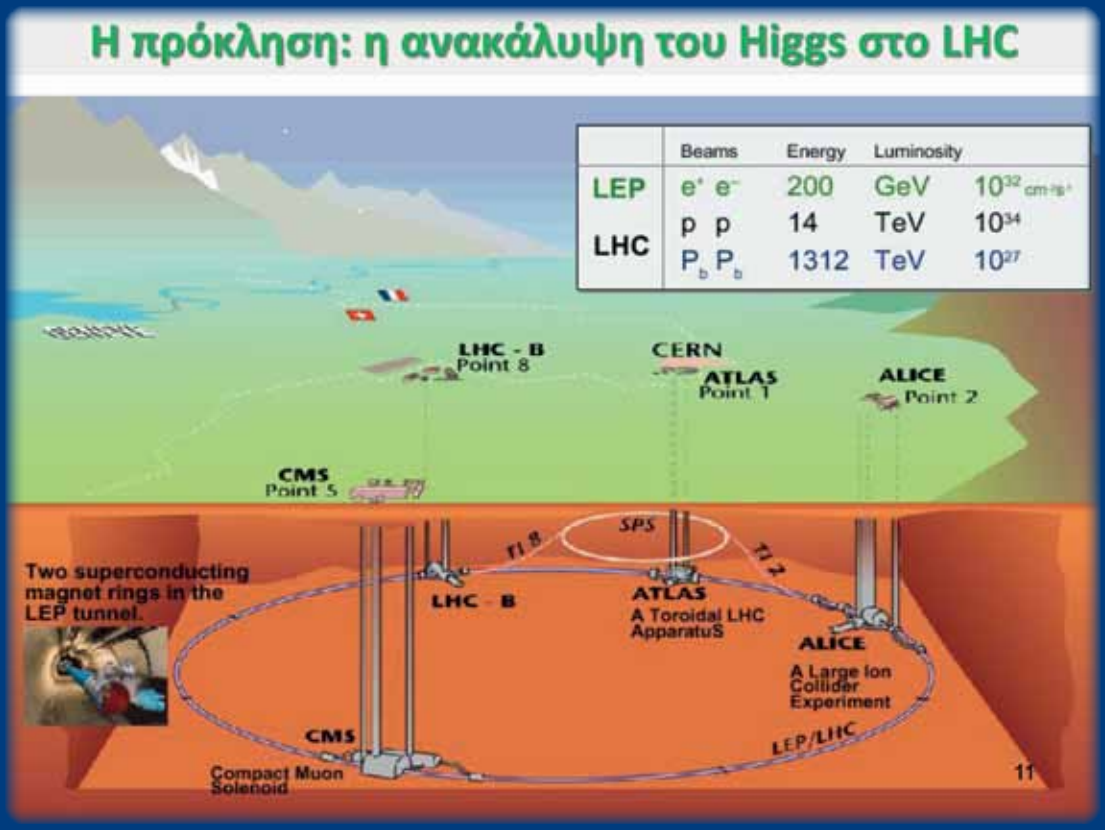
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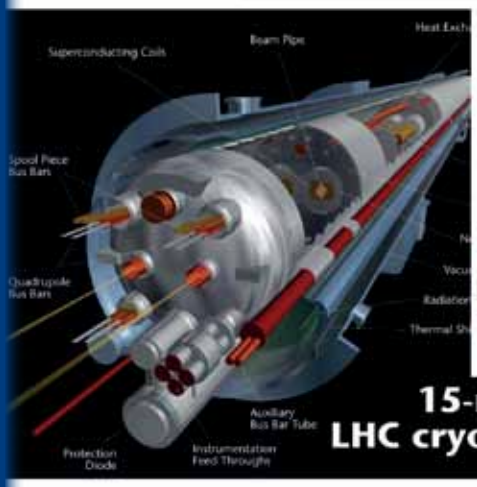


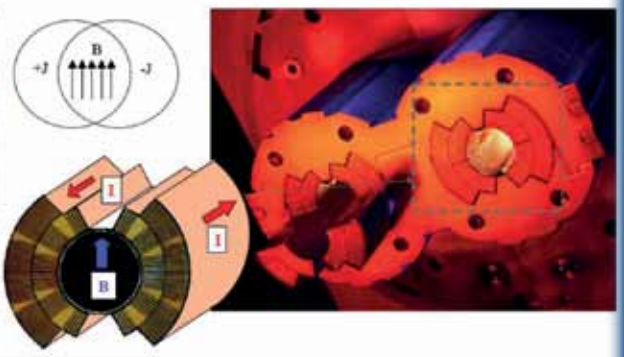


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Οι υπολικοί μαγνήτες





15-m long LHC cryodipole

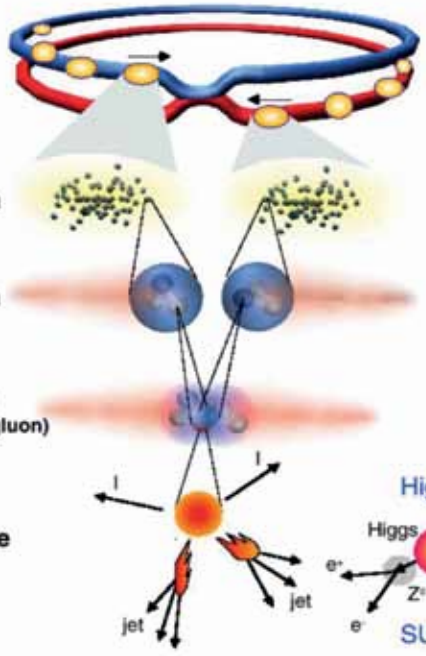
1232 μαγνήτες
Ο ψυχρότερος δακτύλιος στον κόσμο 1.9 Kelvin

Magnetic Field for Dipoles
p (TeV) = 0.3 B(T) R(km)

For p = 7 TeV and R = 4.3 km
⇨ B = 8.4 T
⇨ Current 12 kA

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Συγκρούσεις στο LHC

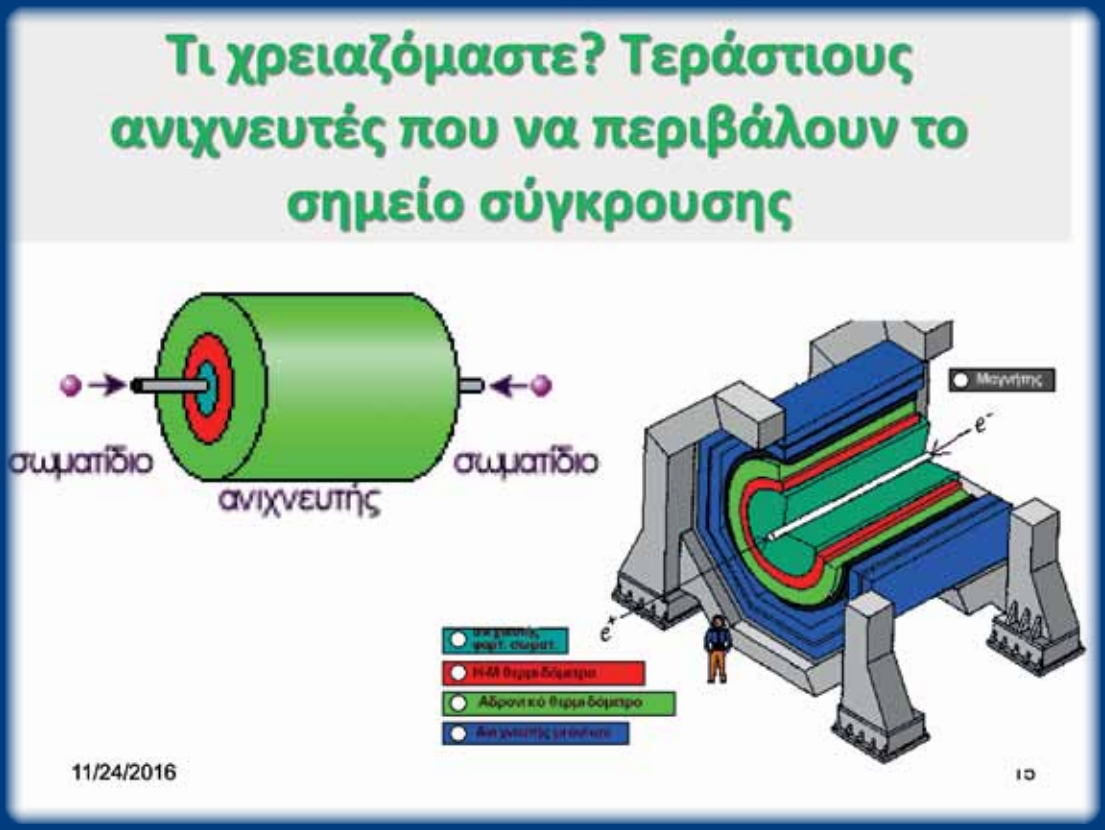


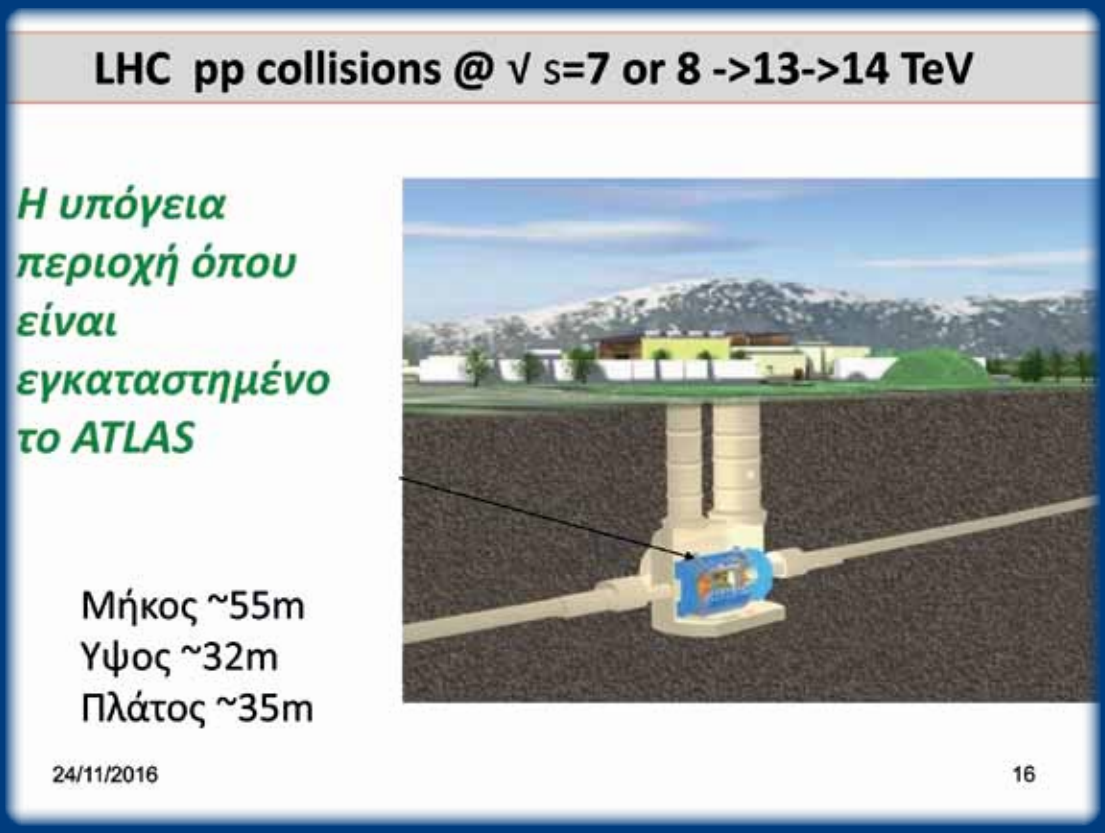
Proton-Proton	2835 bunch/beam
Protons/bunch	10^{11}
Beam energy	7 TeV (7×10^{12} eV)
Luminosity	10^{34} cm^{-2} s^{-1}
Crossing rate	40 MHz
Collisions ≈	10^{7} - 10^{9} Hz

Selection of 1 in 10,000,000,000,000

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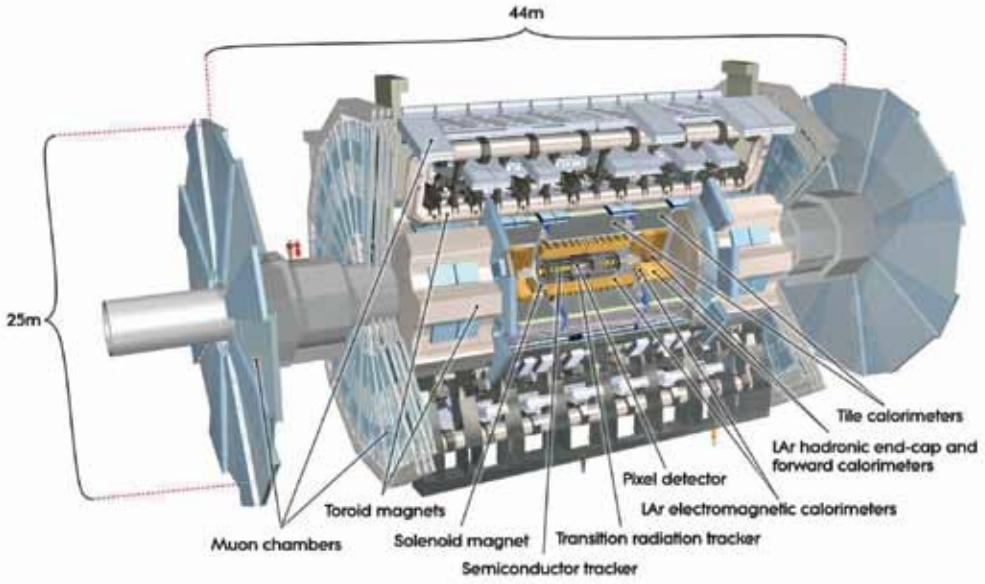




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Ο ανιχνευτής ATLAS



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Μια όψη της πειραματικής περιοχής(2003)

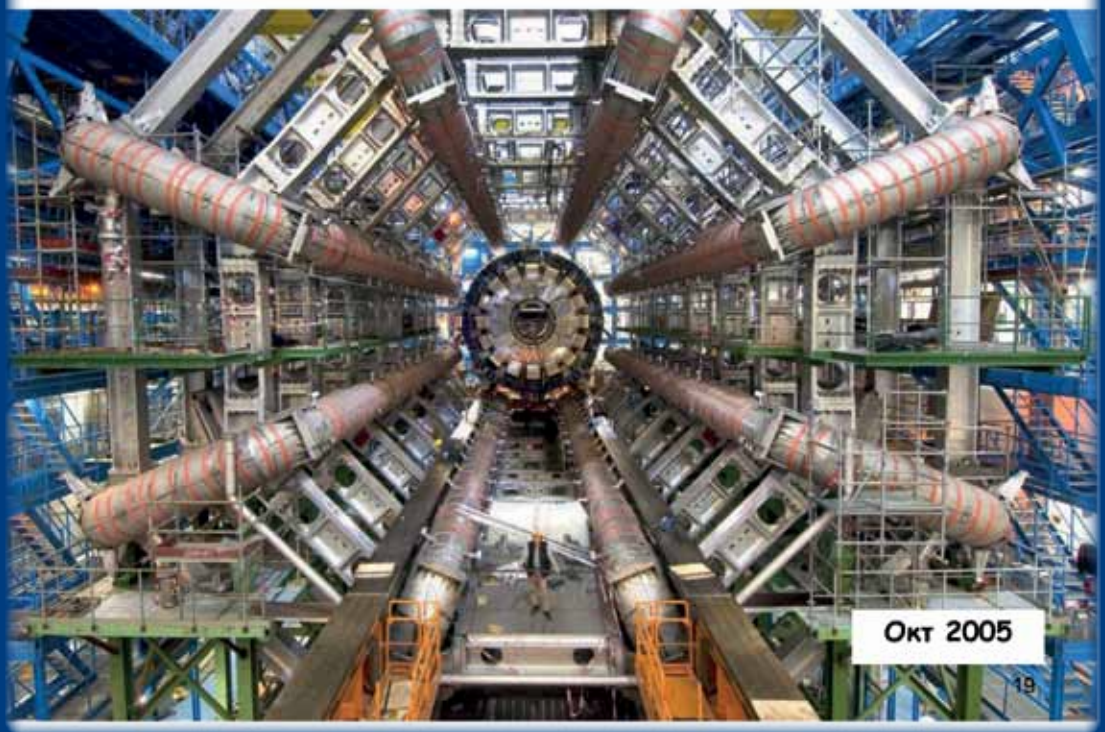


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Ο μεγαλύτερος μαγνήτης



Η ανακάλυψη: Τα βήματα

1) Λήψη δεδομένων (2009->2012) για όσο το δυνατόν μεγαλύτερη χρονικ'η διάρκεια (μαζεύω «στατιστικη»)

$$\sigma = \frac{N(events)}{\int L\,dt \times A \times \varepsilon}$$

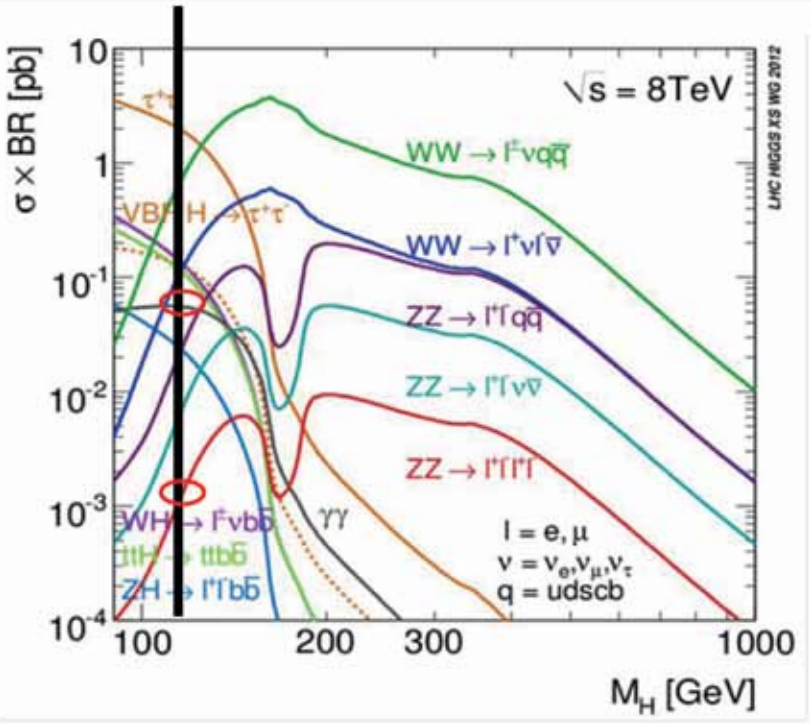
2) Βαθμονόμηση του ανιχνευτή με σωματίδια που γνωρίζαμε ήδη (J/ψ, Υ, Z)
3) Επιλογή γεγονότων και «ανακατασκευή» του Higgs από τα προϊόντα διάσπασης του.

Διαλέγω διασπάσεις με ΧΑΡΑΚΤΗΡΙΣΤΙΚΗ ΥΠΟΓΡΑΦΗ (H->(ZZ)->4l, H->γγ)

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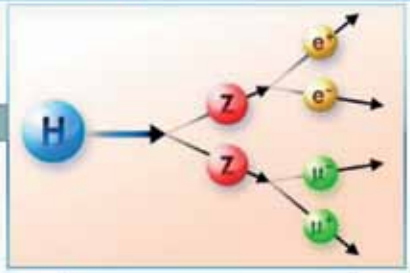
Τρόποι διάσπασης του Higgs σαν συνάρτηση της μάζας του



21

Ποιές διασπάσεις του Higgs μελετήθηκαν αρχικά?

Higgs → $b + \bar{b}$	(b quark and its antiquark)
Higgs → $\tau^+ + \tau^-$	(τ lepton and its antiparticle)
Higgs → $\gamma + \gamma$	(two photons, also called gammas)
Higgs → $W^+ + W^-$	(W boson and its antiparticle)
Higgs → $Z^0 + Z^0$	(Two Z bosons)



$e^+ + e^- + e^+ + e^-$
$e^+ + e^- + \mu^+ + \mu^-$
$\mu^+ + \mu^- + e^+ + e^-$
$\mu^+ + \mu^- + \mu^+ + \mu^-$

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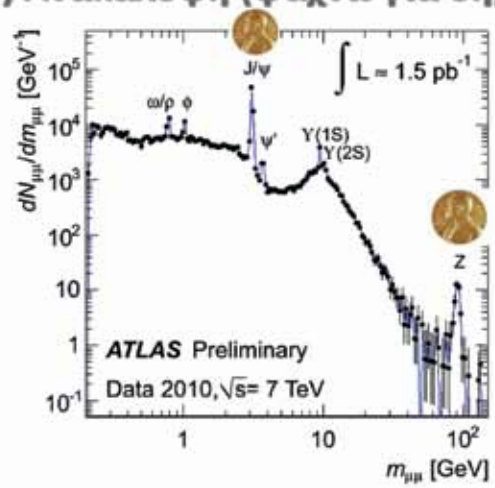
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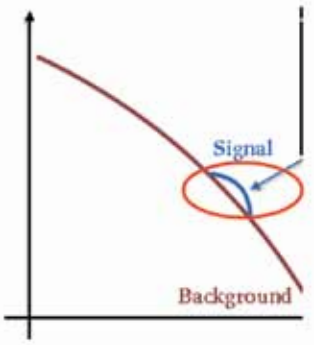
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Η ανακάλυψη: Τα βήματα

4) Ανακάλυψη (ψάχνω γιά σήμα πάνω από συνεχές υποβάθρο

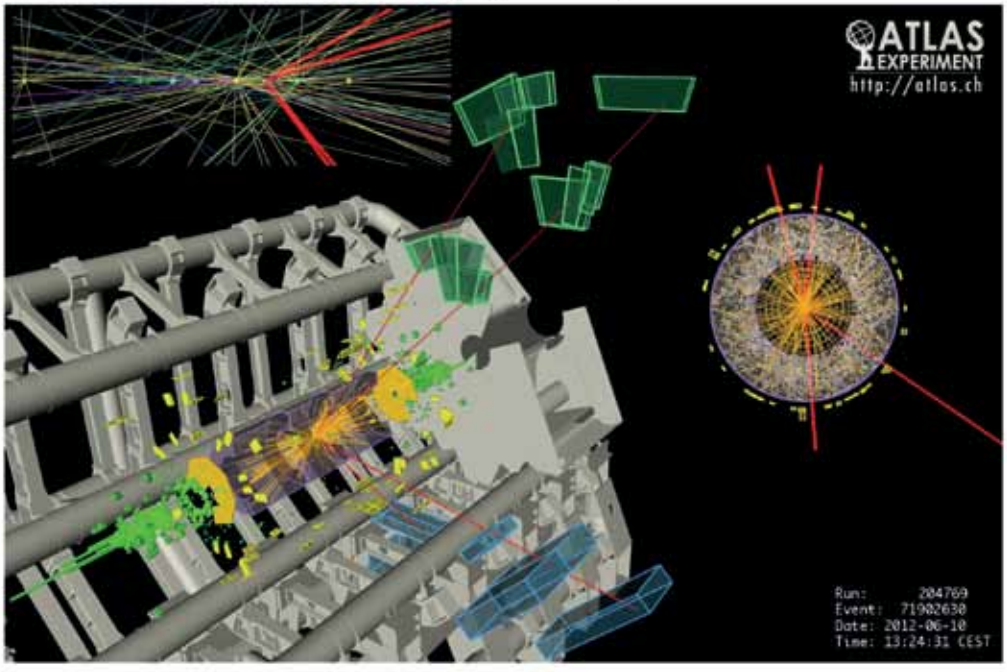




5) Στατιστική ανάλυση (για να δούμε αν το «σήμα» είναι πραγματικό ή στατιστική διακύμανση)

23

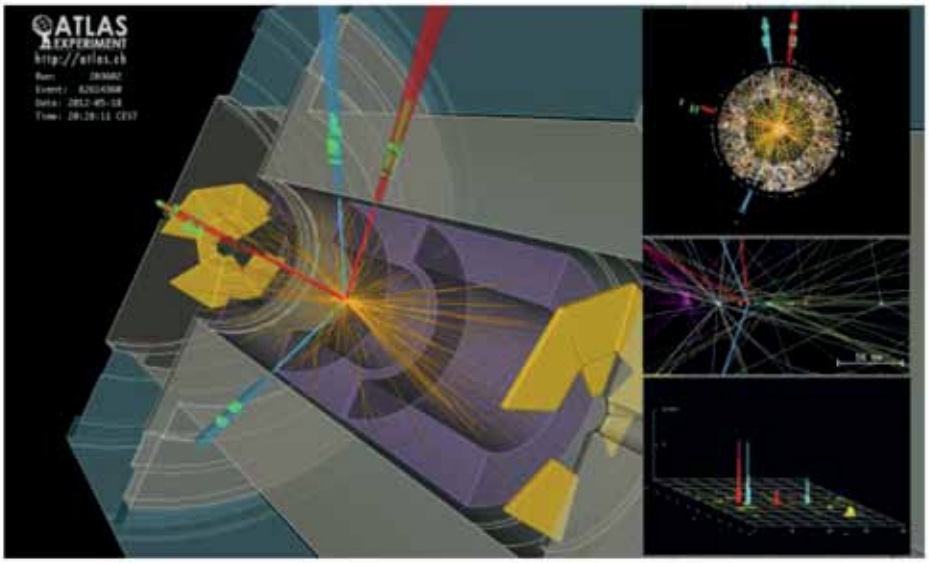
$$H \rightarrow ZZ(*) \rightarrow 4\mu$$



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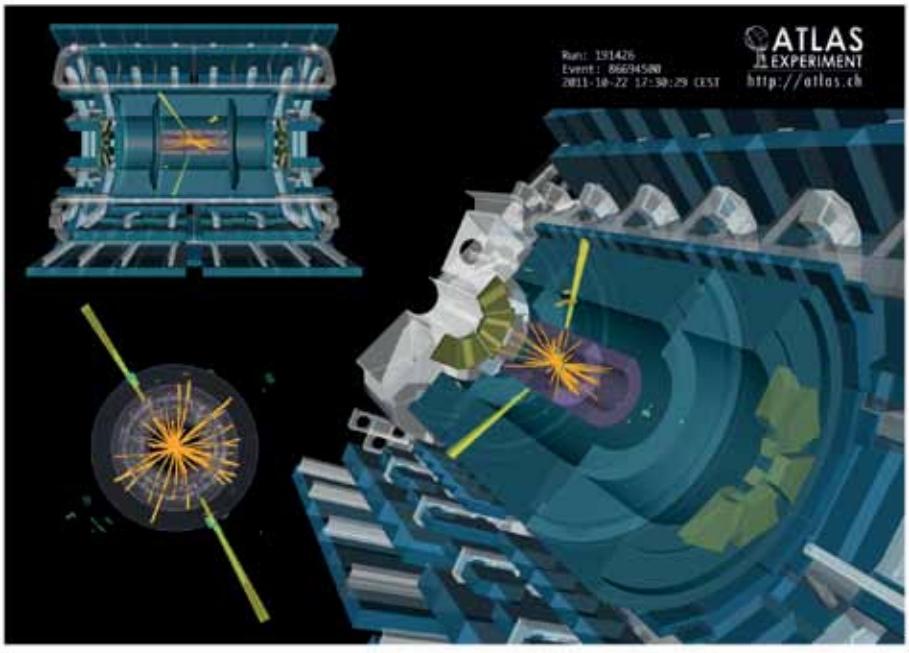
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$$H \rightarrow ZZ(*) \rightarrow 4e$$



25

$$H \rightarrow \gamma\gamma$$

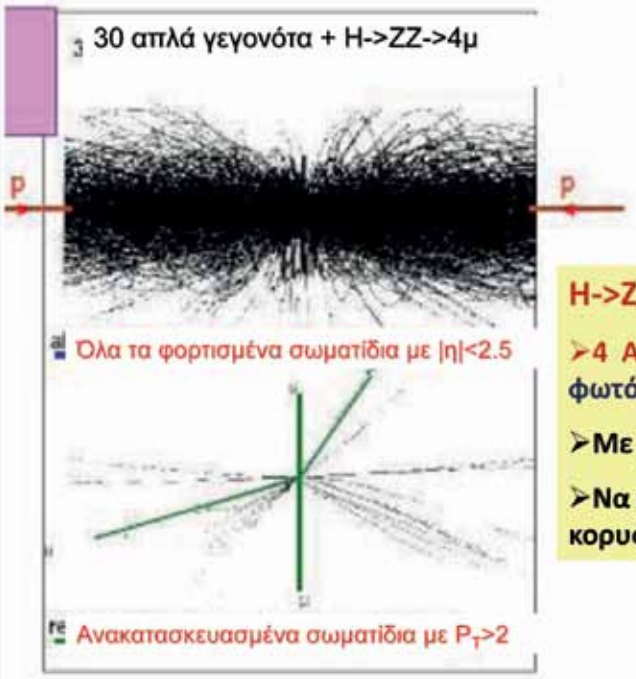


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Τα κριτήρια επιλογής

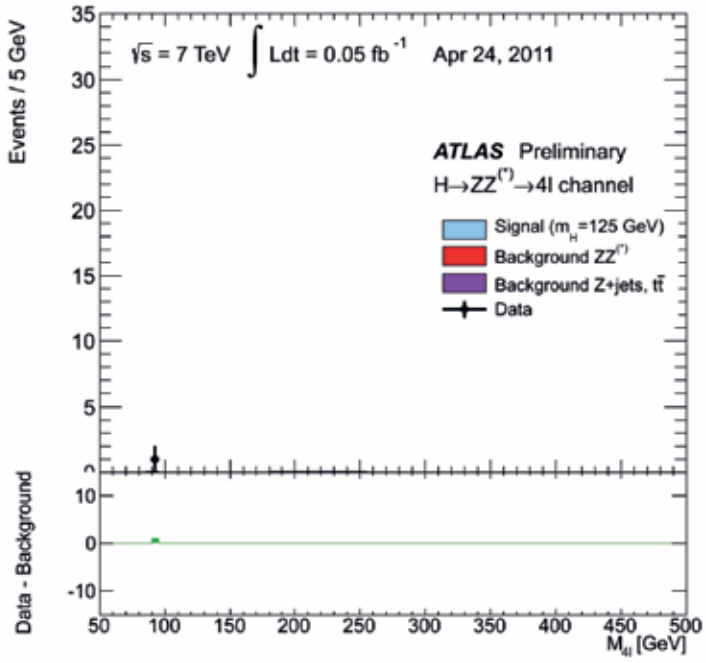


H->ZZ->4 λεπτόνια

- **4 Απομονομένα λεπτόνια ή φωτόνια**
- **Με μεγάλη εγκάρσια ορμή**
- **Να προέρχοντα απο την ίδια κορυφή**

νών

Ανακατασκευή μάζας H->ZZ(*)->4l

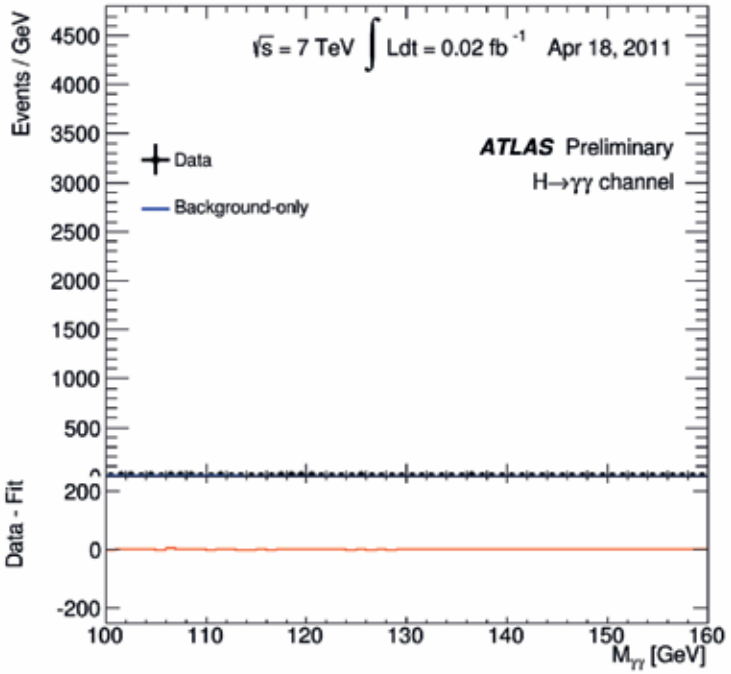


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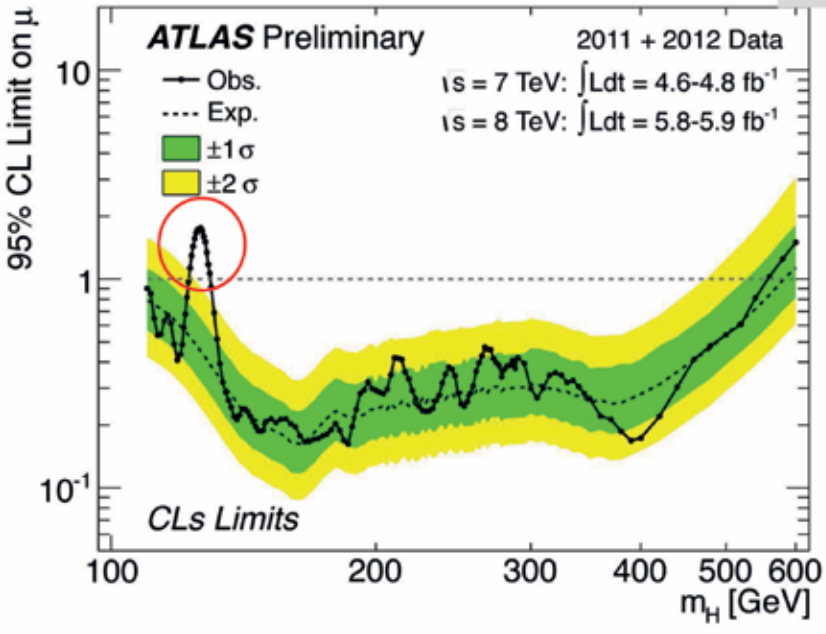
Ανακατασκευή μάζας H->γγ



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Η ανακάλυψη

m=125.09
Lifetime=6*10^{-22} sec

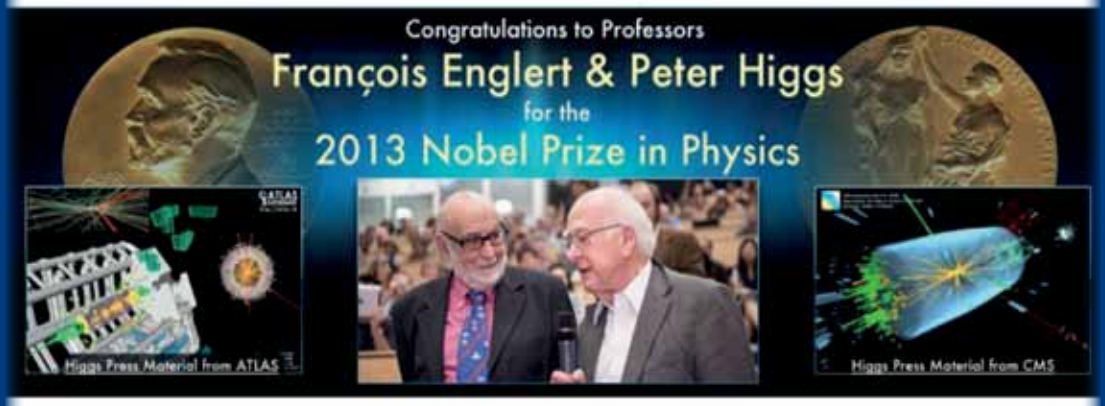


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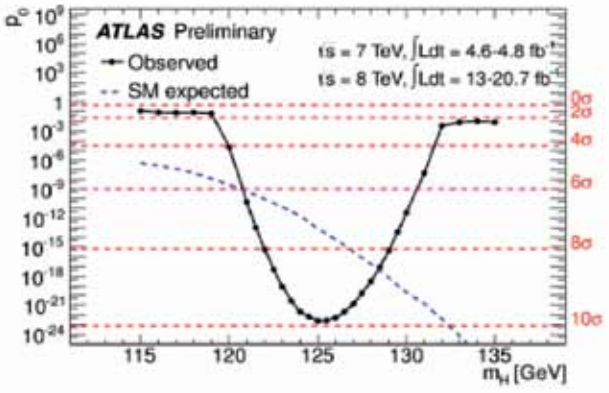
To Nobel



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Ολα τα αποτελέσματα του Run I

Ολα τα κανάλια διάσπασης μαζί δίνουν 10 σ

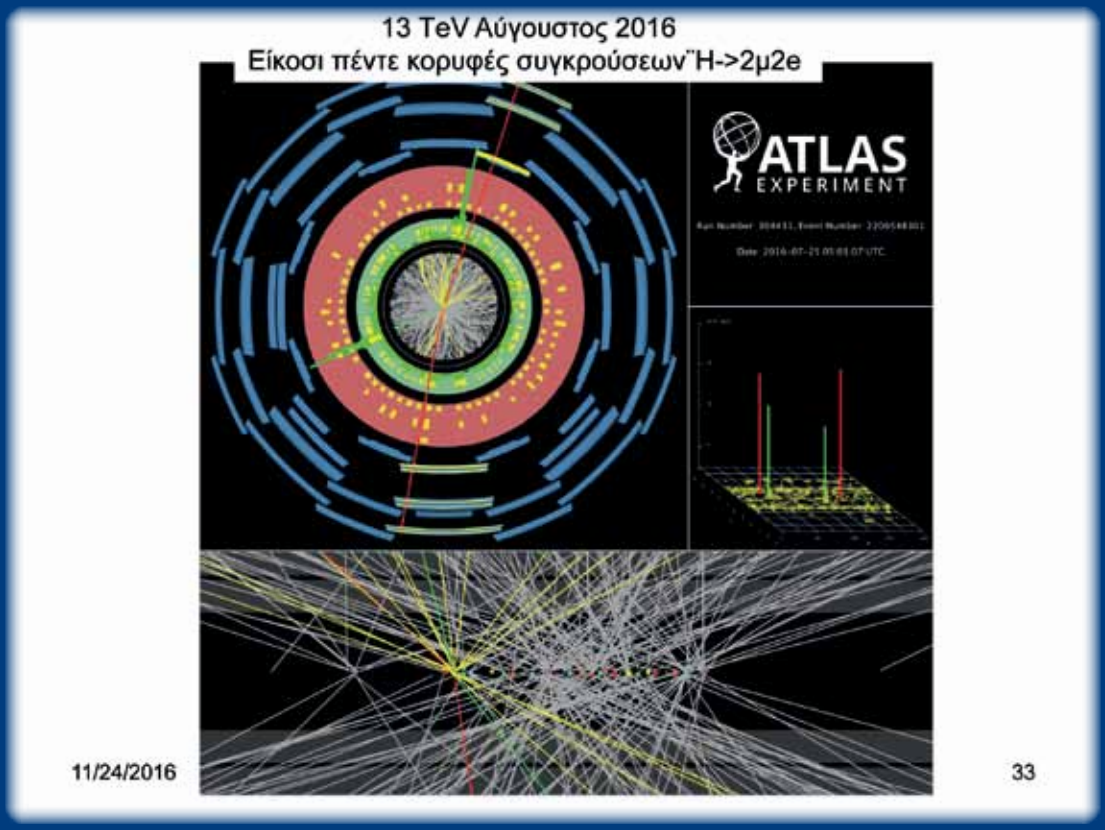


μία στο 1 τρισεκατομμύριο να είναι τυχαιο !!!

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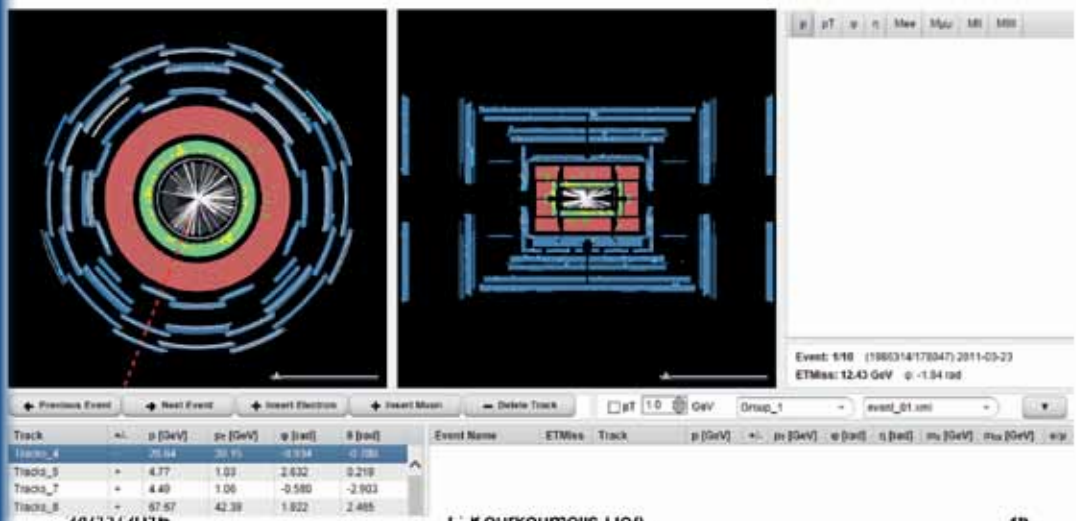




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On-line HYPATIA : http://hypatia.iasa.gr
στα Ελληνικά, Αγγλικά , Γαλλικά και Γερμανικά
Τρέχει παντού (ακόμη και σε κινητά τηλέφωνα)



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ISE demonstrators για μικρότερα παιδιά:

1)¨Επιταχύνοντας σωματίδια (LHC game)

http://tools.inspiringscience.eu/delivery/view/index.html?id=2ca6a9c248ea4cff8a72d4135ddb96e6&t=p

LET'S ACCELERATE PARTICLES GREEK

Πρόκληση Ενδιαφέροντος και Θέση Ερωτημάτων | Δημιουργία Υποθέσεων και Σχεδίου Εργασιών | Σχεδιασμός και Πειραματισμός | Ανάλυση και Ερμηνεία | Συμπέρασμα και Αξιολόγηση

2) Φτιάχνοντας την ύλη (άτομα,νουκλεόνια)

http://tools.inspiringscience.eu/delivery/view/index.html?id=b9afb663f9ff4ef994efbebe2611bb85&t=p





C.Kourko 36

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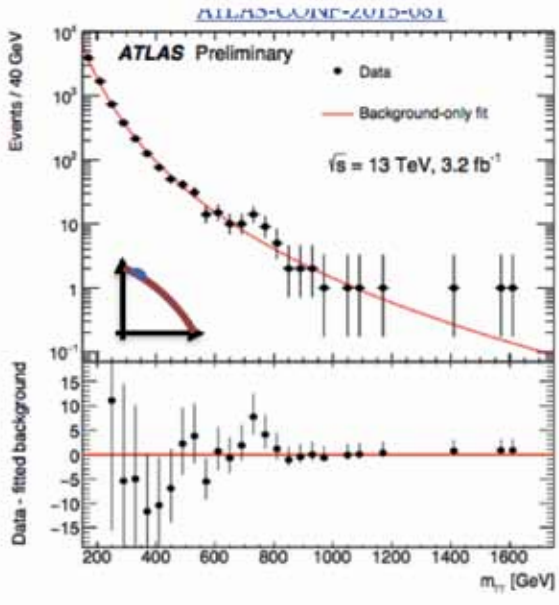
Δεν σταματάει ποτέ η έρευνα..

- Μετράμε τη μάζα
- Μετράμε το πλάτος
- Μετράμε το σπιν
- Μελετάμε τους μηχανισμούς παραγωγής του
- Μετράμε τις ζεύξεις του με όλα τα σωματίδια
- **Ψάχνουμε για επιπλέον μποζόνια "Higgs" -> ΚΑΙΝΟΥΡΓΙΑ ΦΥΣΙΚΗ!!!**

Run II άρχισε τον Ιούνιο –Νοέμβρη 2015 σε διπλάσια ενέργεια
και απο Μάρτη 2016 συνεχώς για 20+ χρόνια

11/24/2016 37

Νέο βαρύ σωματιδίο ???-> γγ



	ATLAS	CMS 8 TeV	CMS 8+13 TeV
Local σ	3.6	2.6	3
Global σ	2.0	<1.2	<1.7
Mass (GeV)	750	760	750
Γ (GeV)	NWA	~25	~25[38]

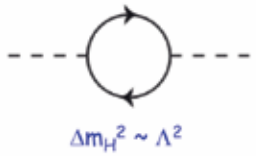
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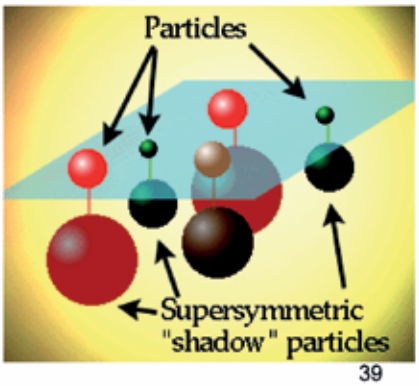
Αναπάντητα ερώτηματα/προβλήματα του ΚΠ

Γιατί τόσο μεγάλες διορθώσεις «με το χέρι»στην μάζα του Higgs??



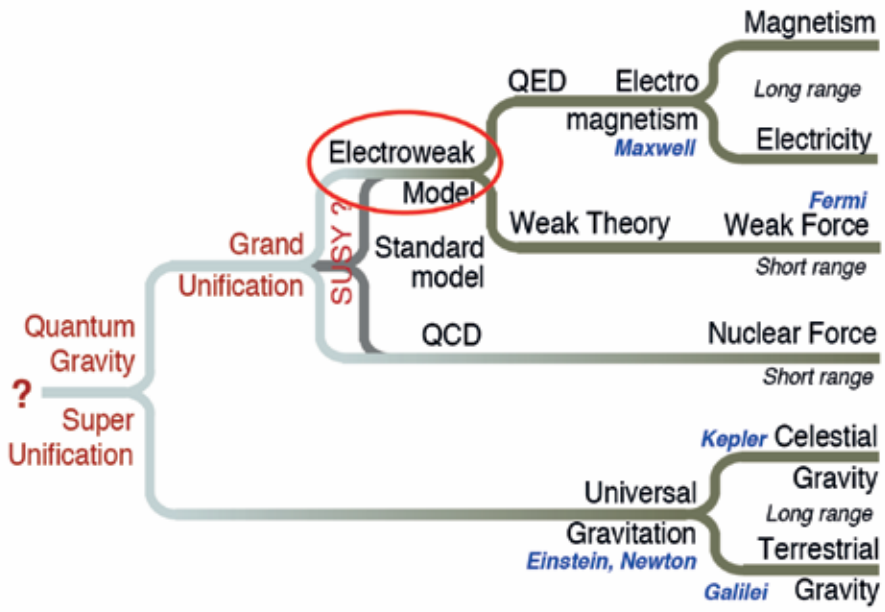
$\Delta m_H^2 \sim \Lambda^2$

SUSY THEORIES
(ΥΠΕΡΣΥΜΜΕΤΡΙΑ)
New particles
Spin 1/2 → Spin 1 (quark→ squark)



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Ενοποίηση των δυνάμεων??

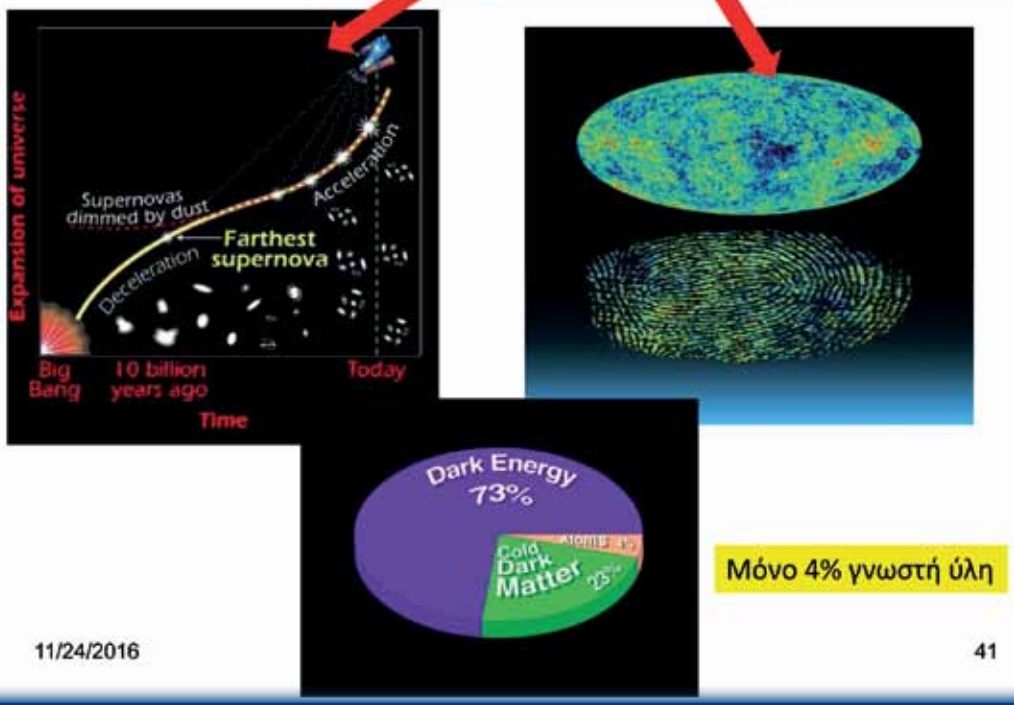


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Σκοτεινή ύλη και ενέργεια



Μόνο 4% γνωστή ύλη

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Και άλλα ερωτήματα..

- Γιατί μόνο τρείς οικογένειες λεπτονίων/κουάρκ?
- Εχουν τα λεπτόνια και κουάρκ περαιτέρω δομή?
- Ασυμετρία ύλης/αντιύλης

New Theories BSM

Θα βρούμε νέα φυσική στο Run II??

Υπομονή.....

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Back-up

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Τι μπορούμε να προσφέρουμε μέσω των Ευρωπαικών προγραμμάτων -> **Masterclasses, e-Masterclasses & Virtual Visits**

- **Τοπικά masterclasses @schools**
  - ~80 σε όλη την Ελλάδα (2012-2015) από Διδυμότοιχο σε Κρήτη
    - Διαλέξεις στους μαθητές για την έρευνα στο CERN
    - Εικονική επίσκεψη (VV) στο πείραμα (ATLAS και CMS)
    - Ανάλυση πραγματικών γεγονότων με την HYPATIA, ανακάλυψη νέων σωματιδίων



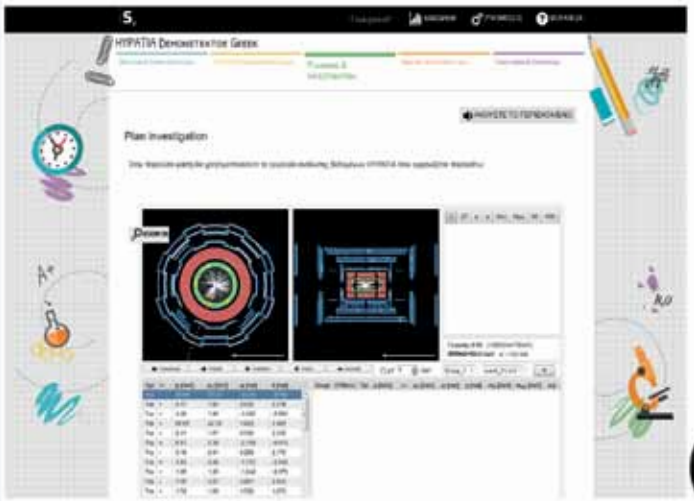


- **e-Masterclasses**
  - Ολλανδοί (9) & Πολωνοί μαθητές (43) στο CERN (Nov 12)
- **...VV με πολλά σχολεία συγχρόνως**
  - CMS (10), ATLAS (10+2 Κύπρου)

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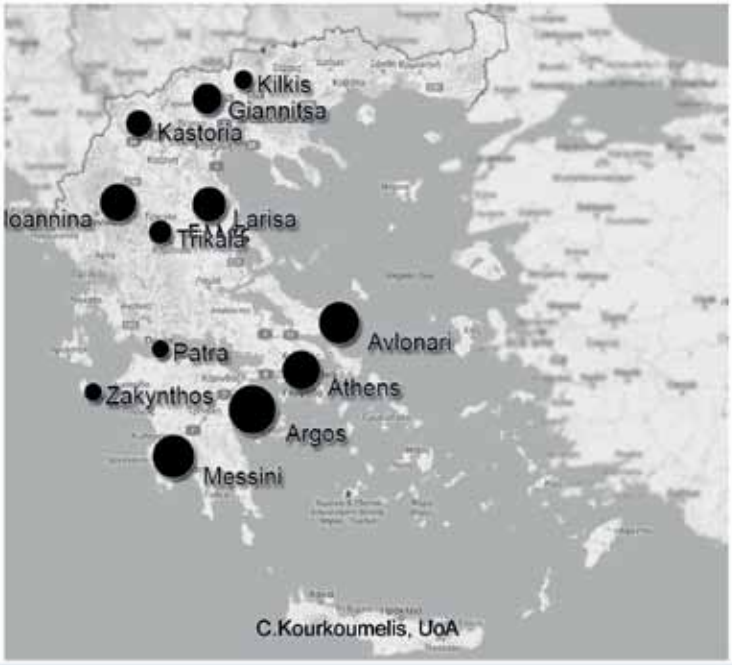
ISE HYPATIA demonstrator +PISA assessment questions





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Masterclasses and VV in Greece (last two years)



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Expanding to Astroparticle physics – discussions and pilot tests ongoing

IceCube Masterclass

http://icecube.wisc.edu/masterclass/home

Auger Masterclass

http://auger.colostate.edu/ED/

- Pilot tests in German Netzwerk Teilchenwelt

International Muon Week

Quarknet

http://Internationalmuonweek.org

International Cosmic Day

http://icd.desy.de

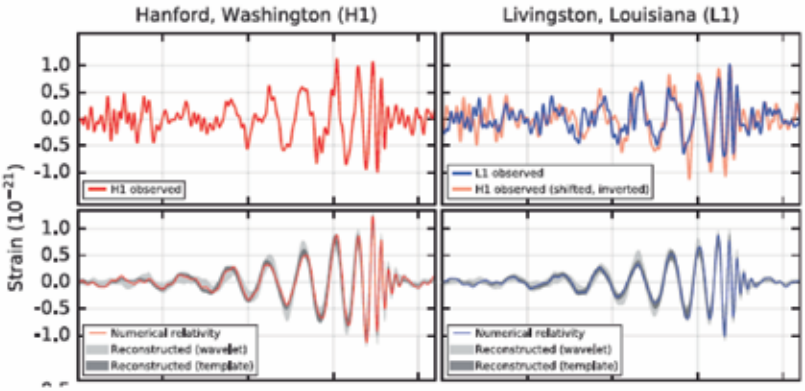


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II. OBSERVATION

On September 14, 2015 at 09:50:45 UTC, the LIGO Hanford, WA, and Livingston, LA, observatories detected

matched-filter analyses that use relativistic models of compact binary waveforms [44] recovered GW150914 as the most significant event from each detector for the observations reported here. Occurring within the 10-ms intersite

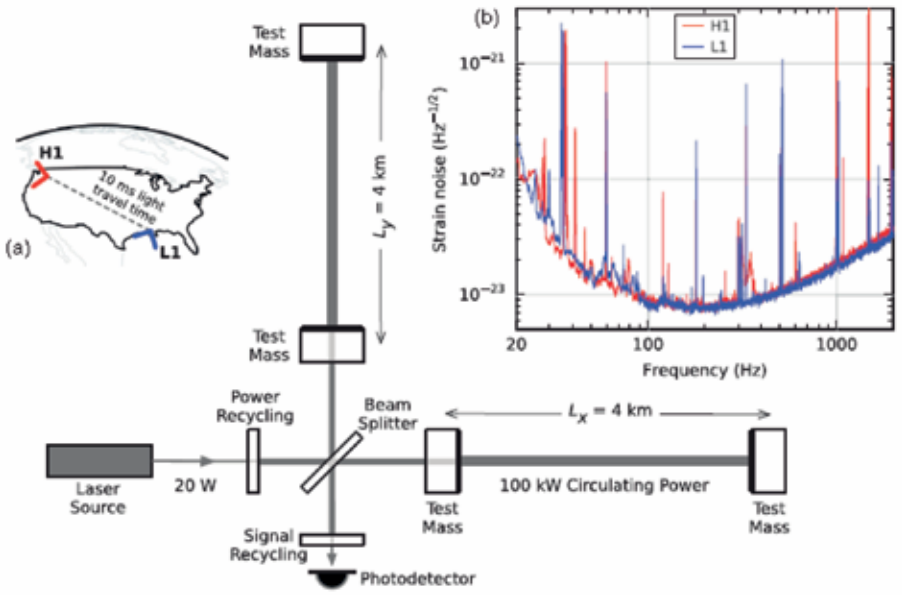


that the black holes for this event were about 29 and 36 times the mass of the sun, and the event took place 1.3 billion years ago. About three times the mass of the sun was converted into gravitational waves in a fraction of a second -- with a peak power output about 50 times that of the whole visible universe. By looking at the time of arrival of the signals -- the detector in Livingston recorded the event 7 milliseconds before the detector in

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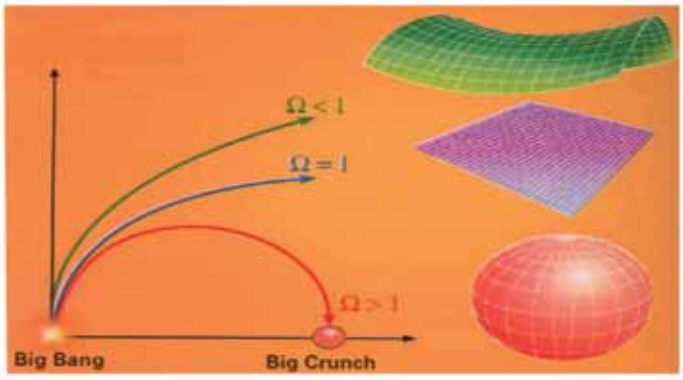
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What is Universe going to do?





Physics Nobel Prize 2011

It will continue expanding faster and faster

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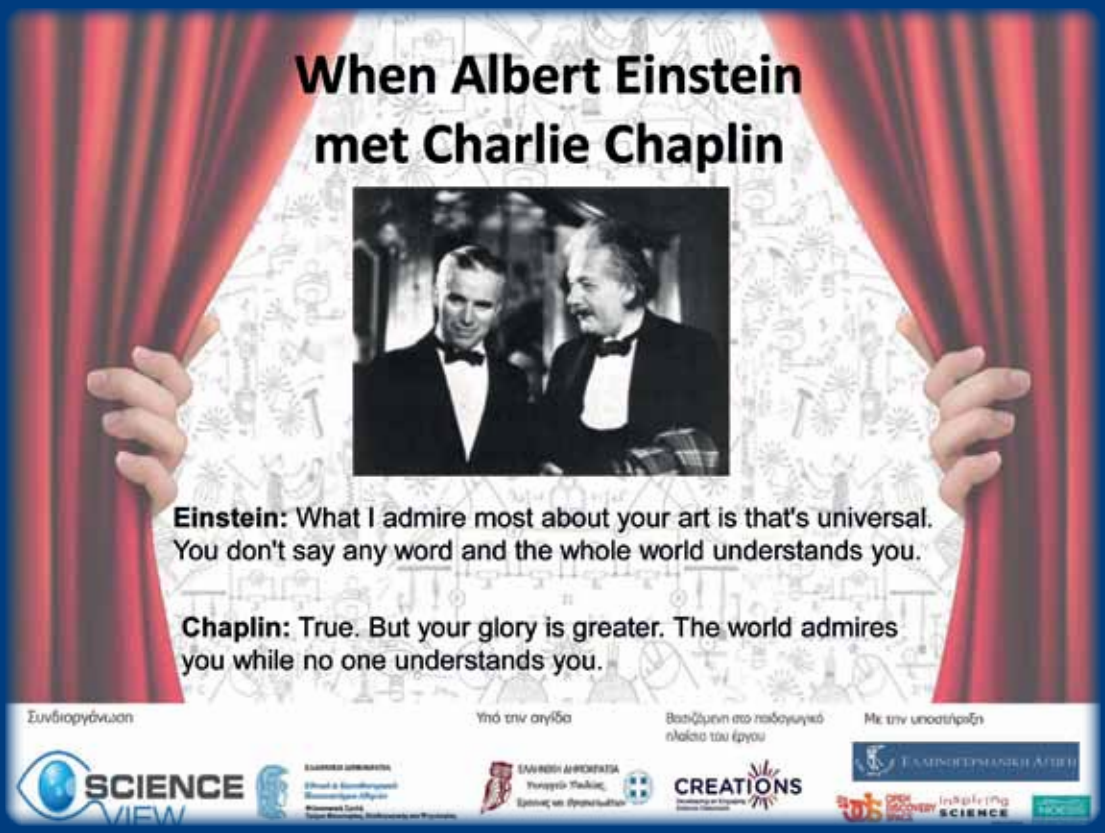




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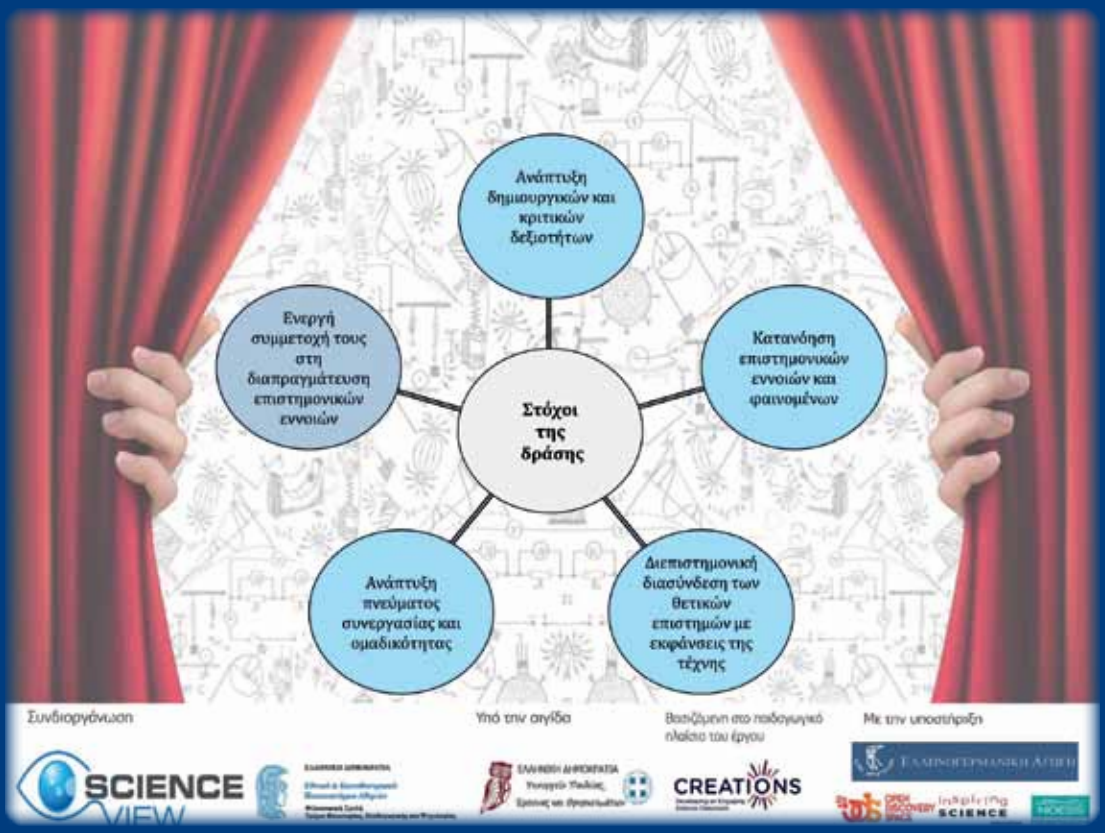




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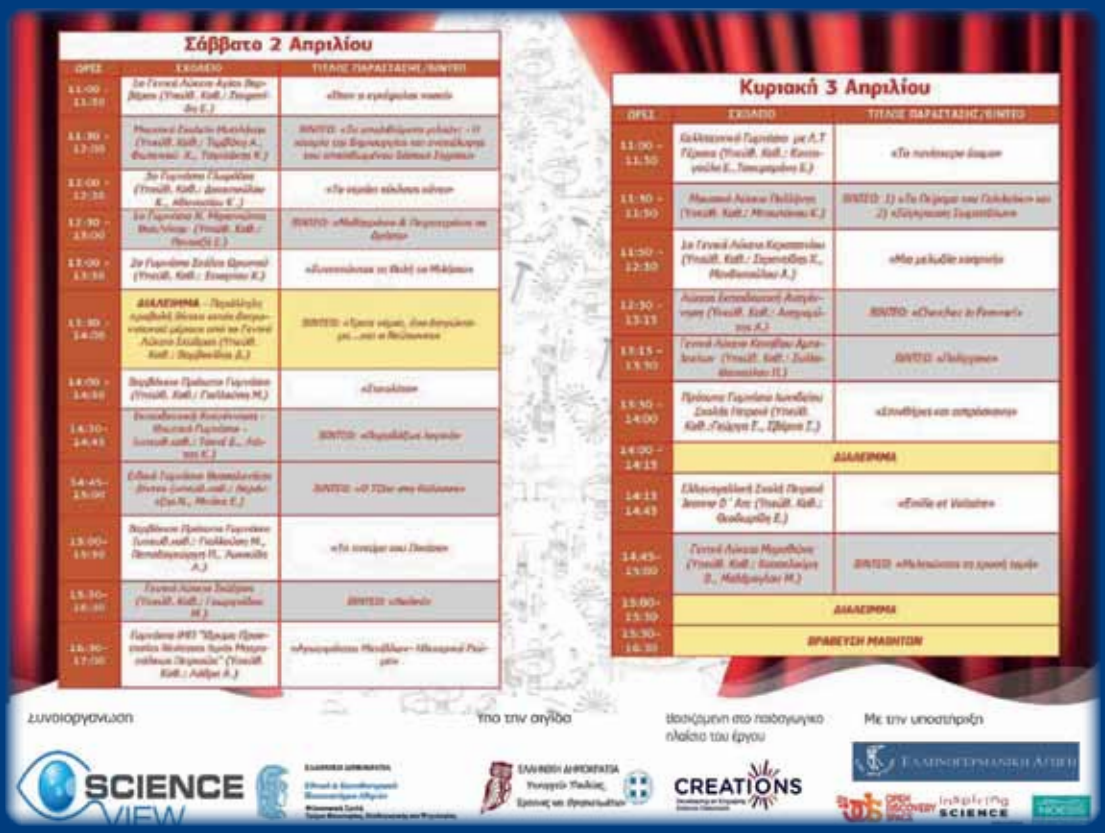




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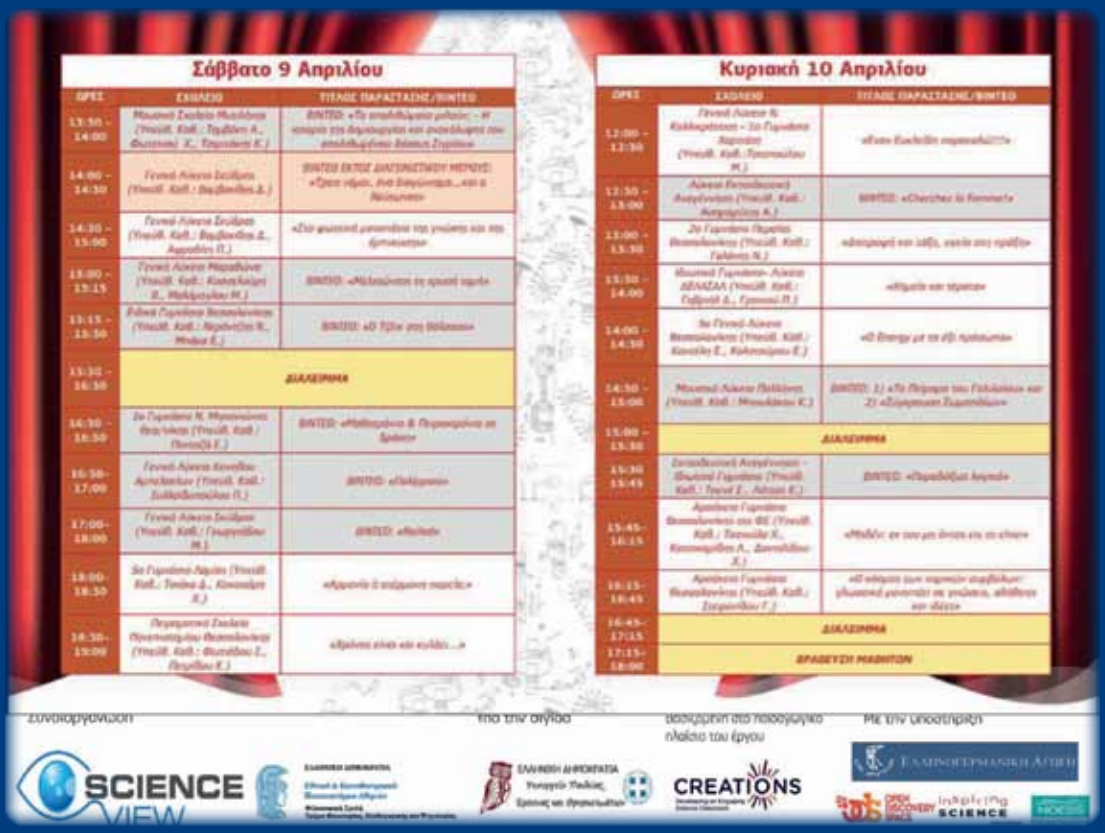




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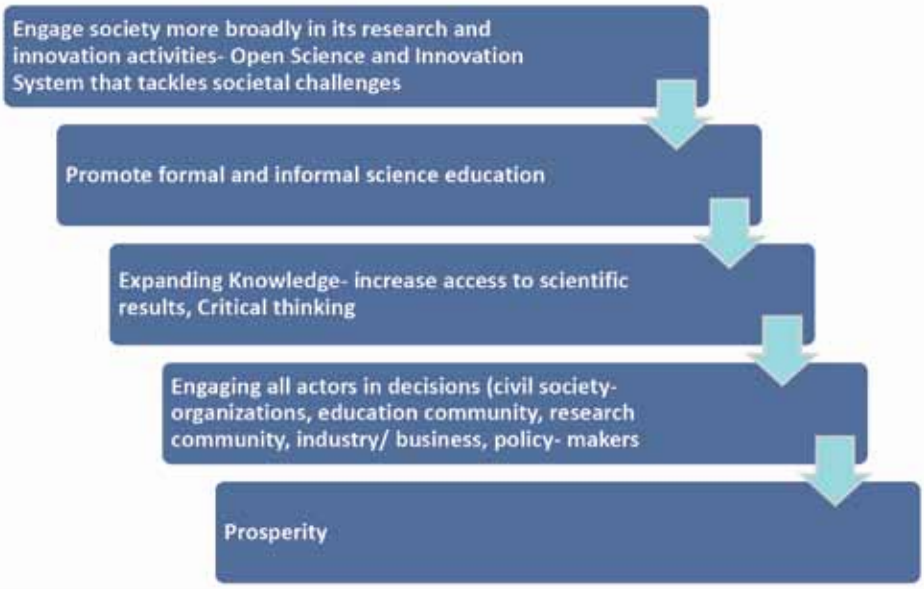
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Θεωρητικό Πλαίσιο (Pedagogical Framework)

- Υπεύθυνη Έρευνα και Καινοτομία (RRI)
- Δημιουργικότητα (Creativity)
- Διερευνητική Μάθηση (Inquiry-based learning)
- Ενσώματη Μάθηση (Embodied learning)
- Αναπαραστασιακά Συστήματα (Representational /semiotic systems)
- Αναλογική Σκέψη (Analogical Reasoning)

Responsible Research and Innovation (RRI)



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Responsible Research and Innovation (RRI)

Equal Opportunities- Ensure gender equality, in both the research process and research content

Needs, Values, Expectations of Societies





Are RRI aspects achieved via these activities?

- Governance ⟷ Change attitudes of researchers Communicate with audience
- Public engagement ⟷ Engagement through involvement of students and teachers
- Gender equality ⟷ Girl and boys are equal through these activities
- Science education ⟷ This is our core aim. Participants learning by doing
- Open access/open science ⟷ Open access to thousands of recourses
- Ethics ⟷ Teamwork, role playing, role exchange develop ethics
- Sustainability ⟷ Develop by the teams of students and teachers, self sustain system
- Social justice/inclusion ⟷ All equal in this procedure, all participate and contribute

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CREATIONS

Creativity in science education definition:

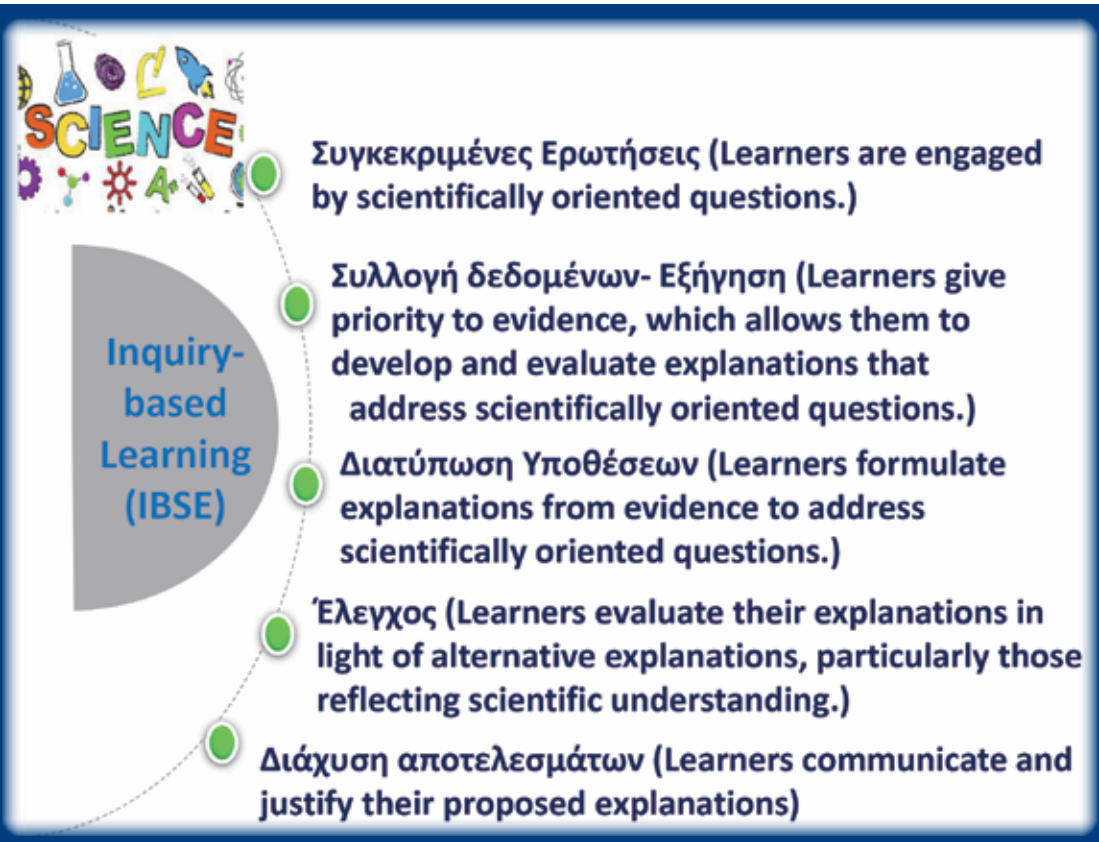
'Purposive and imaginative activity generating outcomes that are original and valuable in relation to the learner. This occurs through critical reasoning using the available evidence to generate ideas, explanations and strategies as an individual or community, whilst acknowledging the role of risk and emotions in interdisciplinary contexts' (D2.1, p66)

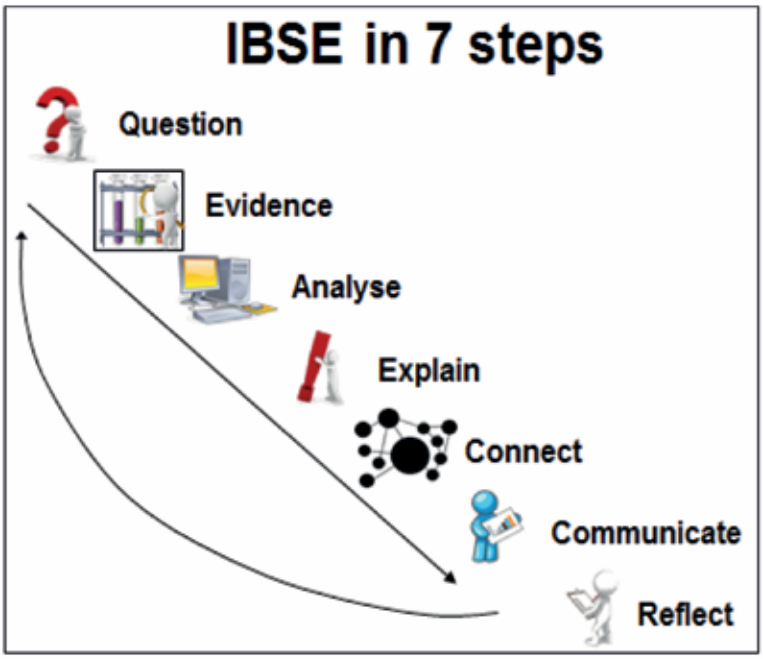
ΔΗΜΙΟΥΡΓΙΚΌΤΗΤΑ (CREATIVITY)

- Στοχευμένη και ευφάνταστη δραστηριότητα (Purposive and imaginative activity)
- Πρωτότυπα μαθησιακά αποτελέσματα (generating outcomes that are original and valuable in relation to the learner)
- Κριτική σκέψη και Αιτιολόγηση για την παραγωγή καινοτόμων ιδεών (critical reasoning - generating ideas and strategies)
- Ενδυνάμωση των μαθητών για τη συγκρότηση διανοητικής και συναισθηματικής ταυτότητας (Emotional engagement)
- Ανάπτυξη συγκεκριμένων στρατηγικών (explanations and strategies as an individual or community)
- Ανάληψη ρίσκου και διαχείριση συναισθημάτων (the role of risk and emotions)
- Υψηλό επίπεδο δημιουργικών δραστηριοτήτων (High expectations in skills of creative engagement)
- Συνυπευθυνότητα (Sharing responsibility for the creative idea)
- Διεπιστημονικότητα (Interdisciplinary)
- Καθημερινά και λειτουργικά περιβάλλοντα (Real life and functional contexts)

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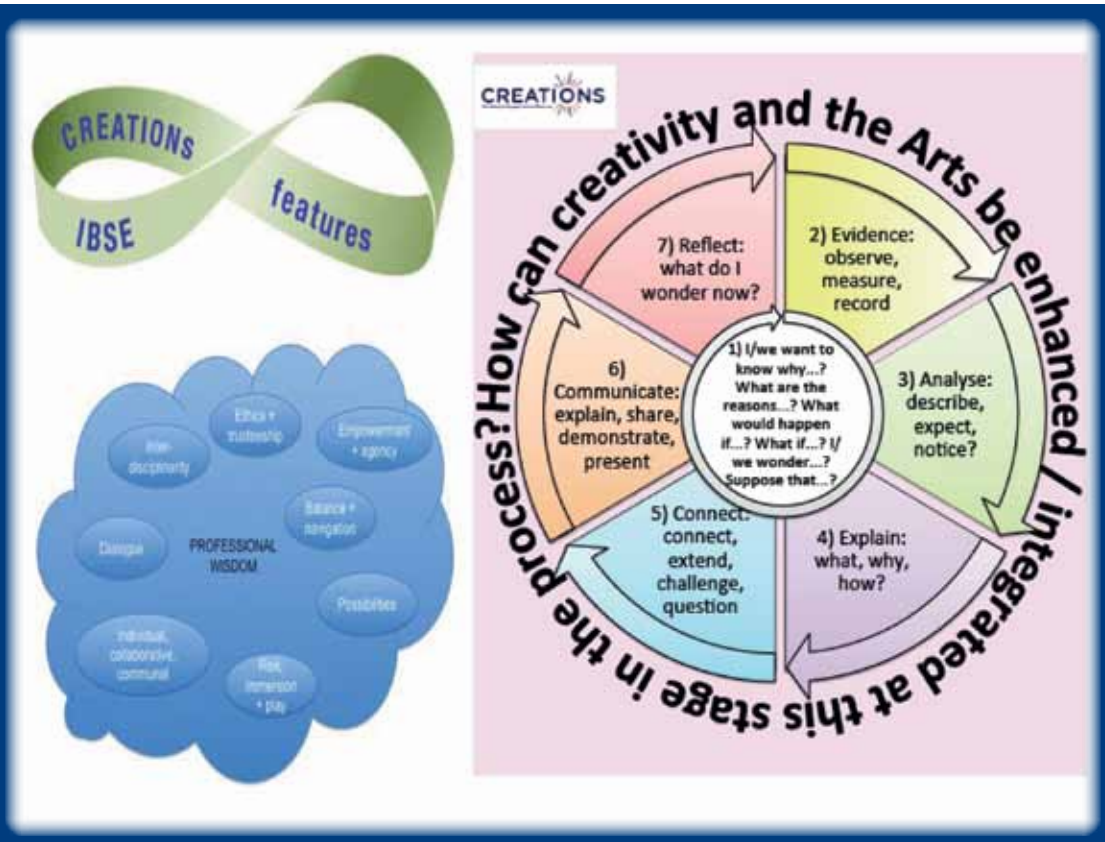
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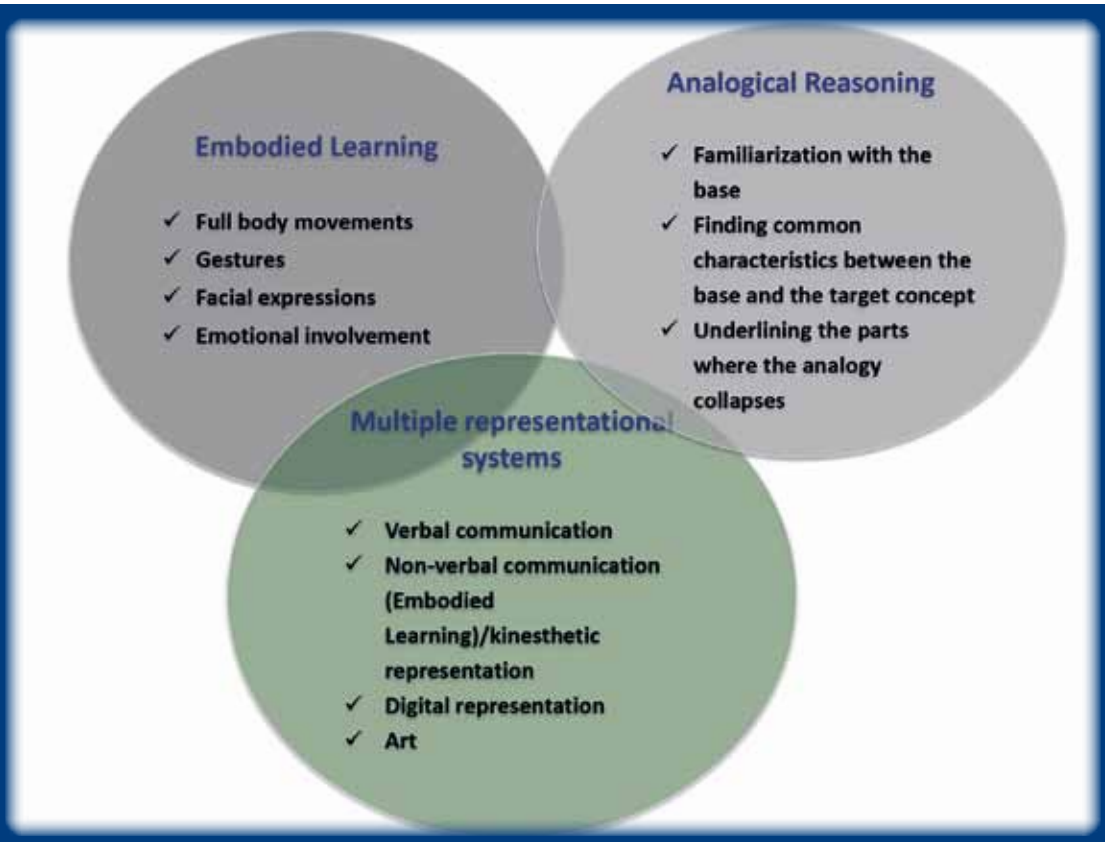
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Workshop 1

Σχολιάστε τις ακόλουθες τρεις εικόνες
ακολουθώντας τα ΘΠ που προαναφέρθηκαν

1. ....
2. ....
3. ....

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Workshop 2

1. Επιλέξτε ένα επιστημονικό θέμα για το LSTT
2. Δείτε το θέμα αυτό υπό το πρίσμα του RRI. Για παράδειγμα ποιος θα μπορούσε να είναι ο ρόλος της κοινωνίας ή του κοινωνικο-πολιτισμικού πλαισίου;
3. Δείτε το θέμα αυτό υπό το πρίσμα του Inquiry. Για παράδειγμα ποιες θα μπορούσαν να είναι οι δράσεις επικοινωνίας/ δημοσιοποίησης του εν λόγω θέματος;
4. Δείτε το θέμα αυτό υπό το πρίσμα του Creativity.
5. Δείτε το θέμα αυτό υπό το πρίσμα του Embodied learning (εκφράσεις προσώπου, κινήσεις ολόκληρου του σώματος, συναισθηματική εμπλοκή,...) ή/και του Αναλογικού Συλλογισμού (Analogical Reasoning)
6. Δείτε το θέμα αυτό υπό το πρίσμα των διαφορετικών σημειωτικών συστημάτων

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Assoc. Prof. Zacharoula Smyrnaiou, ***National and Kapodistrian University of Athens***

Συζήτηση

- Σύγχρονα Θεωρητικά Πλαίσια (**RRI, Inquiry, Creativity, Embodied Systems, Representational/Semiotic Systems, Analogical Reasoning**)
- Ο ρόλος του κοινωνικο-πολιτισμικού πλαισίου; (εποχή που έζησε ο επιστήμονας, σημερινή εποχή, θέματα που απασχολούν το σημερινό πολίτη, …)
- Ο ρόλος διαφορετικών μαθησιακών αντικειμένων; (λογοτεχνία, ιστορία, …)
- Ο ρόλος διαφορετικών αναπαραστασιακών συστημάτων; (ψηφιακό, ενσώματο, λεκτικό…)
- Ο ρόλος των τεχνικών θεάτρου (παύσεις, εγκιβωτισμένη αφήγηση, σκηνές από τα παρασκήνια, θεατρικό παιχνίδι (οριοθέτηση χώρου, έκφραση συναισθημάτων, δημιουργία ομάδας, οικοδόμηση εμπιστοσύνης)

Presentation of the Web based communities of practice for the Initiative

"If Nature then, by her solidarity with Man, attains in Man her consciousness, and if Man's life is the very activation of this consciousness—as it were, the portraiture in brief of Nature,—so does man's Life itself gain understanding by means of Science, which makes this human life in turn an object of experience. But the activation of the consciousness attained by Science, the portrayal of the Life that it has learnt to know, the impress of this life's Necessity and Truth, is—Art".

(Richard Wagner, "The Art-Work of the Future", Translated by William Ashton Ellis, chapter 2)

CREATIONS
Developing an Engaging Science Classroom

H2020-EU.5., H2020-EU.5.a.
Project reference: 665917

Funded with the "Horizon 2020 Framework of the European Commission"

CREATIONS SUMMER SCHOOL July, 2016

"Αν λοιπόν η Φύση απέναντι στον άνθρωπο αποκτά την συνείδησή της και αν η ζωή του ανθρώπου είναι η ίδια η ενεργοποίηση αυτής της συνείδησης, σα να ήταν η μικρογραφία αυτής της ίδιας της Φύση -έτσι η ίδια η ζωή του ανθρώπου αποκτά νόημα μέσα από την Επιστήμη, γεγονός που καθιστά αυτή την ανθρώπινη ζωή με τη σειρά του αντικείμενο της εμπειρίας. Αλλά η ενεργοποίηση της συνείδησης μέσω της Επιστήμης, η απεικόνιση της ζωής που μαθαίνει να γνωρίζει, η εντύπωση αυτής της αναγκαιότητας και η Αλήθεια της ζωής, είναι

η Τέχνη

(Ριχάρδου Βάγκνερ , "Το Έργο-Τέχνης του Μέλλοντος", Μετάφραση Ουίλιαμ Άστον Έλις, κεφάλαιο 2, ελεύθερη απόδοση: Π.Σ.)

CREATIONS
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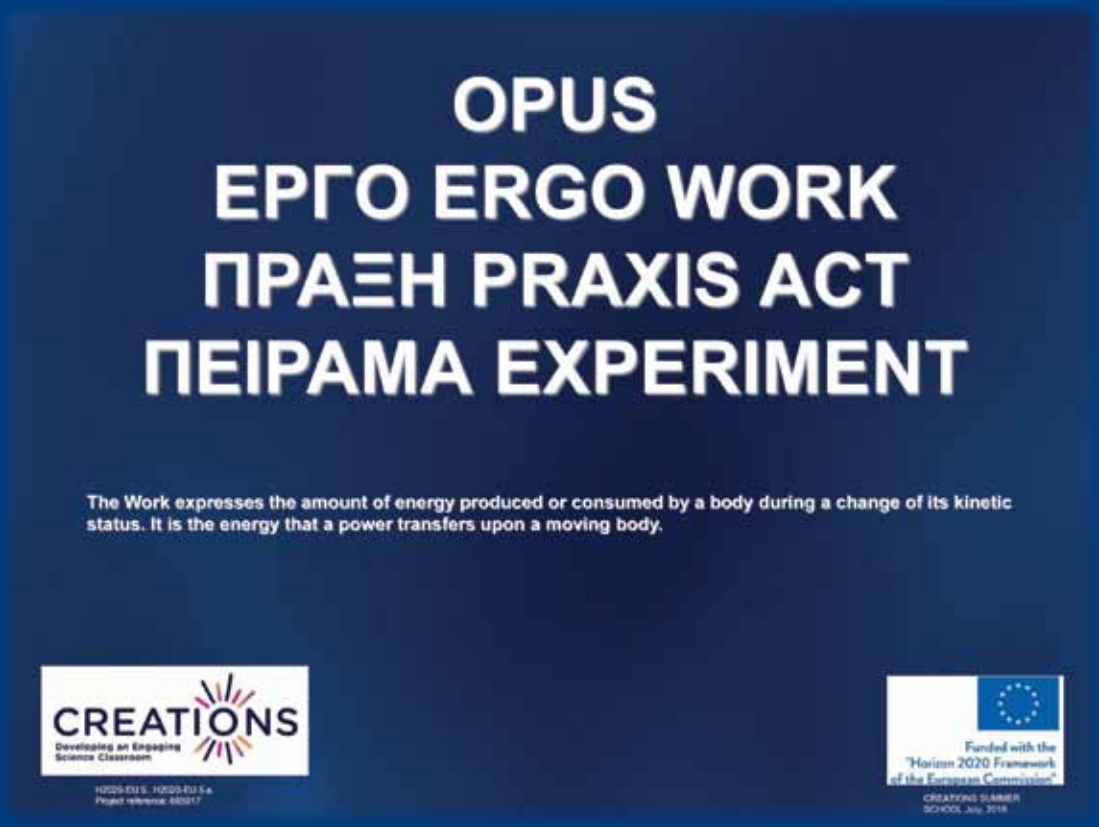
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A creative work ... when playing with Physics formulas

$$W = F*s \quad ...(!)$$

W is the final result of a creative work
F is the magnitude of all creative forces
s is the displacement between a static situation (usually a comfort zone) and a new creative state of cognition (usually a creative state of mind)

Assuming that forces are applied upon a mutually agreed direction...!

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Study of pitch and string tension

Florence 16th c.

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Camerata de' Bardi

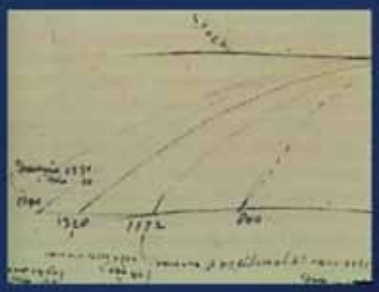
Florence 16th c.

Rebirth of the ancient Greek Tragedy



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Galileo Galilei

Projectile Impetus experiment



Inclined plane experiment

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The birth of an idea…

Write A Science Opera + Distance Learning Music Agoge



Screenshots from "Pappa kom Heim" Science Opera.
The music of one Opera scene was created, performed and multicasted in real time by students in three countries : Greece, Norway, Cyprus





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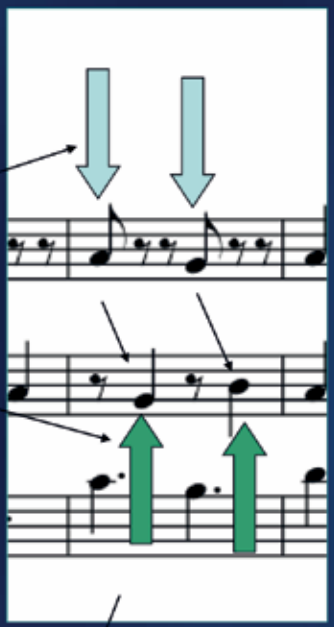
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A potential community of teachers in two continents

Hocket technique.

Notre Dame 13th / 14th c.



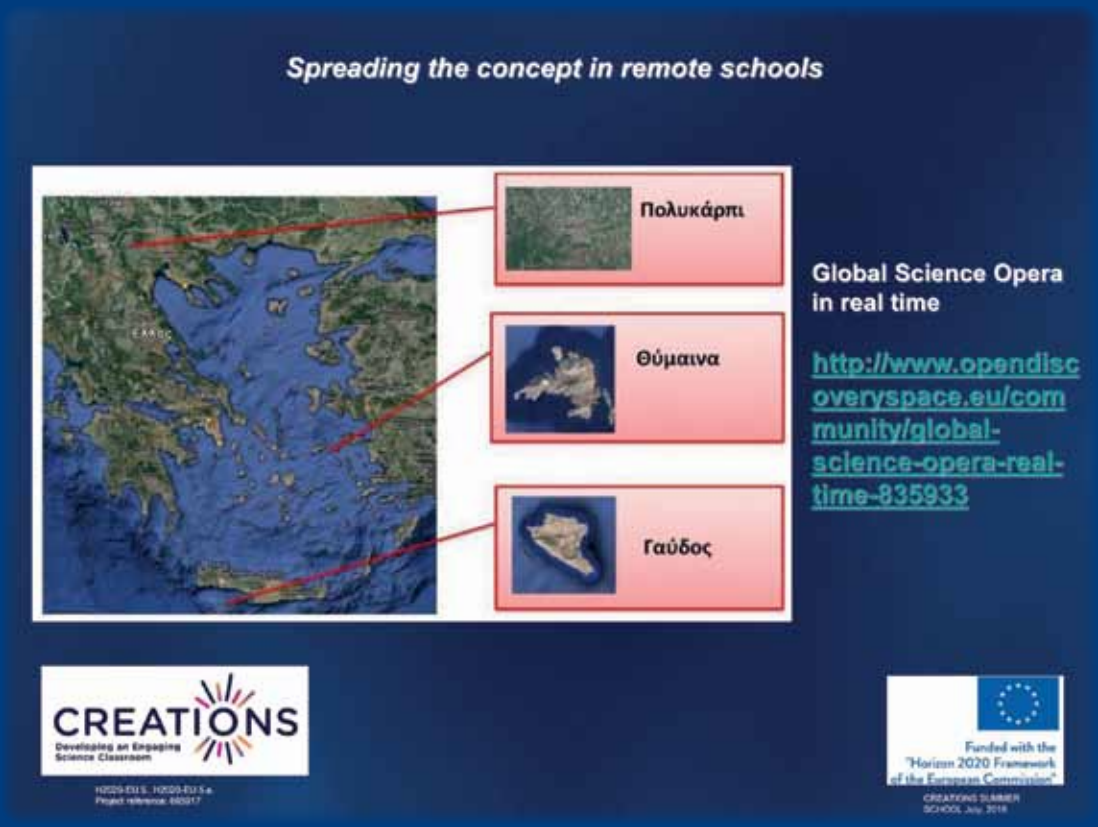


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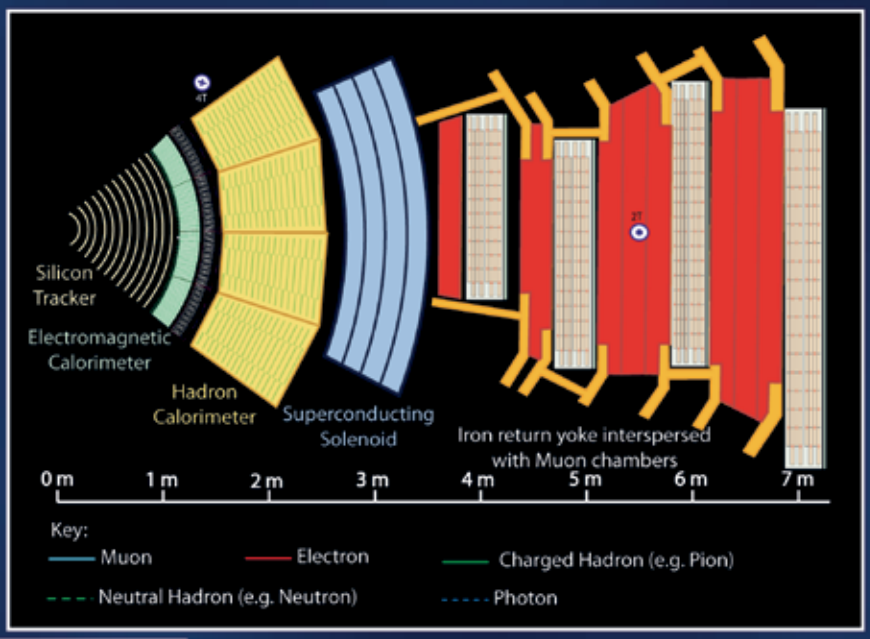
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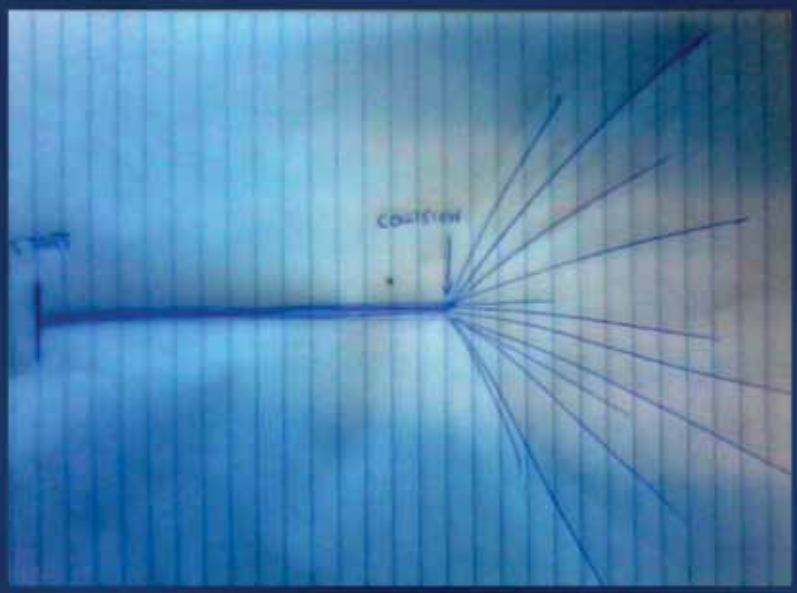


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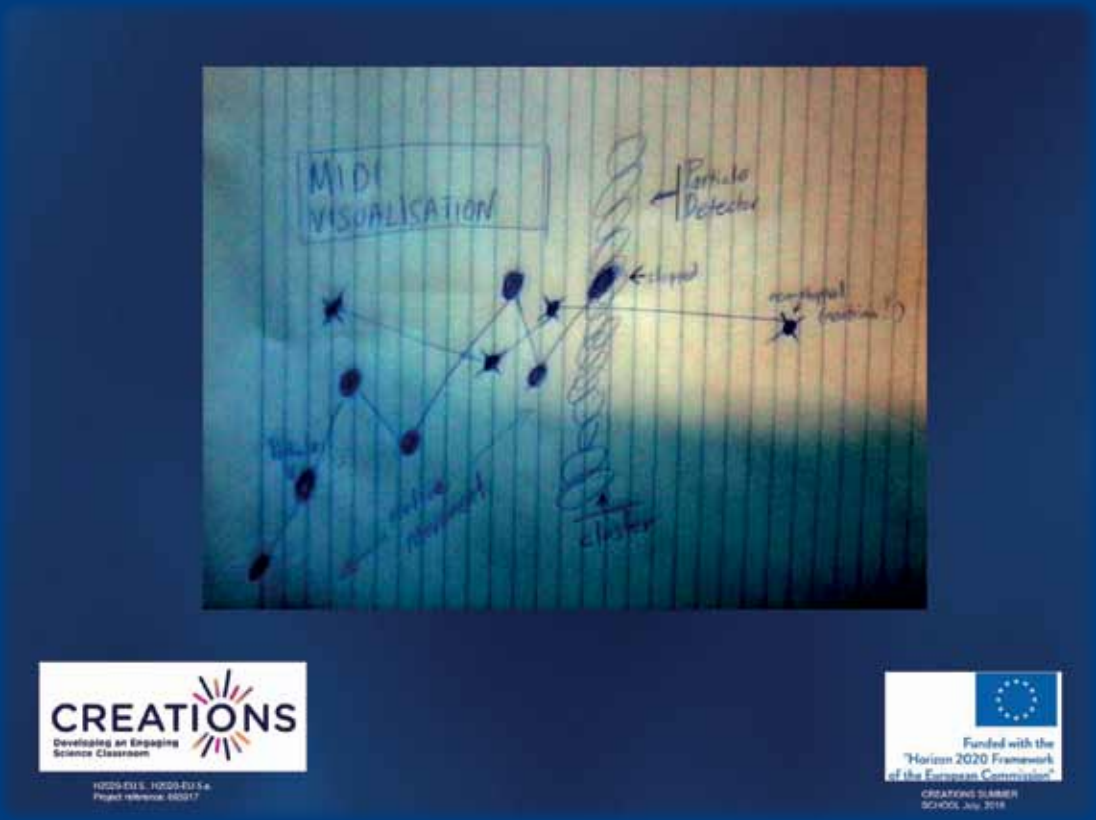
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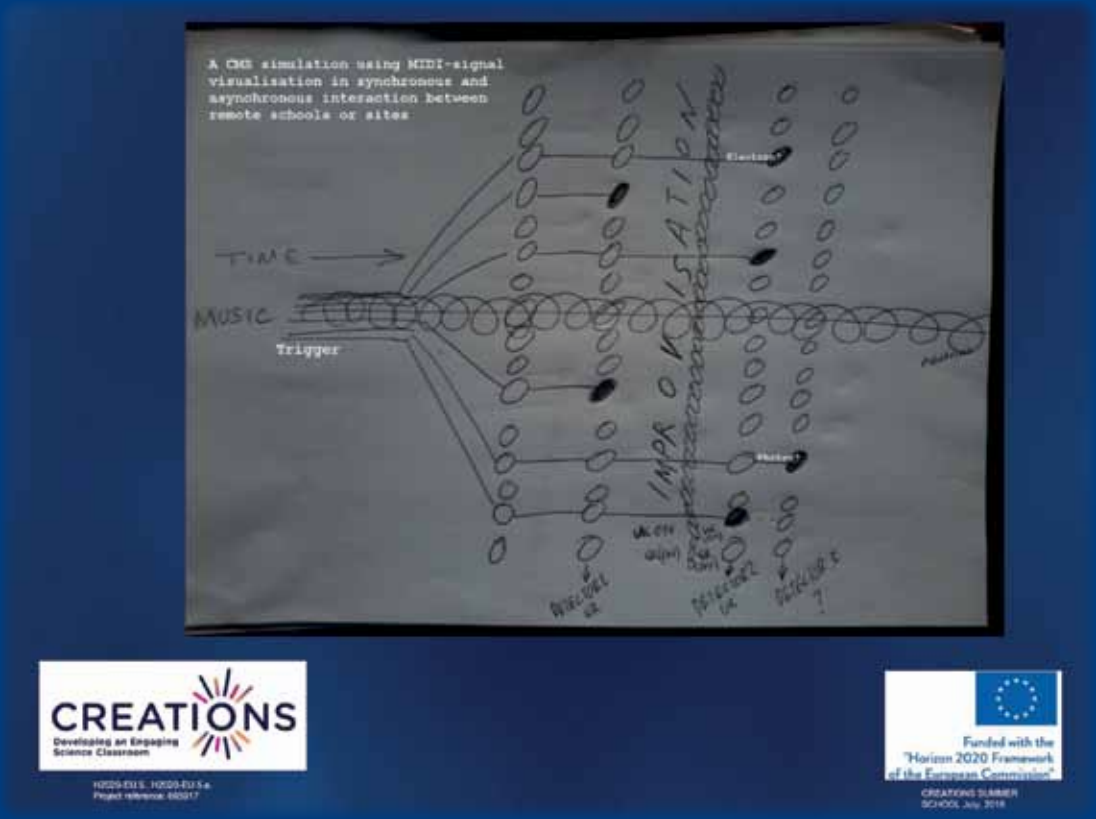


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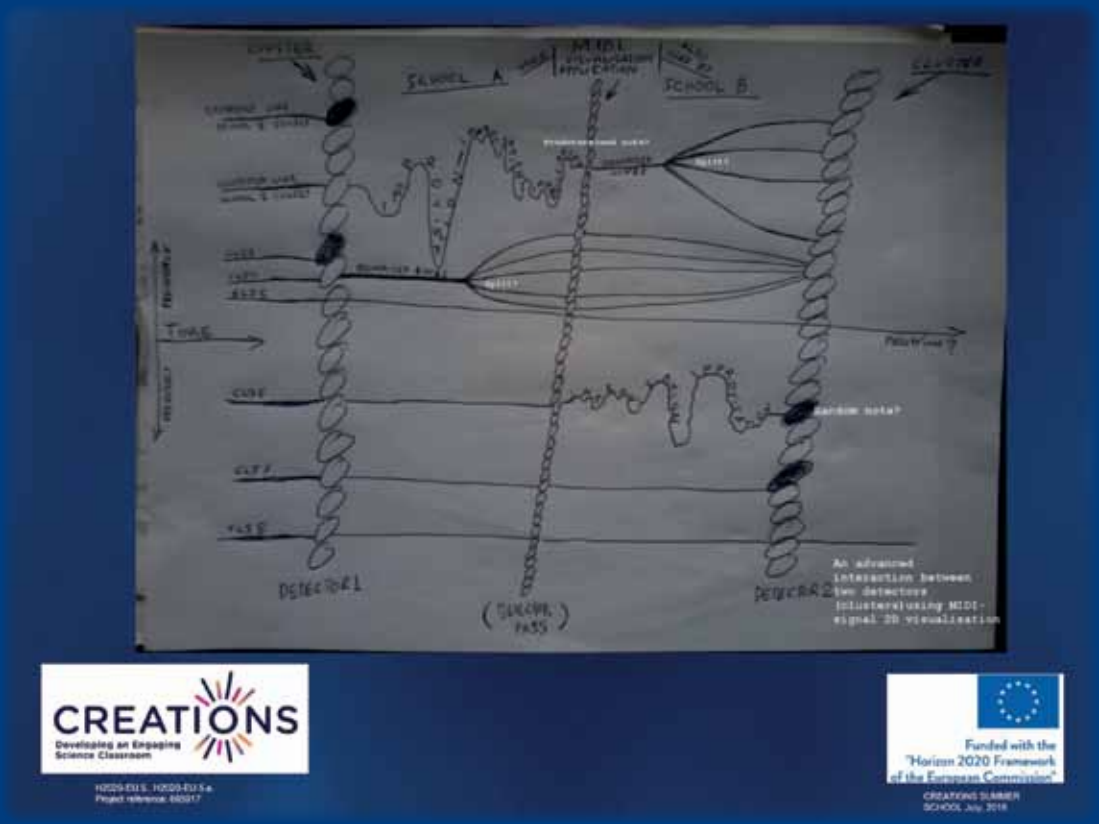
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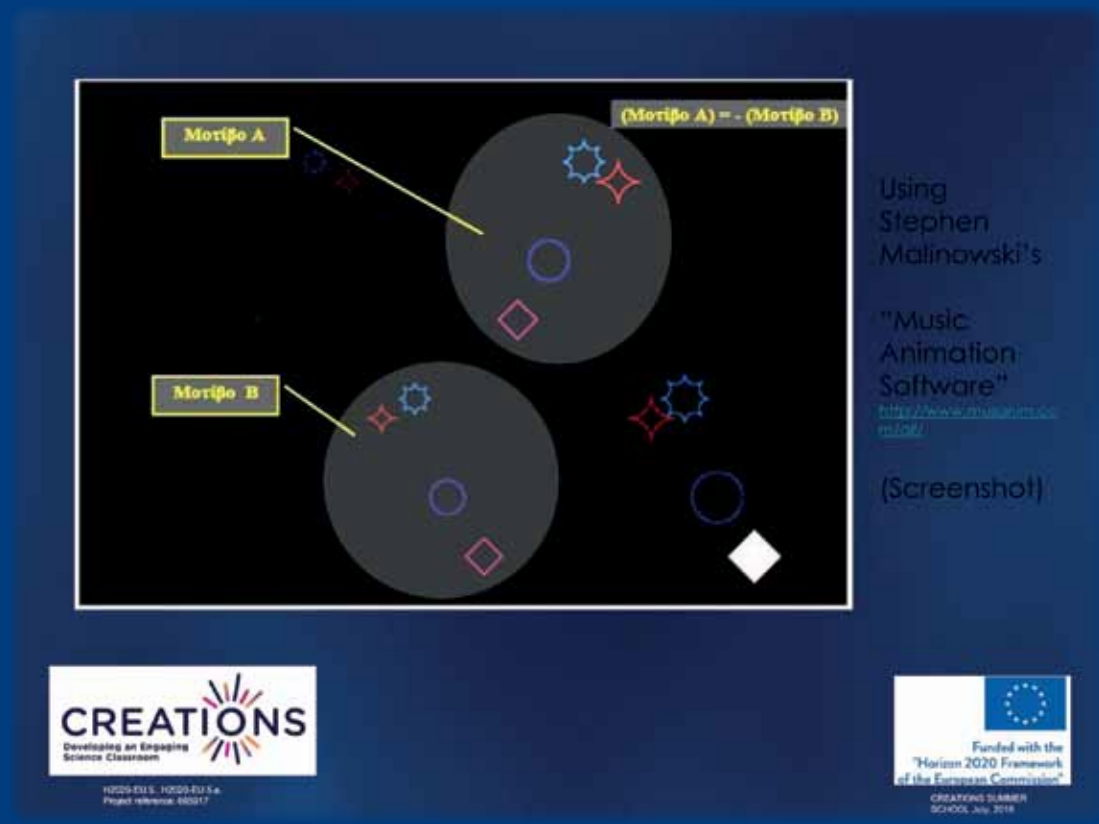
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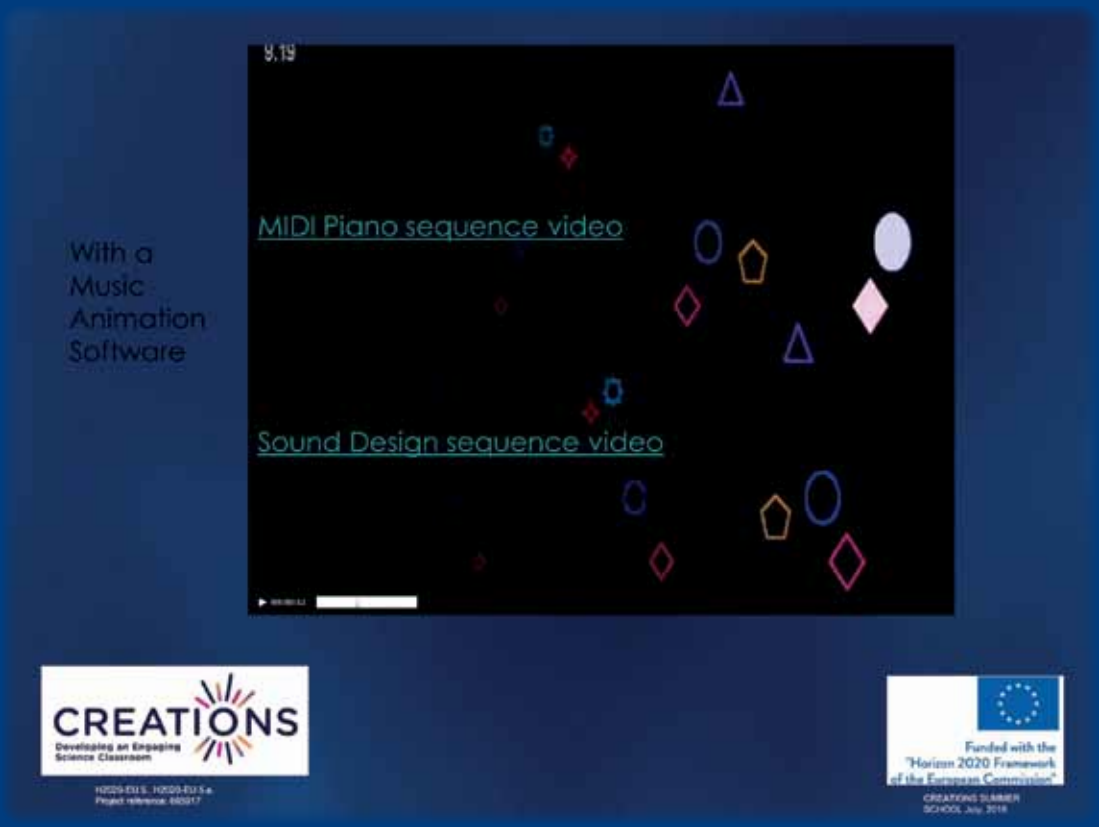
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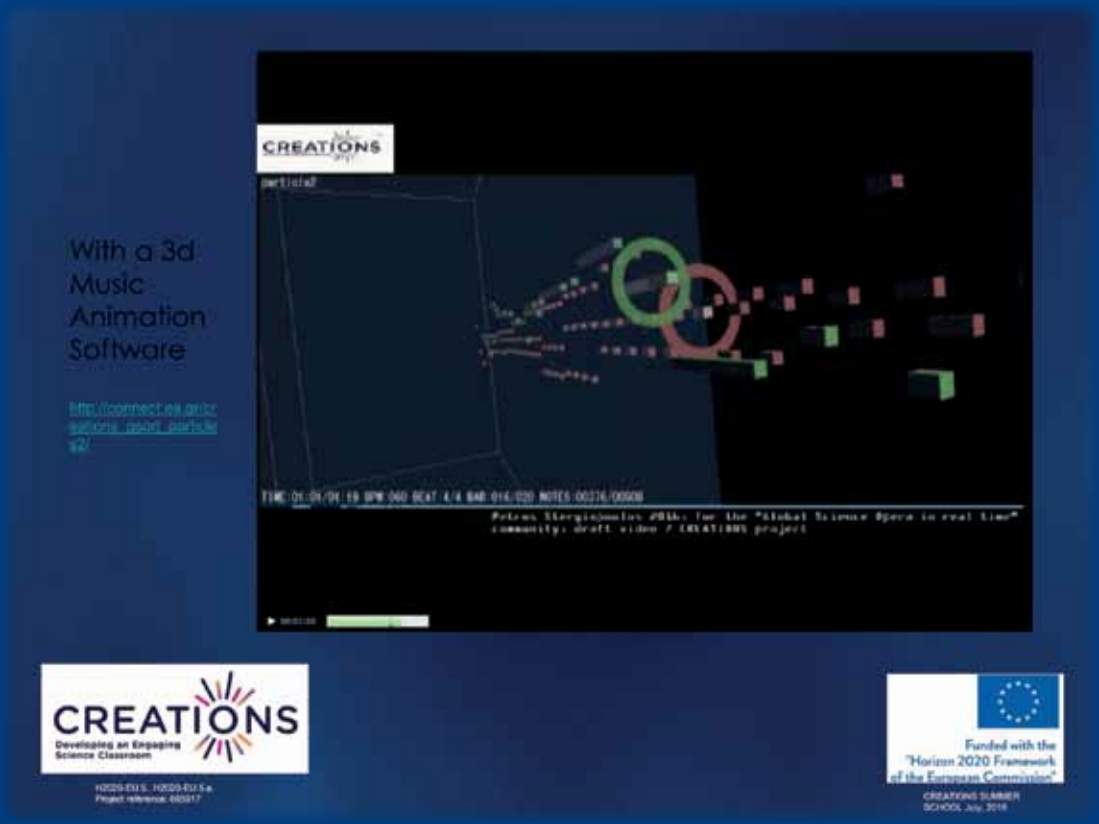


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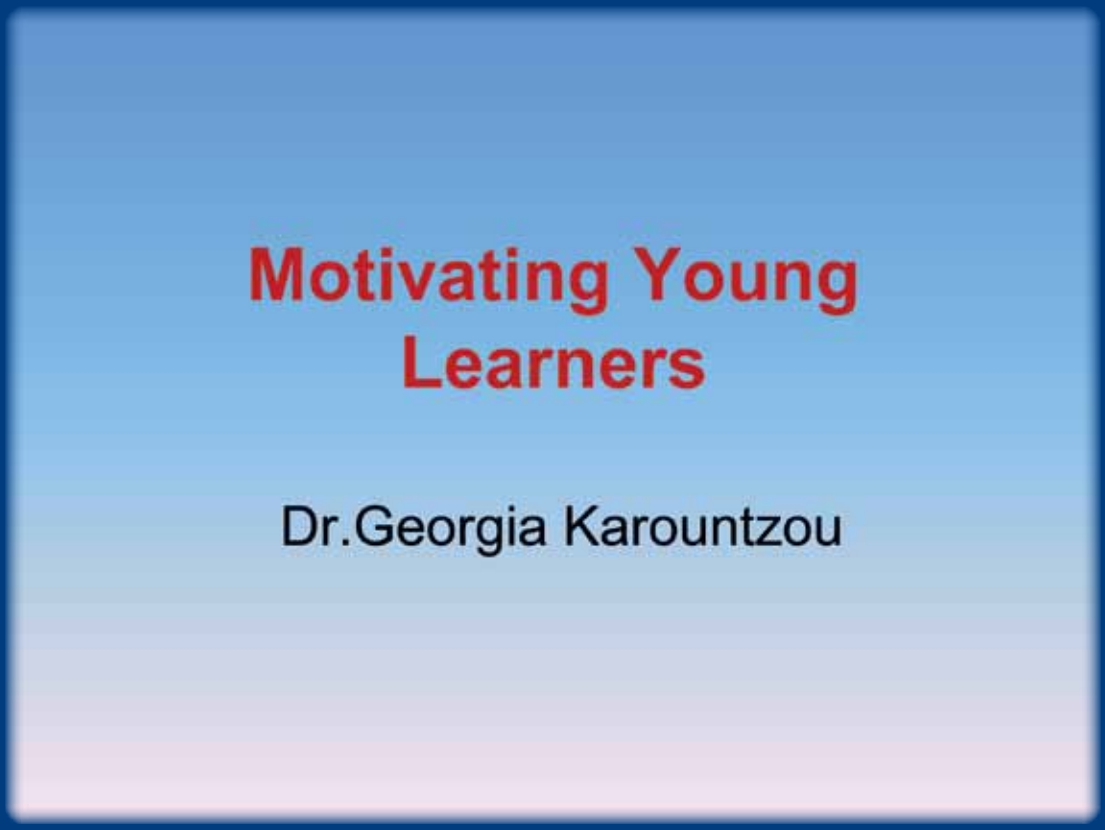


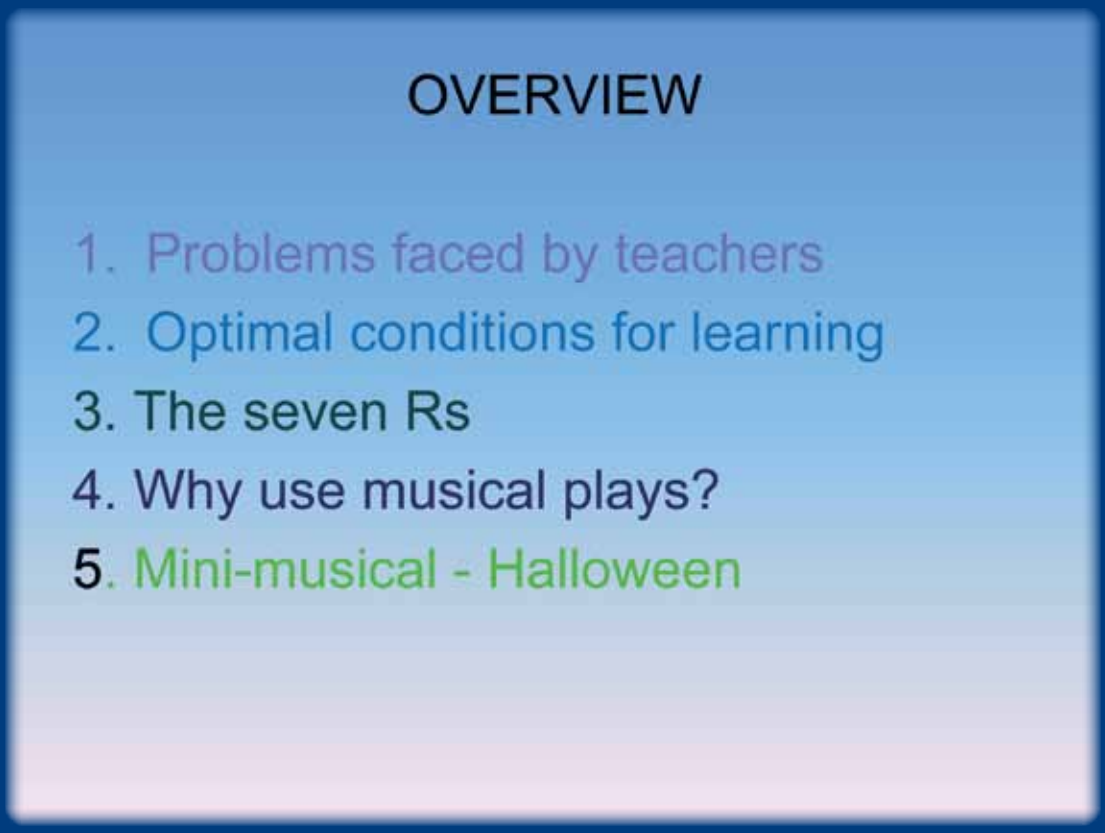
Presentation of the Web based communities of practice for the Initiative



Motivating young learners

Georgia Karountzou
Director of Scientific and Pedagogical Guidance in Primary Education, Peloponnese, region of Peloponnese





Motivating young learners

Georgia Karountzou
Director of Scientific and Pedagogical Guidance in Primary Education, Peloponnese, region of Peloponnese

1. Problems faced by teachers

Children…(*complete the sentence*)

have very short attention spans

forget things quickly

may not be fully confident in L1

may not be motivated to learn

may be frightened

develop at very different rates

can easily be overwhelmed

need effective language learning techniques, not just time fillers

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2. Optimal conditions

What are some of the optimal conditions for helping young learners to learn?

Learning is……

natural
contextualized and part of a real event
interesting and enjoyable

relevant
social
belongs to the child
has a purpose for the child
builds on things the child knows
makes sense to the child
is supported appropriately

Motivating young learners

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is part of a coherent whole
is multi-sensory
is active and experiential
is memorable
allows for personal, divergent responses
takes account of multiple intelligences

Also when…

the child is challenged appropriately
the child wants to learn
the learning atmosphere is relaxed and warm
the child has a sense of achievement

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3. The seven Rs

Provide an integrated framework for managing children positively and creating a happy working environment

Relationships

Creating and maintaining a positive relationship is at the heart of a happy learning environment

Rules

Establish a limited number of clear rules and the reasons for having them

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Routines

Classroom routines make it clear what is expected & what they should do

Rights & responsibilities

May not be stated explicitly with very young, but T can model through own actions which of these they value

Respect

Ss treated respectfully will respond in similar way. If T treats as individuals, they will respond as individuals and not with collective group mentality

Rewards

Effective way of reinforcing appropriate behaviour – stars, stickers, points etc.

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4. Why use musical plays?

Excuses

I can't use musical plays because…

a) the children will _____ and I won't be able to _____ them.
b) I don't have _____ for that.
c) I can't _____ or _____.

the children will make too much noise and I won't be able to control them.

I don't have time for that.

I can't act or sing.

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Children use drama naturally – always in the land of make-believe and slip in and out of multiple roles

Children love being part of something – all involved – shyest & most outspoken

A bonding experience for the group

Drama & musical plays are methods of teaching more effectively

It doesn't matter if you can't act or sing – the children will do this and they are experts!

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Why use musical plays?

outi-slnsermy	ioretntne	uleyncf
nglernai tlssye	nlieltcet	icrnuonitonap
oicdcenenf	ianoimotvt	nomaiiignat
losaci sislkl	senmioto	dxemi yailitb

Multi-sensory – see, hear, act

Cater to different **learning styles**

Help with **pronunciation** of new words

Retention - help learners to remember new words and phrases and anchor texts in long-term memory

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Promote speaking skills - **fluency** and **confidence** – listen and repeat lines

Develop and reinforce **social skills** – be considerate, listen to each other

Ideal for **mixed ability** groups
Also, shy learners can present own personality in fictional character / chorus

Involve **intellect**, **imagination** & **emotions**

Motivation - motivating for them to perform – in front of an audience

Combination of music, language & action makes children express and challenge themselves in a musical context

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5. Mini-musical – Halloween

Preliminary preparation of vocabulary

Read word – Ss listen and point

Translate ?

Close eyes, listen, see on inner TV

Dictionary with no words – Ss say – practice pronunciation

Pairs – with picture dictionary
- A covers word
- B says it

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Introduce characters and story

Design acting area and stage set

Hollowed-out pumpkins with faces
Ss pictures
Bats, spiders on coloured cards
etc.

Props, masks, costumes

Bag for sweets, sweets, white sheets

Witch masks

T-shirts for chorus – same colour

Halloween costumes

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Teaching our local learning

- The Tsakonian region is the area defined from Leonidio to Agios Andreas (a total of 12 villages).In this region, a linguistic dialect based on the Ancient Doric, the Tsakonian, is spoken. It is included in the UNESCO's catalogue for languages under threat of extinction. At the Primary School of Leonidio there is a timeless effort to preserve the language, to have students learn it, and to record it.

- In our everlasting effort, we deemed necessary the scientific recording of the words of the Tsakonian language in the form of a dictionary with both morphological and audio documentation of it. The material produced can be used in the learning process through the development of computational linguistic applications not only for its use by students in order to produce written texts but also for further scientific research by

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Books on wheels



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Encouraging reading



Creative writing



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Theatre play -LYSISISTRATI

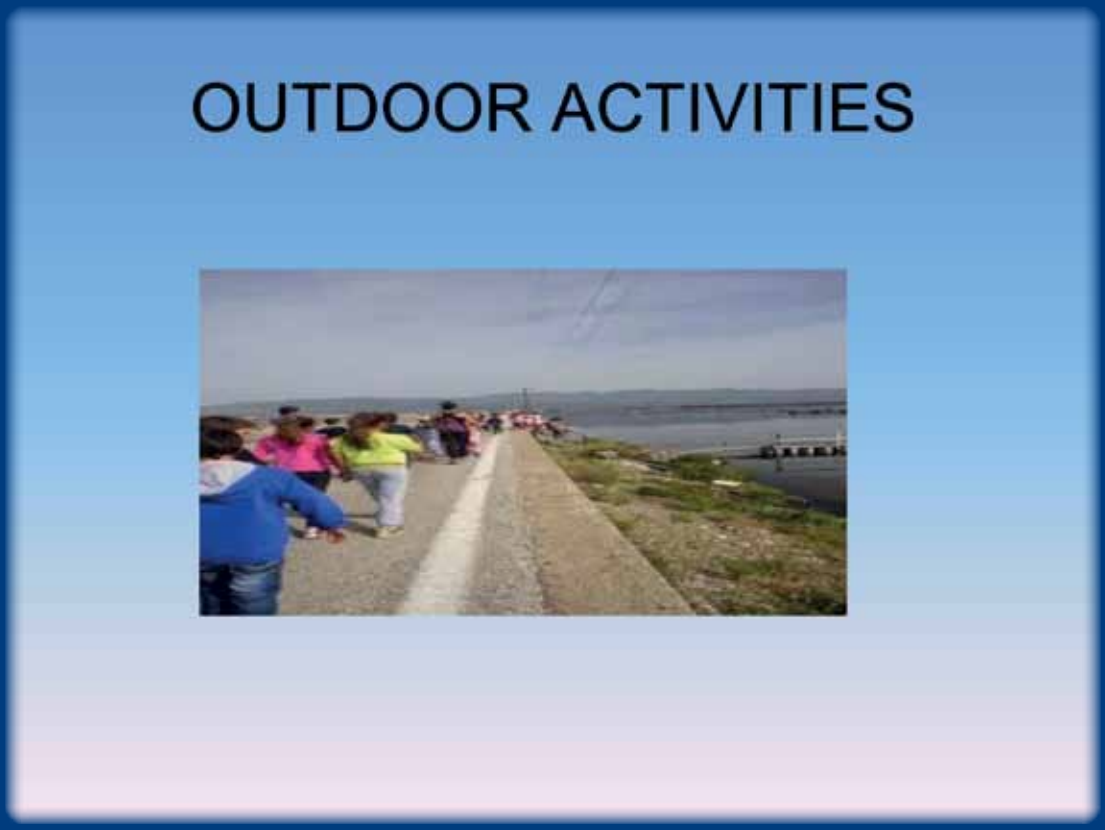


ELEMENTARY SCHOOL



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ENVIRONMENTAL EDUCATION



SCHOOL GARDENING



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MAKING HOT-AIR BALLOONS



EASTER' S TRADITION IN LEONIDIO ARCADIAS



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Go Lab





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Our effort as a School advisor

- oraganising seminars for our teachers in innovative teaching methods
- as being in charge at our perfecture
- Having already planned seminars for our School advisors in Inspiring science Education and Go lab European project with Mrs Panagiota Argyri in November

- https://youtu.be/FeTB8YshKNY?t=19

The case of the primary school of Giannitsochori

Karaggeli Kyriaki Maria





The case of the primary school of Giannitsochori

Karaggeli Kyriaki Maria





The case of the primary school of Giannitsochori

Karaggeli Kyriaki Maria

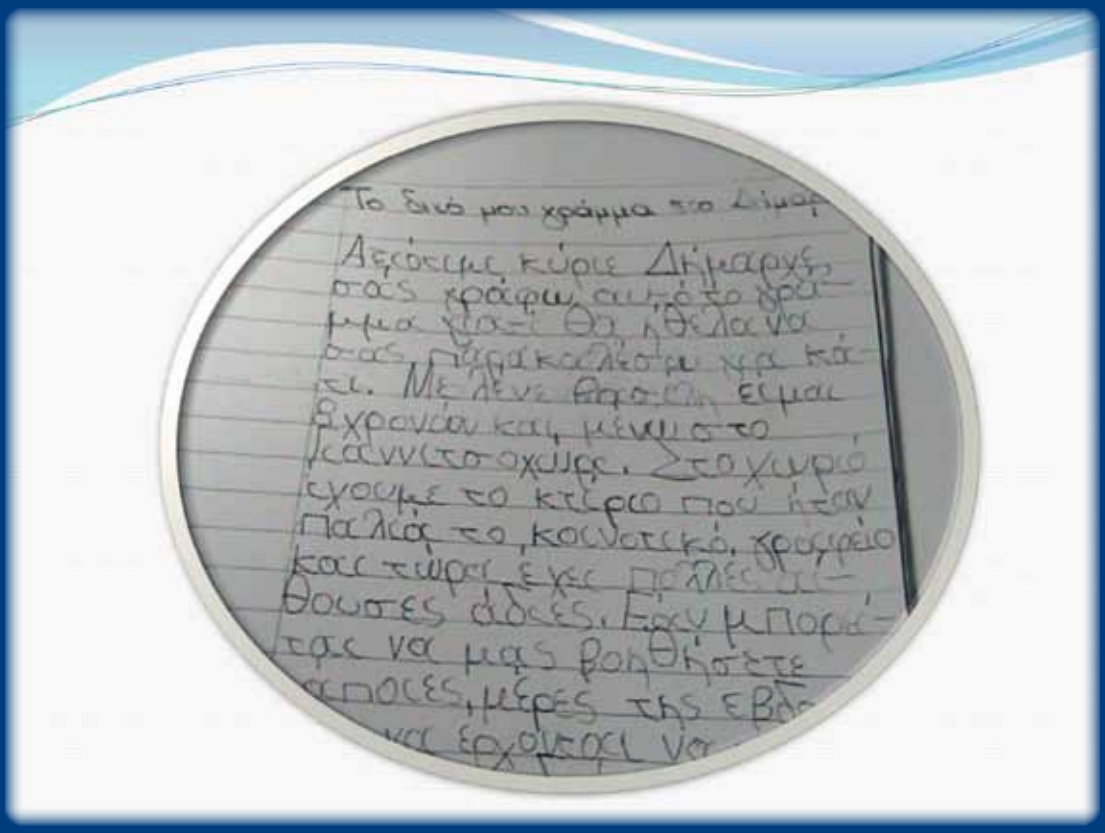




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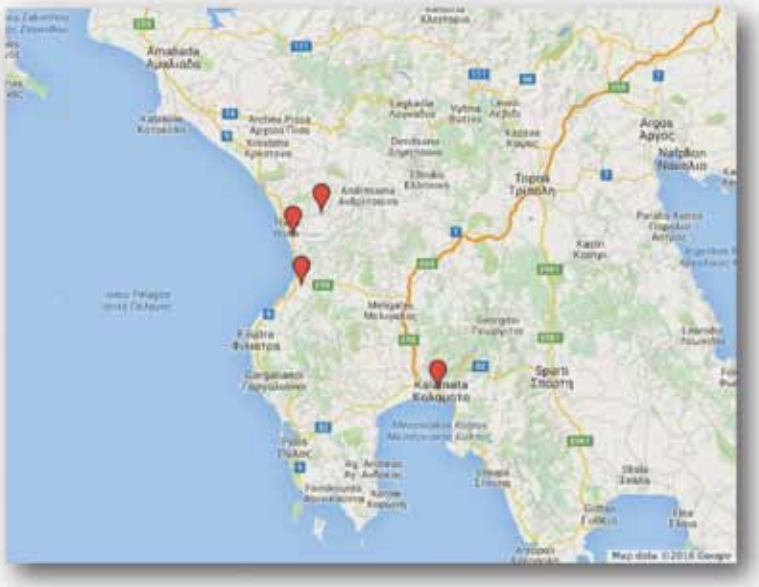
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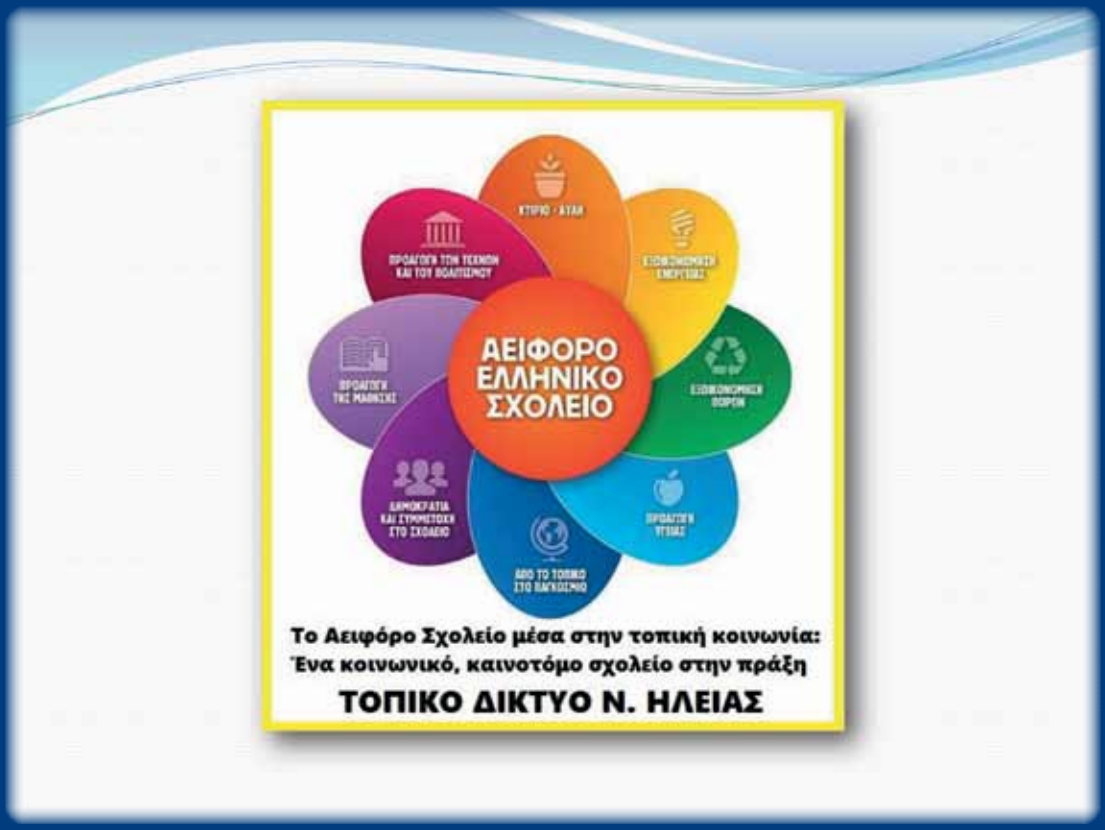
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KALAMATA : 21
www.kalamata21.eu

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ΣΥΛΛΟΓΟΣ ΓΟΝΕΩΝ
& ΚΗΔΕΜΟΝΩΝ
ΔΗΜΟΤΙΚΟΥ ΣΧΟΛΕΙΟΥ ΕΠΙΤΑΛΙΟΥ



The case of the primary school of Giannitsochori

Karaggeli Kyriaki Maria

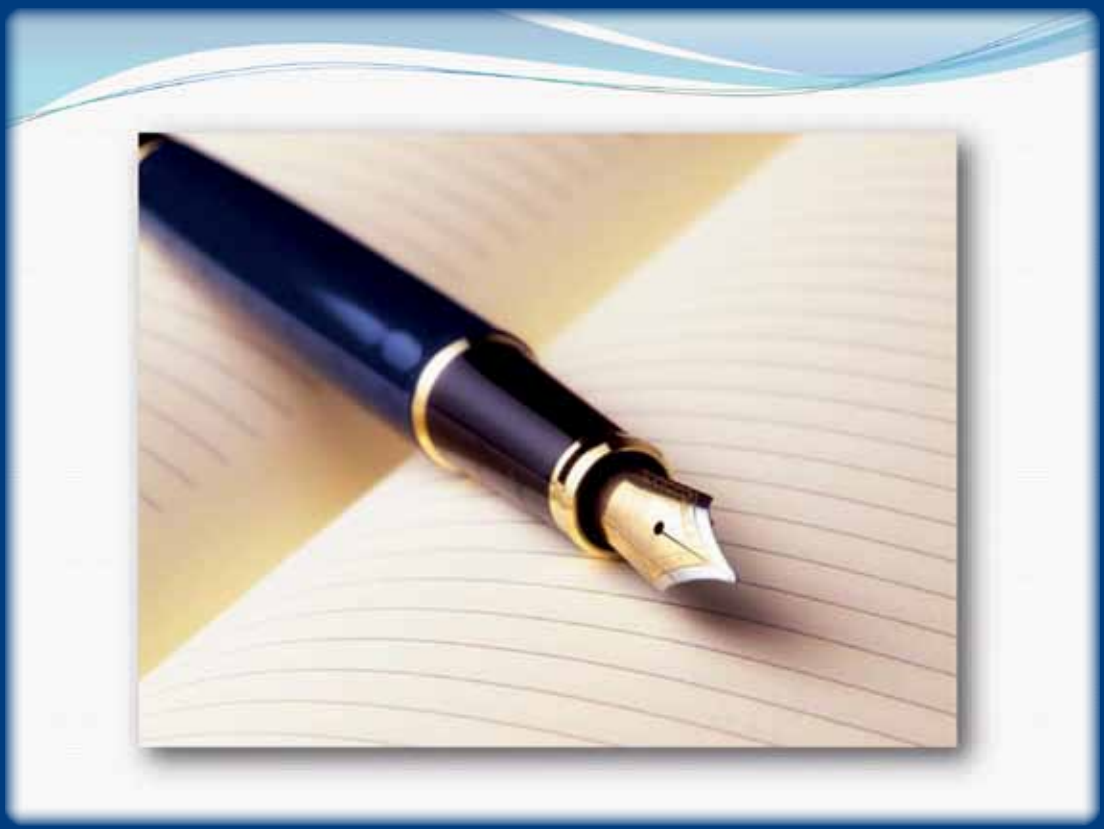




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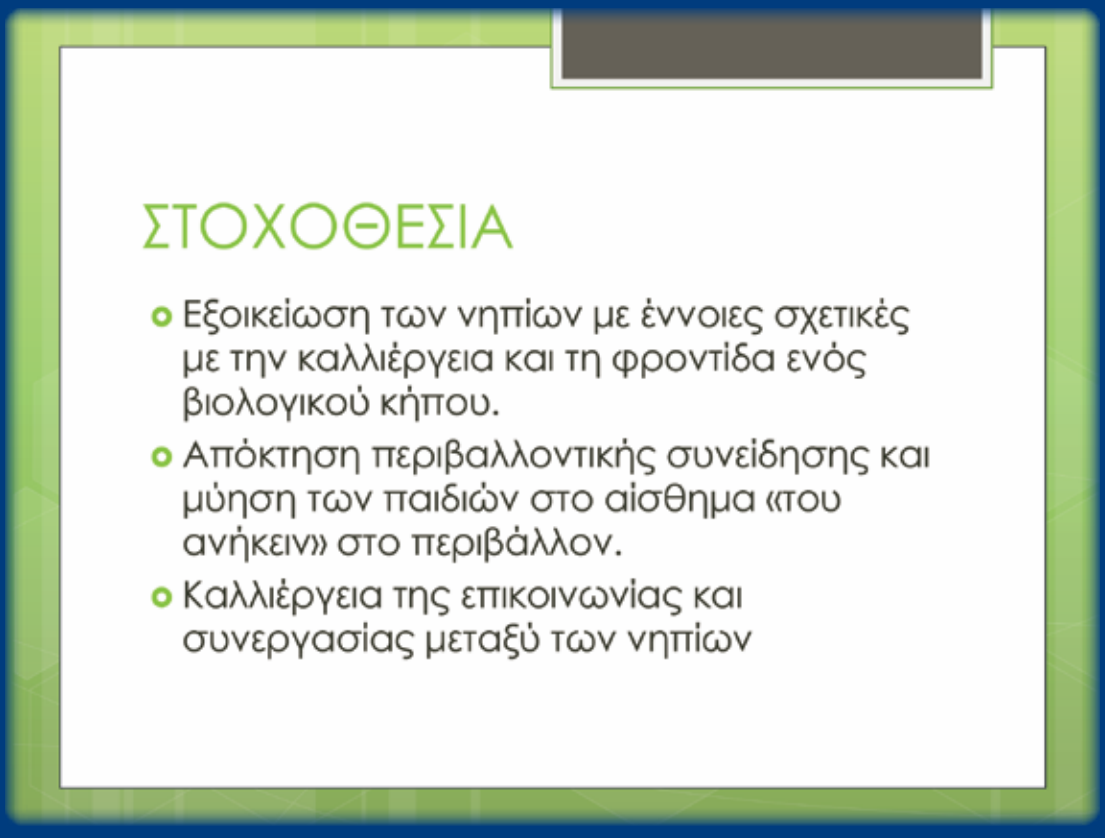
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"The garden of our dreams" - An interdisciplinary approach for the development of environmental awareness of children

Stathi Kelly, Aggelakou Maria, Natsikou Giota, Tsoutsia Aggelika, Kalkantara Karolina
Ellinogermaniki Agogi





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Σχεδιασμός: Ποιοτικά και ποσοτικά χαρακτηριστικά της ομάδας των παιδιών

- Νηπιαγωγείο Ελληνογερμανικής Αγωγής
- Σχολικές χρονιές: 2013-2014, 2014-2015
- Χρόνος υλοποίησης: αρχές Νοεμβρίου-τέλος Μαΐου
- Χώρος: κήπος, τάξη, εξωσχολικοί χώροι
- Ηλικία παιδιών: 5-6 χρονών
- Αριθμός παιδιών: 140
- Αριθμός τμημάτων: 5
- Αριθμός εκπαιδευτικών: 5

Χαρακτηριστικά ομάδας:

- Ομοιογενής εθνική προέλευση
- Κοινή μητρική γλώσσα
- Ομοιογενές κοινωνικοοικονομικό υπόβαθρο

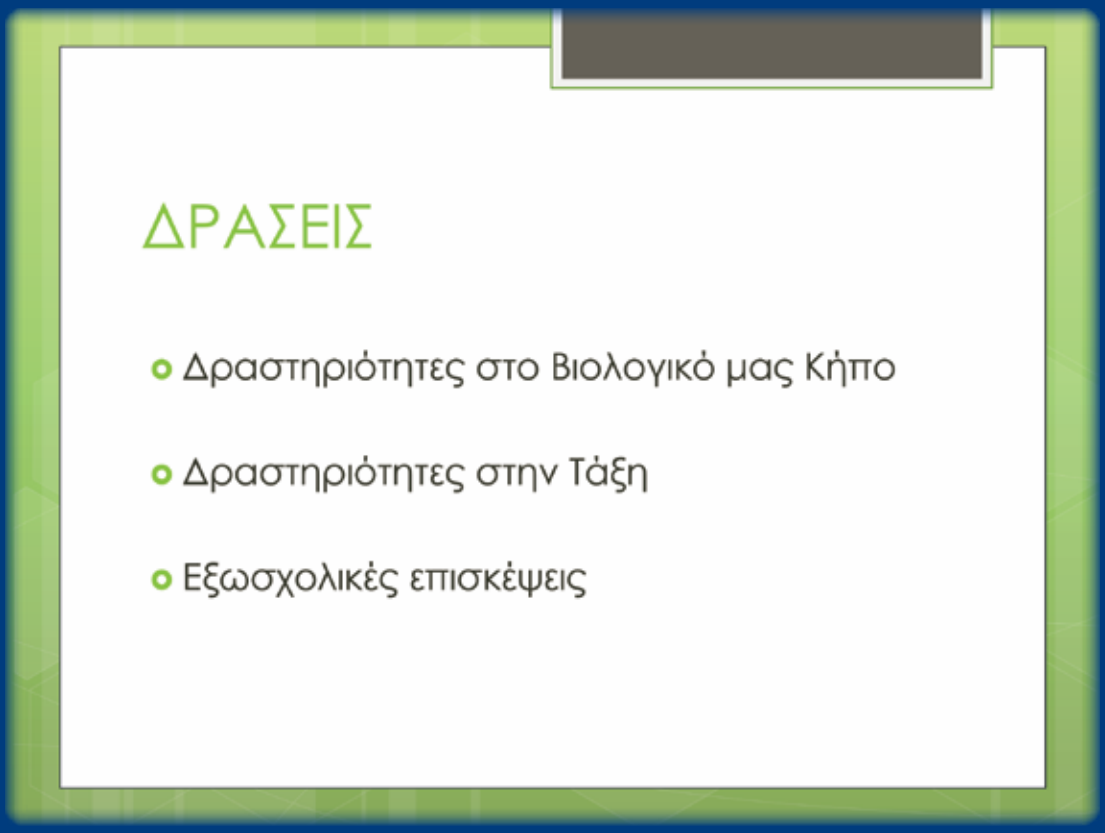
Παιδαγωγική προσέγγιση

- Αρχές Διερευνητικής Μάθησης (Discovery Learning, Bruner)
- Μαθητοκεντρισμός
- Αρχές του Εποικοδομητισμού

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Δραστηριότητα 1η:
Συνάντηση στο κιόσκι του κήπου μας



Δραστηριότητα 2η:
Επιστροφή στη φύση



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Δραστηριότητα 3η:
Ένα σποράκι είμαι εγώ…Δείτε τι θέλω για να αναπτυχθώ



Δραστηριότητα 4η:
Με κέφι, μεράκι και χάχανα, φυτέψαμε τα πρώτα μας λάχανα!



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Ellinogermaniki Agogi

Δραστηριότητα 5η:
Στο μικρό μας κήπο βοηθός...ο βροχερός καιρός.



Δραστηριότητα 6η:
Ο λαχανόκηπος μπαίνει στις τάξεις μας.



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Δραστηριότητα 7η:
Εγκαίνια του κήπου μας



Δραστηριότητα 8η:
Καλή Αντάμωση!



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Δραστηριότητα 9η:
Πειράματα και θαύματα στο μικρό μας κήπο.



Δραστηριότητα 10η:
Τις απορίες για να λύσω, τα φυτά μου θα μετρήσω.



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Δραστηριότητα 11η:
Πράσινη αγορά. Εδώ, τα καλά μαρούλια!



Δραστηριότητα 12η:
Γεια στα χέρια μας!



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Δραστηριότητα 13η:
Τα φυτά αναπνέουν.



Δραστηριότητα 14η:
Ταξιδεύοντας με ένα βιβλίο…σε έναν κήπο στις Αχαρνές.



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Δραστηριότητα 15η:
Δύο παράξενοι επισκέπτες.



Δραστηριότητα 16η:
Μια τηλε - φιλία χτίζεται.



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Δραστηριότητα 17η:
Μια τηλε - φιλία συνεχίζεται...



Δραστηριότητα 18η:
« Ψάξε- ψάξε δε θα το βρεις»

Αίνιγμα 1ο

Αίνιγμα 2ο



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Δραστηριότητα 19η:
«Τίποτα δεν πάει χαμένο»
(κομποστοποίηση)



Δραστηριότητα 20η:
Διαδραστική Αφίσα « Ο Βιολογικός μας κήπος»

http://vatraxakia.ea.gr

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Δραστηριότητα 21η:
Μικροί και μεγάλοι ανθίσαμε από περηφάνεια.



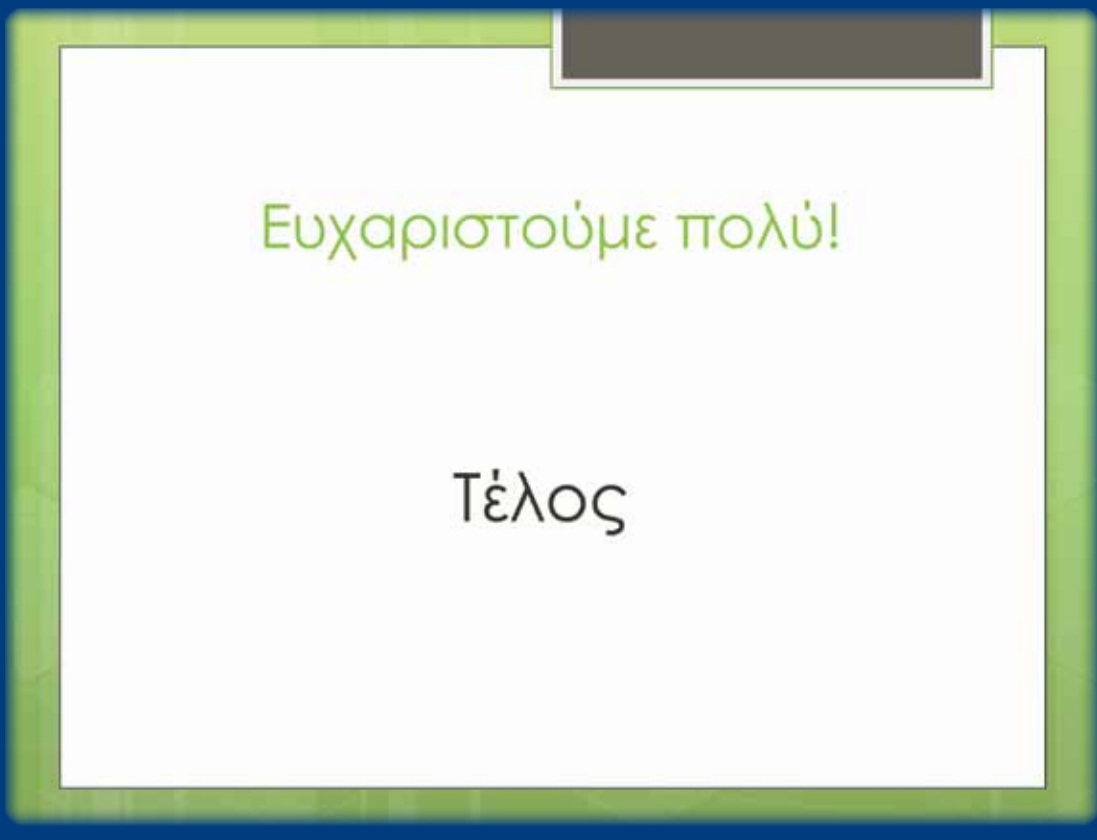
Δραστηριότητα 22η:
Ένας ηλεκτρονικο-βιολογικο-βοτανικός επίλογος



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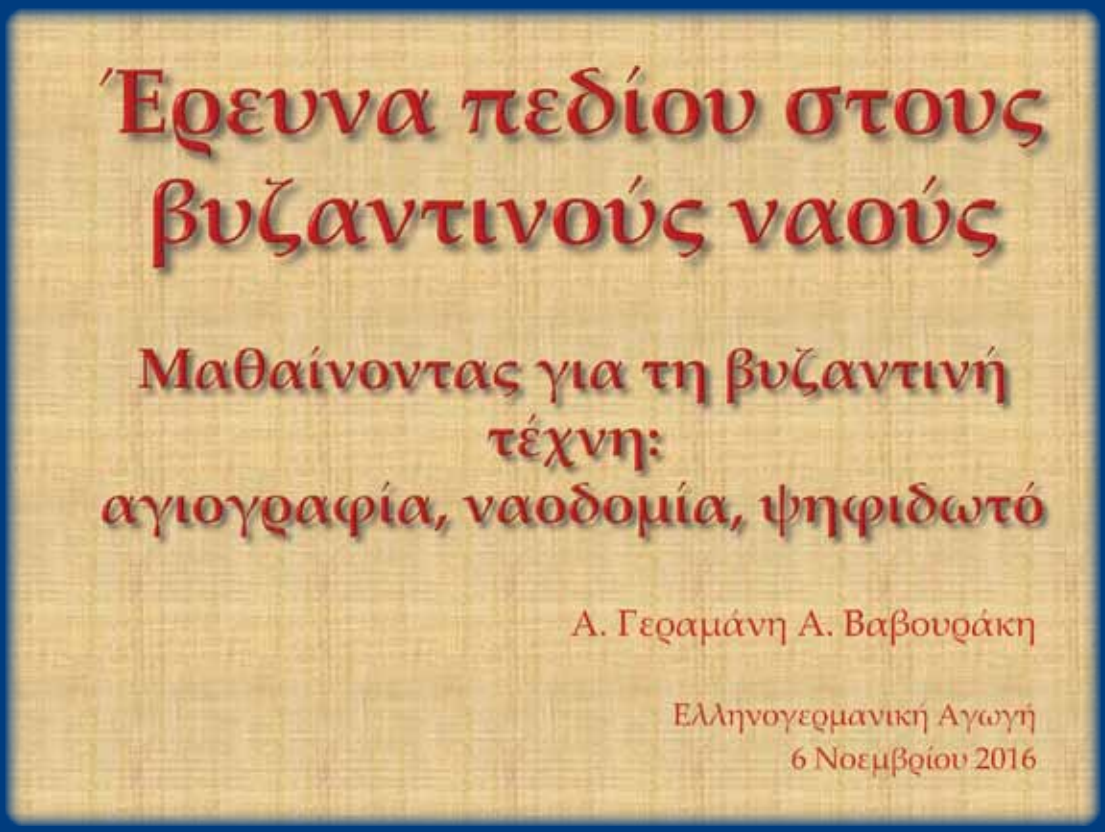
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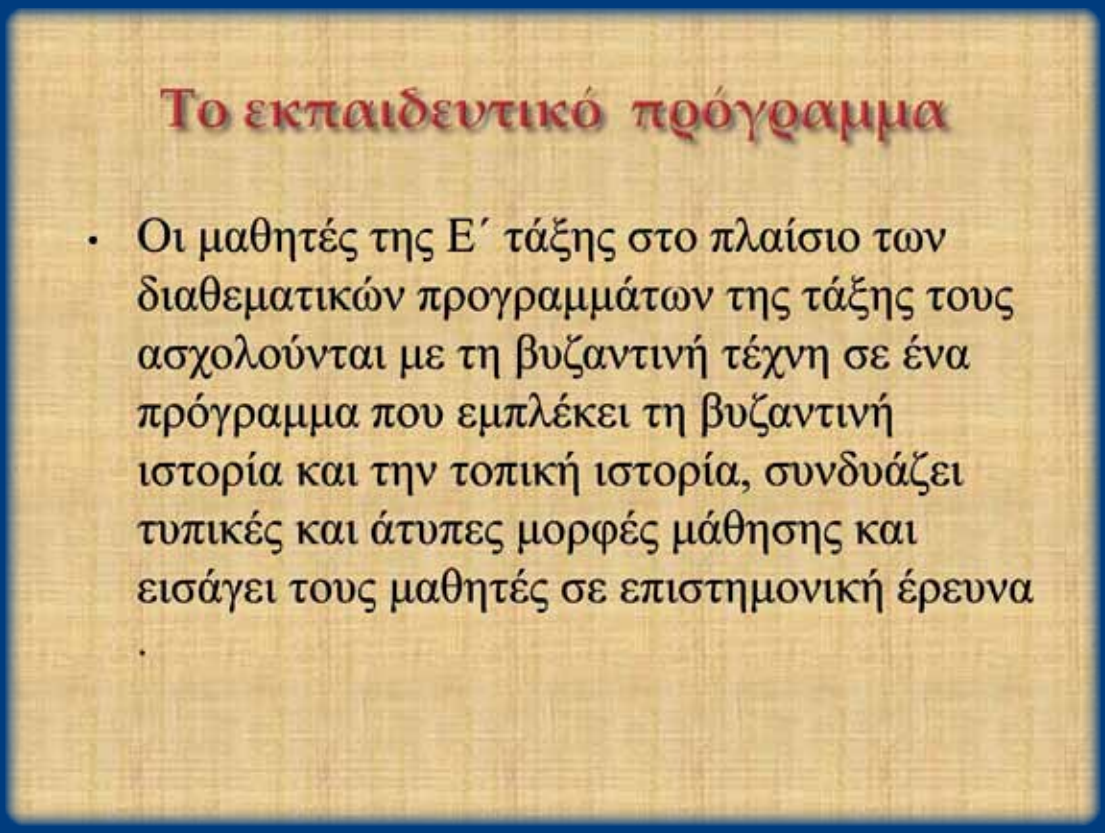




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Οι γενικές παιδαγωγικές αρχές

Ο προγραμματισμός και ο σχεδιασμός του προγράμματος εντάσσεται στον προσανατολισμό μας προς τον σχεδιασμό και την αξιοποίηση διαθεματικών εκπαιδευτικών προγραμμάτων που:

- Ενθαρρύνουν την ενεργό συμμετοχή των παιδιών στη γνωστική διαδικασία.
- Αξιοποιούν ποικίλες πηγές γνώσης και δραστηριότητες εκτός σχολικού εγχειριδίου.
- Καλλιεργούν συστηματικά τη δεξιότητα συνεργασίας .
- Εμπλέκουν τα παιδιά σε επιστημονική μελέτη και έρευνα
- Αναπτύσσουν την ικανότητα κριτικής επεξεργασίας και σύνθεσης των πληροφοριών.

Οι στόχοι του προγράμματος

Οι μαθητές:

- να γνωρίσουν τις βασικές μορφές της βυζαντινής ναοδομίας
- να γνωρίσουν βασικές αρχές της αγιογραφίας και να ασκηθούν στην «ανάγνωση των εικόνων»
- να γνωρίσουν τις αρχές του εικονογραφικού κύκλου
- να έρθουν σε επαφή με την τεχνική των ψηφιδωτών και να διακρίνουν τα υλικά και τον σκοπό κατασκευής τους
- να οργανώσουν και να πραγματοποιήσουν έρευνα πεδίου
- να συλλέξουν πληροφορίες, να τις επεξεργαστούν και να τις συνθέσουν
- να συνεργαστούν.

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Εξοικείωση με τη βυζαντινή τέχνη

Πρώτη προσέγγιση του θέματος στη σχολική τάξη

Μέσα από συζήτηση στην τάξη και με την προβολή κατάλληλου εκπαιδευτικού υλικού οι μαθητές γνωρίζουν

- τις βασικές αρχές και τα είδη της βυζαντινής ναοδομίας,
- τις μορφές, τα θέματα και τα χρώματα της αγιογραφίας,
- τα υλικά και τη χρήση των βυζαντινών ψηφιδωτών.



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Εξοικείωση με τη βυζαντινή τέχνη

Επίσκεψη στο Βυζαντινό Μουσείο

- επίσκεψη των μαθητών στο Βυζαντινό και Χριστιανικό Μουσείο της Αθήνας
- περιήγηση τους σε **επιλεγμένα** εκθέματα
- εφαρμογή ειδικού εκπαιδευτικού σεναρίου στη διαδραστική συνεργατική πλατφόρμα μάθησης **Collage** (www.ea.gr/ep/collage)

Η εκπαιδευτική πλατφόρμα Collage

Η συνεργατική πλατφόρμα μάθησης Collage βασίζεται στη συγγραφή έξυπνων ερωτήσεων σε μια παιχνιώδη δραστηριότητα.

Μέσω του Collage ο εκπαιδευτικός μπορεί να μετατρέψει την επίσκεψη σε ένα μουσείο ή σε έναν αρχαιολογικό χώρο σε ένα εποικοδομητικό μάθημα (www.ea.gr/ep/collage).

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Η εκπαιδευτική πλατφόρμα Collage

Οι μαθητές χρησιμοποιώντας κινητές συσκευές έχουν πρόσβαση στις παιγνιώδεις αλλά στοχευμένες δραστηριότητες που έχει ετοιμάσει ο εκπαιδευτικός και εργαζόμενοι σε ομάδες ανακαλύπτουν τα εκθέματα του Μουσείου μέσα από μια διαδικασία που ενθαρρύνει τη αυτενέργεια και καλλιεργεί τη συνεργασία.

Εξοικείωση με τη βυζαντινή τέχνη
Επίσκεψη στο Βυζαντινό Μουσείο

Η επίσκεψη στο μουσείο μετατρέπεται σε εποικοδομητική δράση

Μέσω του Collage οι μαθητές

- εργάζονται σε **ομάδες** των δύο ή και περισσότερων παιδιών
- χρησιμοποιούν κινητές συσκευές
- απαντούν «**παίζοντας**» σε «έξυπνες» ερωτήσεις
- **αυτενεργούν** και **ανακαλύπτουν** τα στοιχεία της βυζαντινής τέχνης τα οποία μελετούν (π.χ. υλικά ψηφιδωτού) και έχουν προηγουμένως συζητήσει.

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Εξοικείωση με τη βυζαντινή τέχνη
Επίσκεψη στο Βυζαντινό Μουσείο

- **παρατηρούν** και **εντοπίζουν** σε αυτά χαρακτηριστικά στοιχεία
  - της αγιογραφίας
  - της ναοδομίας
  - του αγιογραφικού κύκλου
  - του ψηφιδωτού



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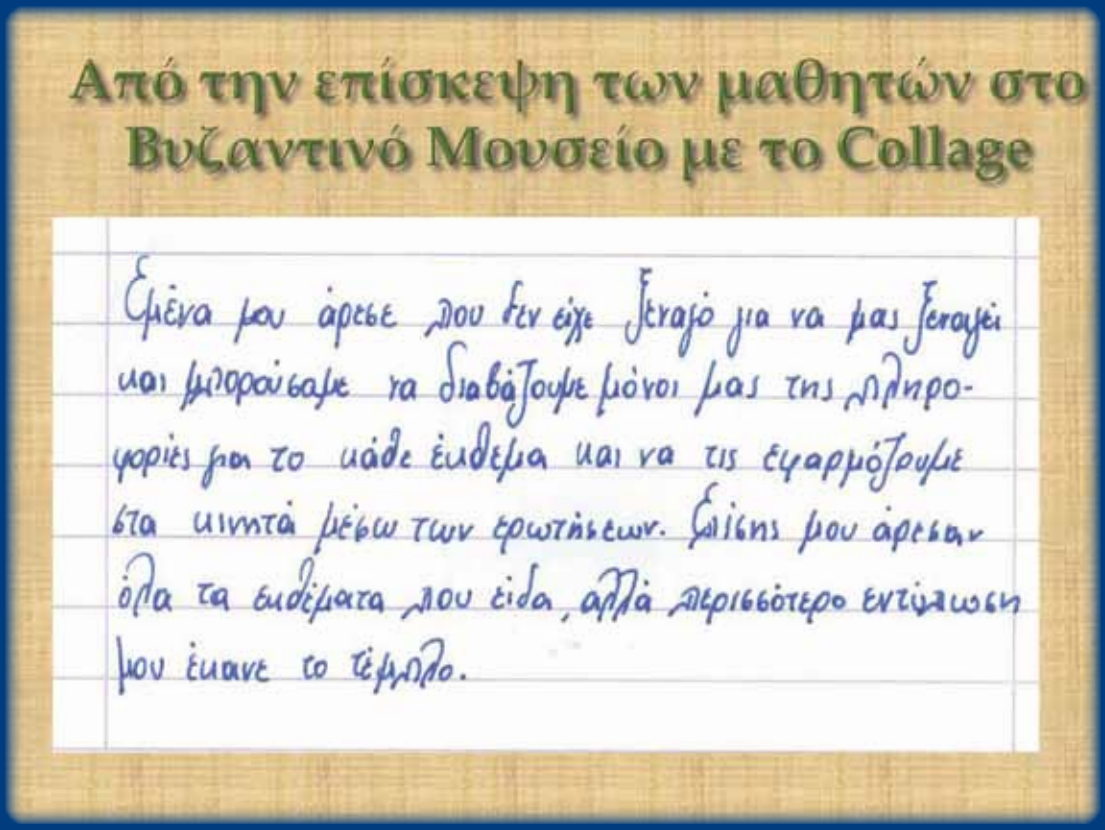
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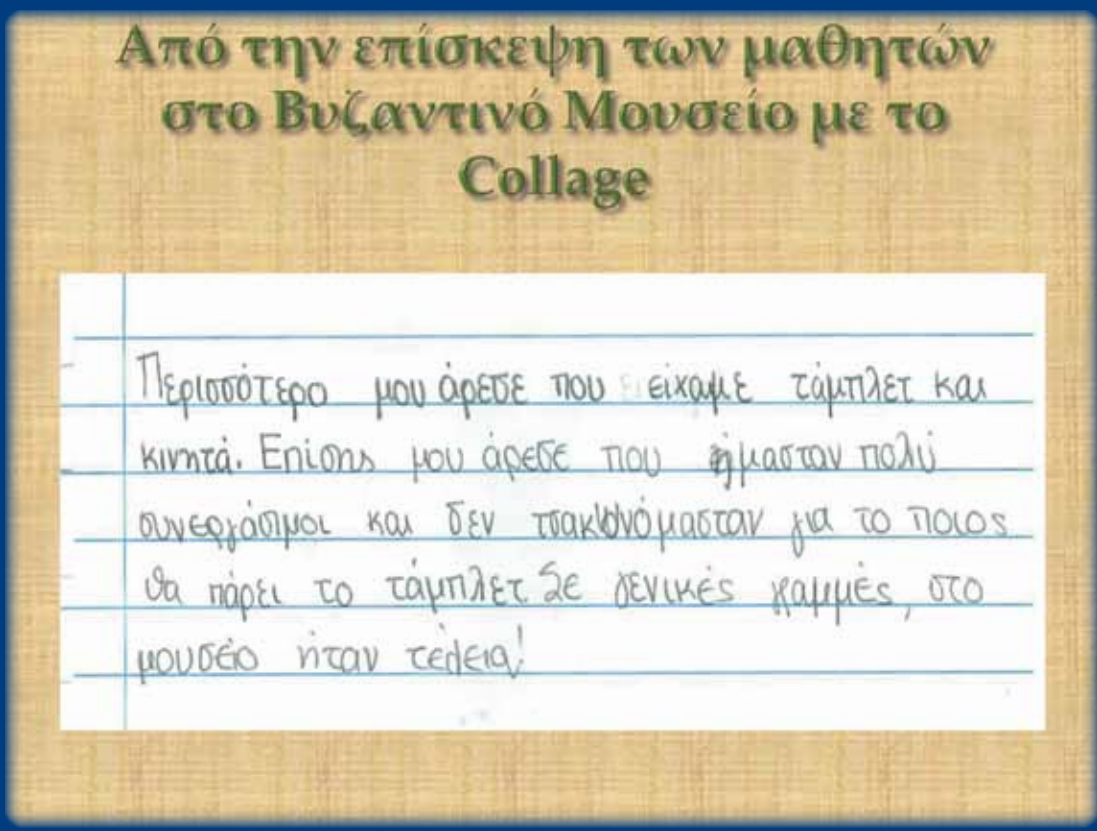




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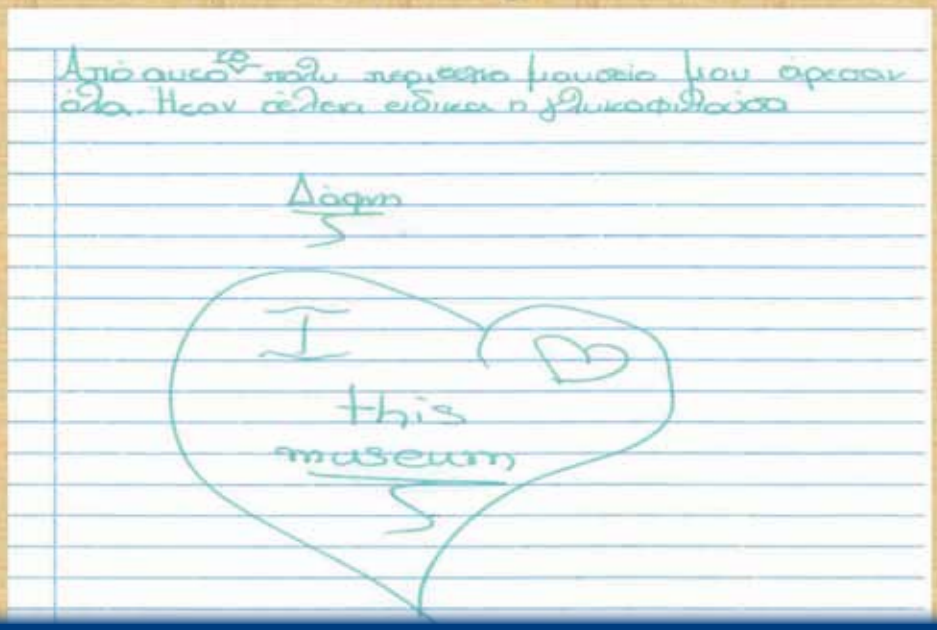




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Από την επίσκεψη των μαθητών στο Βυζαντινό Μουσείο με το Collage



Έρευνα πεδίου: Μελέτη στους βυζαντινούς ναούς της Αττικής

Μετά την εξοικείωση με τα αντιπροσωπευτικά δείγματα της βυζαντινής τέχνης οι μαθητές είναι έτοιμοι να παρατηρήσουν τα παραπάνω στοιχεία στον φυσικό τους χώρο, στον βυζαντινό ναό και να πραγματοποιήσουν έρευνα πεδίου.

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Έρευνα πεδίου: Σχεδιασμός φύλλου παρατήρησης ναού

Μετά από συζήτηση στην τάξη, μαζί με τους μαθητές αποσαφηνίζουμε ποιες παραμέτρους και ποια στοιχεία θα παρατηρήσουμε και θα καταγράψουμε και συντάσσουμε το φύλλο παρατήρησης του βυζαντινού ναού.

Παρατηρούνται και καταγράφονται :

- Η ναοδομία - ο τύπος του ναού
- Ο αγιογραφικός κύκλος
- Χαρακτηριστικά έργα αγιογραφίας και χριστιανικά σύμβολα
- Ψηφιδωτά, αν υπάρχουν

Έρευνα πεδίου: Προετοιμασία της επίσκεψης

Αφού επιλέξουμε ποιον ναό θα επισκεφτούμε, οι μαθητές πραγματοποιούν μια μικρή βιβλιογραφική έρευνα και συλλέγουν στοιχεία για την ιστορία του ναού και για τις περιπέτειές του στο πέρασμα των χρόνων. Οι πληροφορίες παρουσιάζονται στην τάξη.

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Έρευνα πεδίου: Επίσκεψη στον ναό και συλλογή στοιχείων

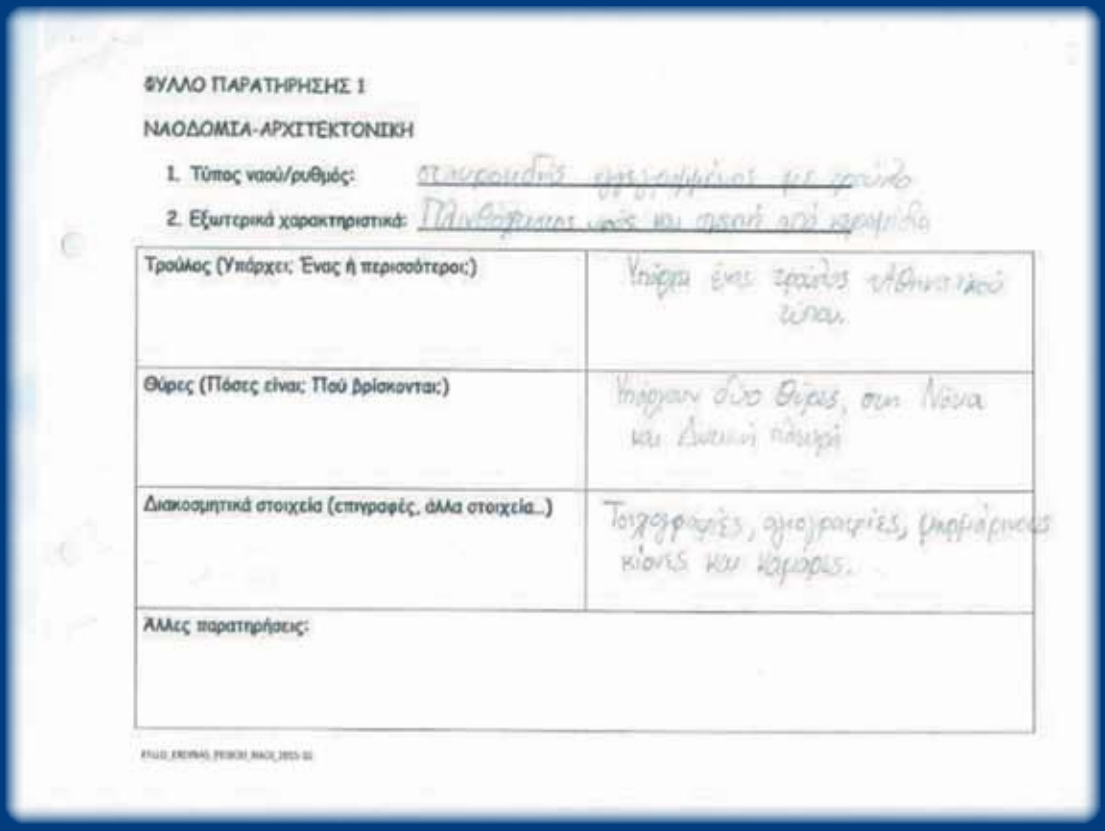
Οι μαθητές **παρατηρούν** και **καταγράφουν** τα στοιχεία στο φύλλο παρατήρησης.

Η παρατήρηση ολοκληρώνεται με τη φωτογράφιση στοιχείων που παρατηρήθηκαν.

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ΦΥΛΛΟ ΠΑΡΑΤΗΡΗΣΗΣ 1

ΝΑΟΔΟΜΙΑ-ΑΡΧΙΤΕΚΤΟΝΙΚΗ

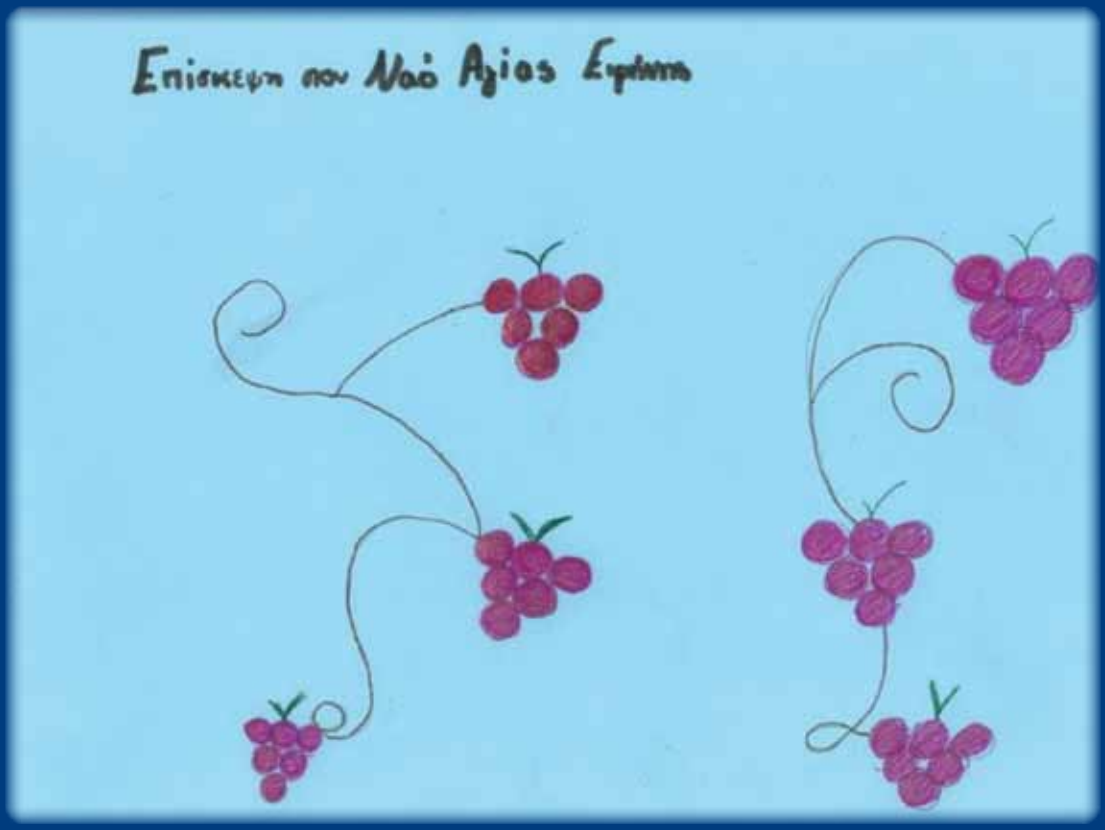
1. Τύπος ναού/ρυθμός: σταυροειδής εγγεγραμμένος με τρούλο

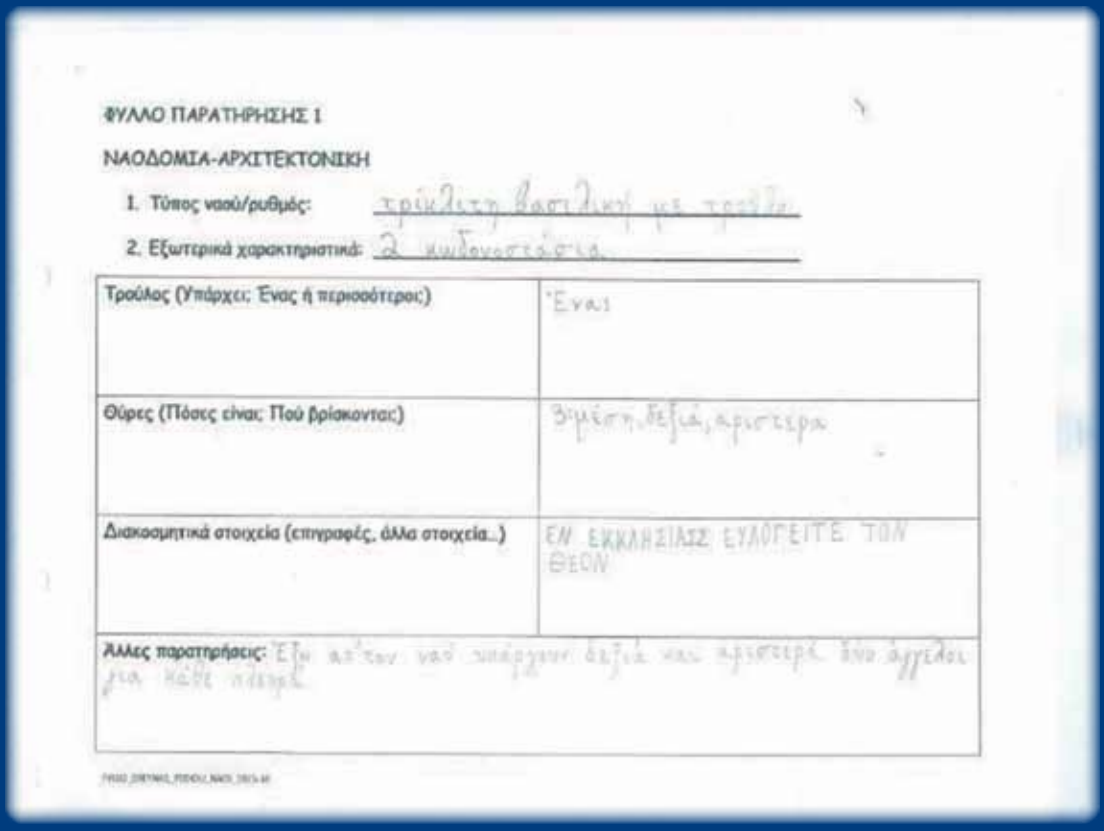
2. Εξωτερικά χαρακτηριστικά: Πλινθόκτιστος ναός και σχεδόν από παντού

Τρούλος (Υπάρχει; Ένας ή περισσότεροι;)	Υπάρχει ένας τρούλος οκθαίδεκα κίονα.
Θύρες (Πόσες είναι; Πού βρίσκονται;)	Υπάρχουν δύο θύρες, στη Νότια και Δυτική πλευρά
Διακοσμητικά στοιχεία (επιγραφές, άλλα στοιχεία...)	Τοιχογραφίες, αγιογραφίες, μαρμάρινες κίονες και καμάρες.
Άλλες παρατηρήσεις:	

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ΦΥΛΛΟ ΠΑΡΑΤΗΡΗΣΗΣ 1

ΝΑΟΔΟΜΙΑ-ΑΡΧΙΤΕΚΤΟΝΙΚΗ

1. Τύπος ναού/ρυθμός: τρίκλιτη βασιλική με τρούλο

2. Εξωτερικά χαρακτηριστικά: 2 κωδωνοστάσια

Τρούλος (Υπάρχει; Ένας ή περισσότεροι;)	Ένας
Θύρες (Πόσες είναι; Πού βρίσκονται;)	3 μέση, δεξιά, αριστερά
Διακοσμητικά στοιχεία (επιγραφές, άλλα στοιχεία...)	ΕΝ ΕΚΚΛΗΣΙΑΣΣ ΕΥΛΟΓΕΙΤΕ ΤΟΝ ΘΕΟΝ
Άλλες παρατηρήσεις: Έξω από τον ναό υπάρχουν δεξιά και αριστερά ένα άγγελοι για κάθε πλευρά	

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ΦΥΛΛΟ ΕΡΓΑΣΙΑΣ 3

ΑΓΙΟΓΡΑΦΙΕΣ

Θέση (πού βρίσκεται)	Θέμα* (τι απεικονίζει)	χρώματα	κατάσταση
Κάτω από το μάτι του θεού	παναγία γλυκοφιλούσα καναλλα	ερυθρό μπλε χρυσο	πολύ καλή
πάνω απο το παγκάκι	άγια Ειρήνη	χρυσό, ερυθρό μπλ	καλή
κάτω από το περσινό τέμπλο	άγιοι στυρίζουν	γκρίζο κίτρινο ροζ	αφθαρτη
πάνω απο το ιερατείο	παναγία και Χριστός	ερυθρο μπλε κεφτ	πολύ καλή

*Τρούλος, κόγχη τρούλου, τέμπλο (οριζόντια ζώνη), δεξιά/αριστερά της Ωραίας Πύλης, τοίχος ναού

ΦΥΛΛΟ ΕΡΓΑΣΙΑΣ 4

ΧΡΙΣΤΙΑΝΙΚΑ ΣΥΜΒΟΛΑ

σύμβολο	θέση*	κατάσταση
σταυρός	οροφή	καλή
Κωνσταντίνε τη τούτω νικα	δίπλα στην τοιχογραφία που βρίσκεται δεξιά	πολύ καλή
μάτι	στην εικόνα της παναγίας κανελλος	καλή
περιστέρι	βρίσκεται στην εικόνα της κυρίαρχης αθλιότητας	αρκετά καλή

* Τρούλος, κόγχη τρούλου, τέμπλο (οριζόντια ζώνη), δεξιά/αριστερά της Ωραίας Πύλης, τοίχος ναού

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Παντοκράτορας στον τρούλο: Αγ. Γεώργιος Ομορφοκκλησιά



Η άμπελος η αληθινή : Καθολικό Μονής Καισαριανής



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Παναγία η Πλατυτέρα :
Άγιος Ελευθέριος- Παναγία
Γοργοεπήκοος



Καθολικό Μονής Καισαριανής:
Παναγία ένθρονος
Βρεφοκρατούσα



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Ωραία Πύλη : Μονή Άγιος Ιωάννης Κυνηγός



Επεξεργασία στοιχείων στην τάξη και παρουσίαση με πόστερ

Οι μαθητές επιστρέφοντας στην αίθουσα διδασκαλίας εργαζόμενοι ανά ομάδες

- επεξεργάζονται τα στοιχεία που κατέγραψαν στα φύλλα παρατήρησης

  και

- συνθέτουν την παρουσίαση του ναού που επισκέφτηκαν.

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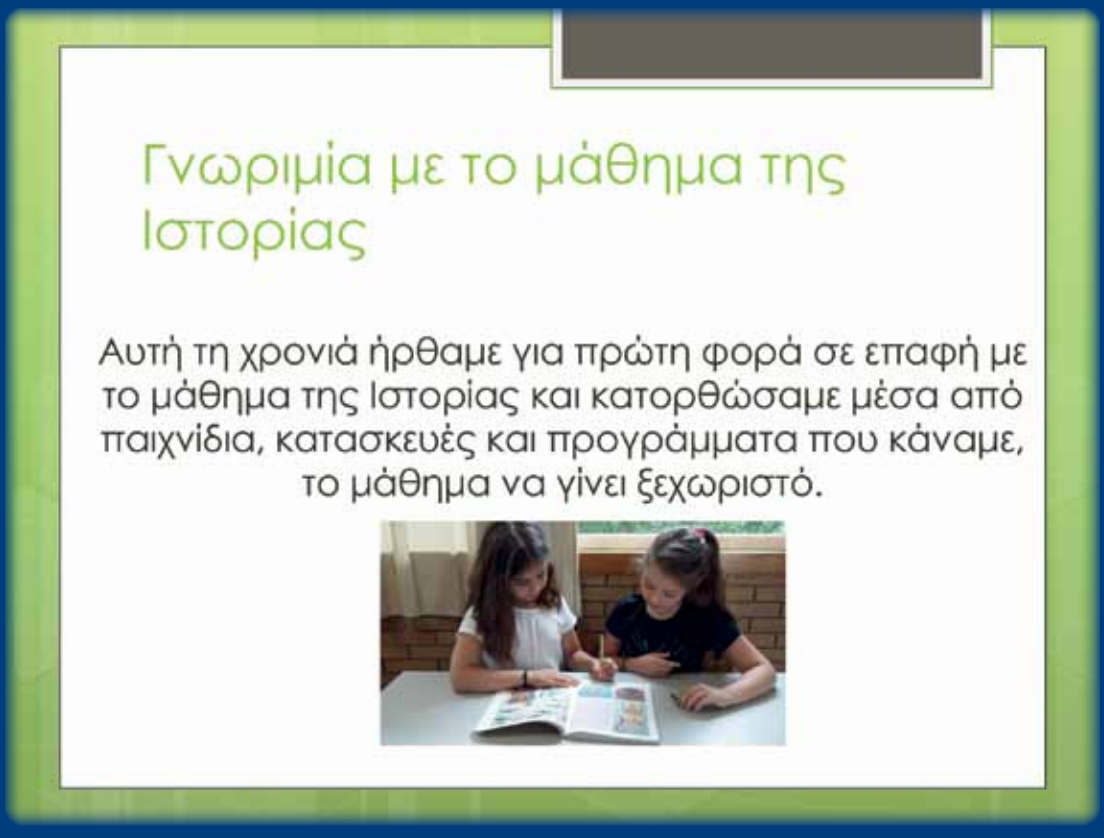
Ιστοσελίδες

http://www.imml.gr/
http://www.eie.gr/byzantineattica/
http://www.byzantinemuseum.gr/
http://www.benaki.gr/

Discovering the Minoan and Mycenaean cultures

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Μύθος ή πραγματικότητα

Κάθε φορά επεξεργαζόμασταν τους λόγους που οι άνθρωποι τότε δημιουργούσαν μύθους και πώς εμείς σήμερα ερμηνεύουμε τα φαινόμενα αυτά με τη βοήθεια της επιστημονικής γνώσης, διαχωρίζοντας έτσι τον μύθο από την πραγματικότητα.

Γνωριμία με τους προϊστορικούς πολιτισμούς…

Γνωρίσαμε τους προϊστορικούς πολιτισμούς (Μινωικό-Μυκηναϊκό), ανακαλύψαμε πώς από τα αρχαιολογικά ευρήματα παίρνουμε σημαντικές πληροφορίες για τα στοιχεία των πολιτισμών, τον τρόπο ζωής και τις συνήθειες των ανθρώπων και κατανοήσαμε πώς από το αρχαιολογικό εύρημα αναδεικνύεται η ιστορική γνώση.

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Ταξίδι στον Μινωικό και Μυκηναϊκό πολιτισμό

Το μάθημα της Ιστορίας μας φάνηκε πολύ ενδιαφέρον! Γι' αυτό αποφασίσαμε στο πλαίσιο της διαθεματικής μας εργασίας με τίτλο «Ταξίδι στον Μινωικό και Μυκηναϊκό πολιτισμό>> να ταξιδέψουμε ως ιστορικοί ερευνητές στον Μινωικό και Μυκηναϊκό πολιτισμό και να τους μελετήσουμε.



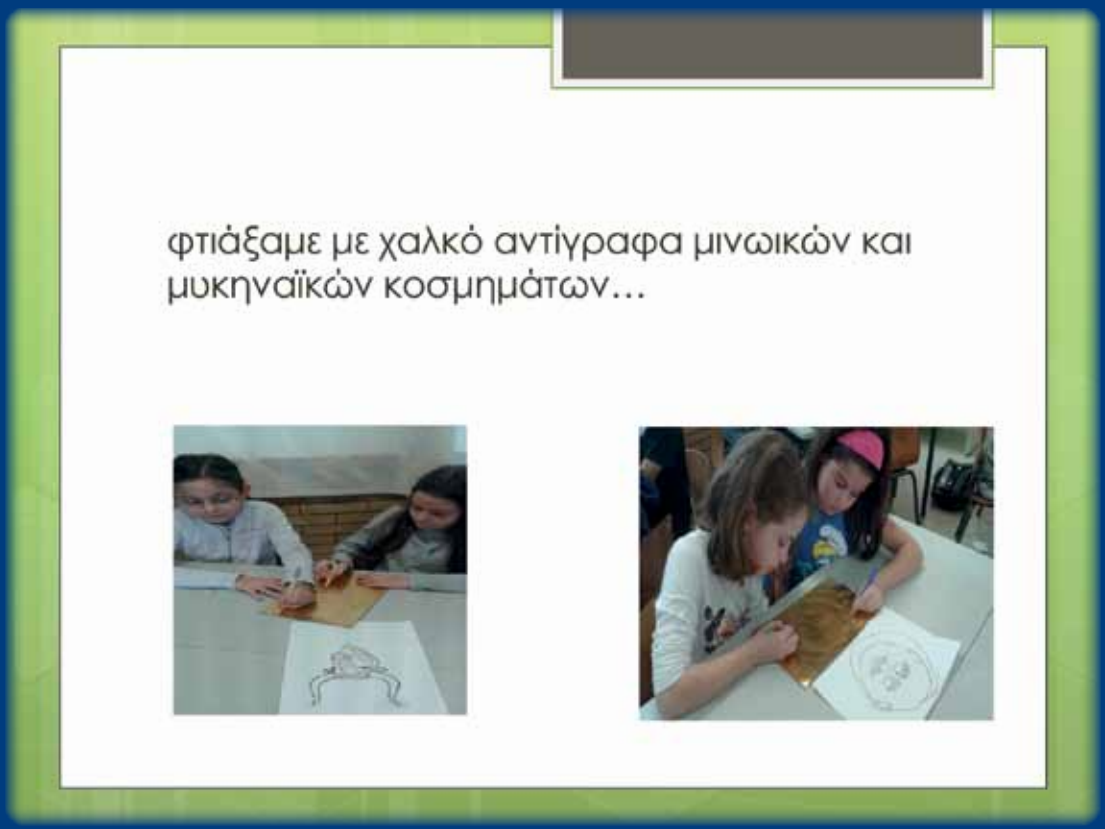
Μελέτη ευρημάτων

Το ταξίδι μας στους πολιτισμούς ξεκίνησε με τη μελέτη των ευρημάτων που μας μαρτυρούν τις συνήθειες των λαών, την καθημερινή τους ζωή, τον τρόπο που ντύνονταν και διασκέδαζαν, ακόμα και αν ήταν φιλειρηνικοί ή φιλοπόλεμοι.

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κατασκευάσαμε με πηλό μινωικές σφραγίδες και γράψαμε συλλαβογράμματα και ιδεογράμματα της Γραμμικής Β΄, της γραφής των Μυκηναίων.





Περιήγηση στο Αρχαιολογικό Μουσείο με την ψηφιακή πλατφόρμα Collage

Όλοι οι μαθητές επισκεφθήκαμε το Αρχαιολογικό Μουσείο και περιηγηθήκαμε σε ευρήματα που χρονολογούνται από την Εποχή του Χαλκού, την περίοδο του λαμπρού μυκηναϊκού πολιτισμού αξιοποιώντας την πλατφόρμα μάθησης Collage.



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Ξεναγηθήκαμε στους χώρους του μουσείου και γνωρίσαμε από κοντά τα μυκηναϊκά εκθέματα χρησιμοποιώντας tablets και απαντώντας σε ερωτήσεις πολλαπλής επιλογής.



Γνωριμία με έναν αρχαιολόγο

Μια πολύ ενδιαφέρουσα δράση της φετινής χρονιάς ήταν η εργασία για τους μεγάλους αρχαιολόγους. Οργανώσαμε τις ομάδες μας και το κάθε τμήμα επέλεξε έναν διάσημο Έλληνα ή ξένο αρχαιολόγο. .



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Στάδια εργασίας

Αναζητήσαμε πληροφορίες μέσα από το διαδίκτυο αλλά και από ιστορικά, αρχαιολογικά βιβλία για τη ζωή, το έργο του και τις πιο σημαντικές ανασκαφές του.

Καταγράψαμε τις πληροφορίες και τις επεξεργαστήκαμε ομαδικά.

Τέλος παρουσιάσαμε τη ζωή και το έργο του αρχαιολόγου που είχαμε επιλέξει να μελετήσουμε με πρωτότυπους τρόπους.





Αρχαιολογική ανασκαφή

Η ζωή και το έργο των αρχαιολόγων που μελετήσαμε μας παρακίνησε να οργανώσουμε τη δική μας πραγματική ανασκαφή. Στην αρχή, μάθαμε τα βασικά βήματα που κάνει ένας αρχαιολόγος για να αρχίσει την ανασκαφή του.

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Μικροί αρχαιολόγοι εν δράσει…

Σε κάθε ομάδα μοιράσαμε τους ρόλους (ιστορικός, σχεδιαστής, φωτογράφος) που θα έχει ο καθένας κατά τη διάρκεια της ανασκαφής και ορίσαμε τις αρμοδιότητές του. Φορέσαμε τα καπέλα μας και ξεκινήσαμε για το «Κέντρο Ελληνικός Κόσμος», όπου και κάναμε την πρώτη μας ανασκαφή και φέραμε στο φως προϊστορικά ευρήματα και ευρήματα επόμενων χρονικών περιόδων, χρησιμοποιώντας τα κατάλληλα εργαλεία.





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Παρουσίαση ανασκαφικού έργου…

Αφού διαχωρίσαμε τα ευρήματα, δημιουργήσαμε ένα ημερολόγιο ανασκαφής και παρουσιάσαμε με τη ματιά ενός… αρχαιολόγου κάποιο από τα προϊστορικά ευρήματα που ανακαλύψαμε!

Η έρευνά μας

Αφού είχαμε κατανοήσει μέσα από τις δραστηριότητες που συμμετείχαμε την έννοια μύθος και ιστορία, μελετήσαμε την Ιλιάδα και την Οδύσσεια του Ομήρου και επεξεργαστήκαμε τις ραψωδίες.



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Επεξεργασία ραψωδιών

Σε κάθε ομάδα αναλάβαμε τη μελέτη μιας ραψωδίας. Αναλύσαμε το περιεχόμενό της και αναδείξαμε τα μυθικά και τα ιστορικά στοιχεία. Καταλάβαμε πόσο σημαντικό είναι όχι μόνο να μπορείς να ανακαλύπτεις τα στοιχεία, αλλά τεκμηριώνεις. Στο τέλος της δράσης παρουσιάσαμε τη μελέτη που είχαμε κάνει στις υπόλοιπες ομάδες.





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Παρουσίαση της διαθεματικής μας εργασίας

Το ταξίδι μας στην Ιστορία ολοκληρώθηκε με την παρουσίαση της διαθεματικής μας εργασίας. Ένα μεγάλο μέρος της έκθεσης ήταν αφιερωμένο στο μουσείο που εμείς φτιάξαμε.





Το μικρό μας μουσείο

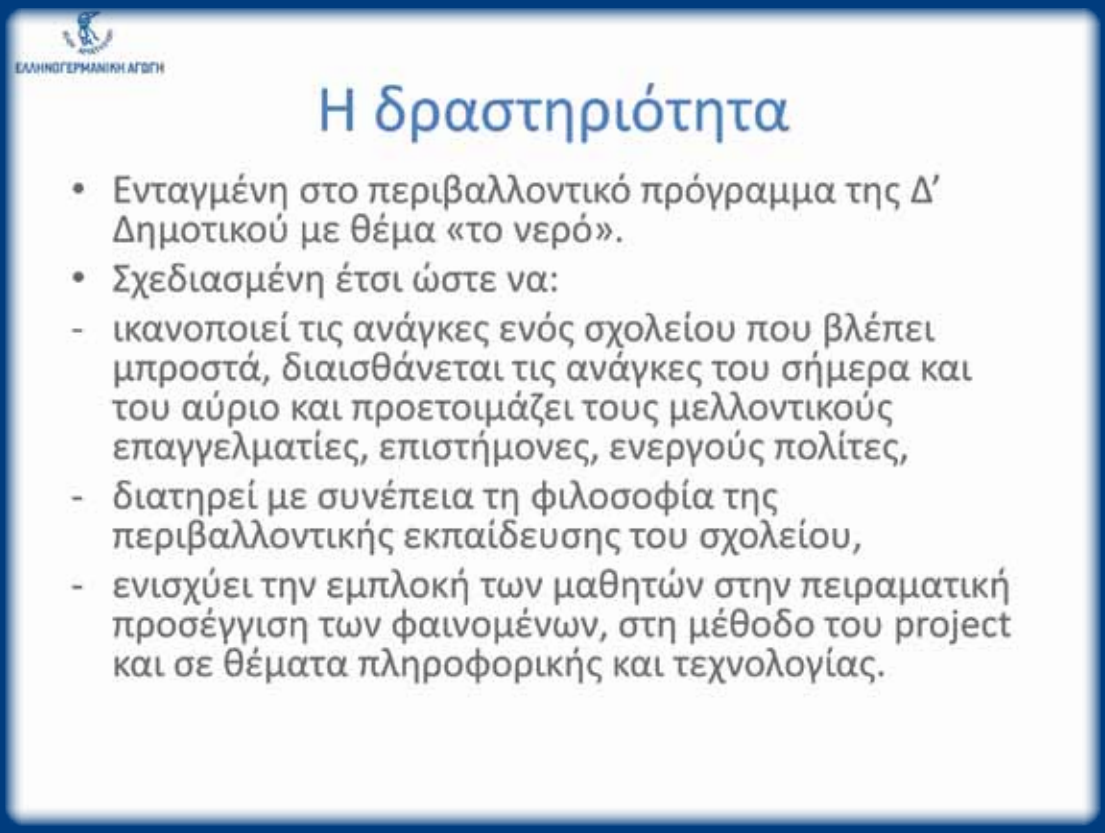
Παρουσιάσαμε αντίγραφα από μινωικά και μυκηναϊκά ευρήματα που είχαμε κατασκευάσει, ξεναγήσαμε τους γονείς μας και παίξαμε μαζί τους αφού πρώτα τους παρουσιάσαμε τη θεατρική μας παράσταση με θέμα τον Τρωικό πόλεμο.



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ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ

Στόχοι της δραστηριότητας

- Ευαισθητοποίηση και ενεργοποίηση σε θέματα περιβάλλοντος : Γνωριμία με το υδάτινο οικοσύστημα.
- Προώθηση της ενεργής, βιωματικής μάθησης.
- Αξιοποίηση όλων των αισθήσεων ως μέσο μάθησης.
- Ανάπτυξη ποικίλων δεξιότητων.
- Γνωριμία και εφαρμογή των βημάτων της επιστημονικής μεθόδου και τις φυσικές επιστήμες.
- Διεπιστημονική προσέγγιση (Φυσική, Χημεία, Βιολογία, Πληροφορική...).
- Γνωριμία με το Hardware Development.

ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ

Μεθοδολογία

- Συνδυασμός παιδαγωγικών μεθόδων:

- πειραματισμός
- μελέτη πεδίου
- περιβαλλοντικό μονοπάτι
- project

ώστε να εξασφαλιστούν οι ανώτεροι στόχοι.

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Περιγραφή δραστηριότητας

- Έλεγχος της ποιότητας του νερού του ποταμού Ερασίνου
- Στάδια:

1. Προετοιμασία πριν την επίσκεψη στον υδροβιότοπο με μελέτη:
   - των φάσεων του νερού (πειραματικά),
   - του κύκλου του νερού στη φύση,
   - της σπουδαιότητας του νερού ως πηγή ζωής,
   - των προβλημάτων που σχετίζονται με το νερό (υπερκατανάλωση/μόλυνση),
   - της σπουδαιότητας του νερού ως βασικό συστατικό ενός υδροβιότοπου.
2. Δράση πεδίου
   - Προσεγγίζουμε το ποτάμι με τις αισθήσεις.
   - Προσεγγίζουμε το ποτάμι με τη βοήθεια των επιστημών.
   - Παρατηρούμε και καταγράφουμε.
3. Μελέτη των παρατηρήσεων και έκδοση συμπερασμάτων

ΕΛΛΗΝΟΓΕΡΜΑΝΙΚΗ ΑΓΩΓΗ

Ανάλυση σταδίων

Προετοιμασία πριν την επίσκεψη στον υδροβιότοπο

- Αναγνώριση της σπουδαιότητας του νερού ως πηγή ζωής και των προβλημάτων που σχετίζονται με το νερό (υπερκατανάλωση/μόλυνση)
- Ταξινόμηση οικοσυστημάτων
- Μελέτη υδάτινων οικοσυστημάτων
- Στόχευση των υδροβιότοπων
- Οργανισμοί και στοιχεία που απαρτίζουν έναν υδροβιότοπο
- Οικολογική αξία / Διεθνής σύμβαση Ramsar
- Ανάγκη διατήρησης και προστασίας

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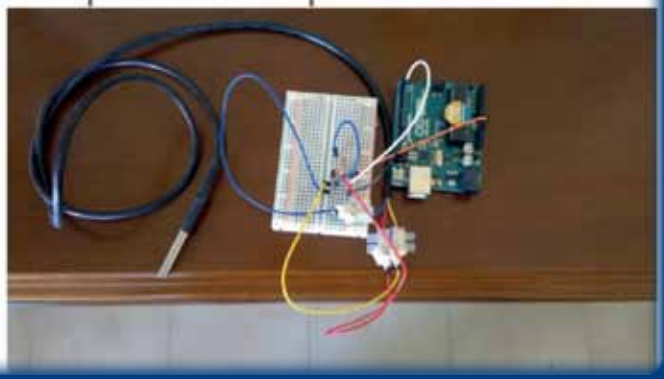
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Ανάλυση σταδίων

Προετοιμασία πριν την επίσκεψη στον υδροβιότοπο

- Εισαγωγή στο hardware development.
- Γνωριμία με τις πλακέτες.
- Ανάλυση του τρόπου σύνδεσης με την οθόνη, τον αισθητήρα και την πλακέτα μέσω του breadboard.

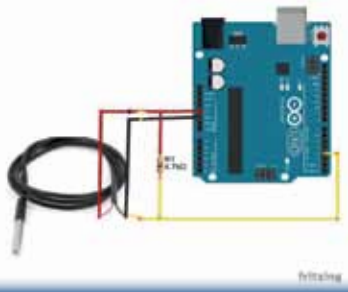


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Ανάλυση σταδίων

Προετοιμασία πριν την επίσκεψη στον υδροβιότοπο

- Επεξήγηση της βασικής γλώσσα που χρησιμοποιούμε με το arduino (C).
- Παρουσίαση παραδειγμάτων και δυνατοτήτων του προγραμματισμού.
- Εναλλακτικοί τρόποι προγραμματισμού. (SCRATCH / MBLOCK)



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Ανάλυση σταδίων

Δράση πεδίου

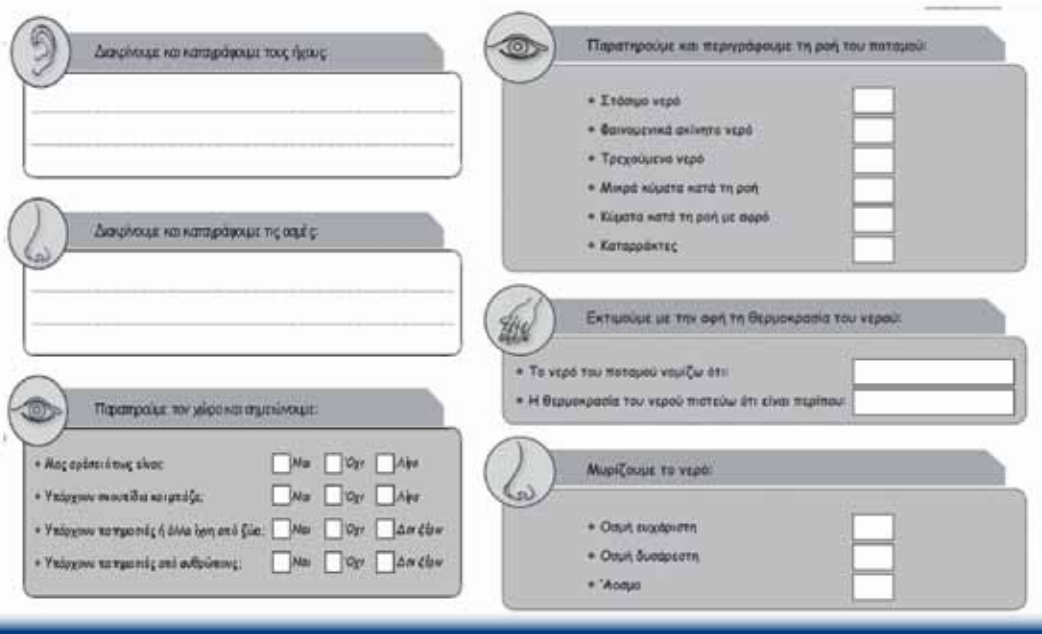
- Χωρισμός μαθητών σε ομάδες.
- Επίσκεψη και μελέτη του περιβάλλοντα χώρου και του ποταμού Ερασίνου στον υδροβιότοπο Βραυρώνας:

- Με τις αισθήσεις
- Με τη βοήθεια των φυσικών επιστημών και της τεχνολογίας

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Ανάλυση σταδίων

Δράση πεδίου



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Ανάλυση σταδίων

Δράση πεδίου

- **Βιολογία**

Εκτίμηση ποιότητας νερού από παρουσία μικρών ασπόνδυλων ζώων (βιοδείκτες)



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Ανάλυση σταδίων

Δράση πεδίου

- **Χημεία**

Εκτίμηση ποιότητας νερού από τιμή pH



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Ανάλυση σταδίων

Δράση πεδίου

- **Φυσική**

Εκτίμηση ποιότητας νερού από θερμοκρασία νερού



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Ανάλυση σταδίων

Δράση πεδίου

- **Πληροφορική**

Μέτρηση θερμοκρασίας με το ψηφιακό θερμόμετρο και σύγκριση με το εργαστηριακό





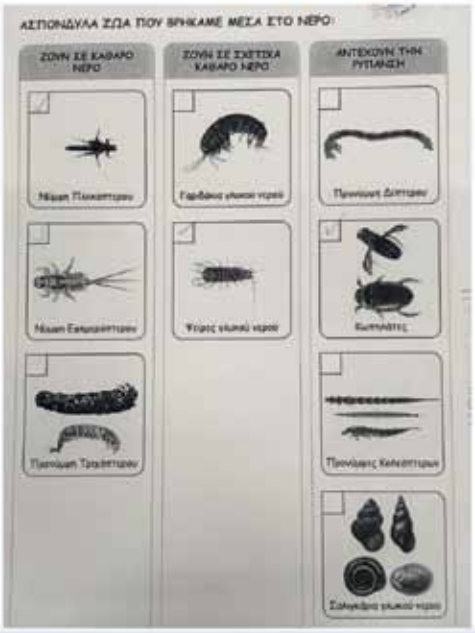
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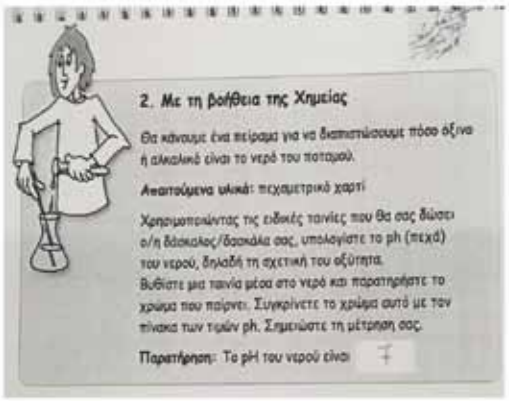
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Ανάλυση σταδίων

Μελέτη παρατηρήσεων και έκδοση συμπερασμάτων



Συνδυασμός παρατηρήσεων και δεδομένων ώστε να βγουν συμπεράσματα για την ποιότητα του νερού του ποταμού



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Ανάλυση σταδίων

Μελέτη παρατηρήσεων και έκδοση συμπερασμάτων





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Ανάλυση σταδίων

Μελέτη παρατηρήσεων και έκδοση συμπερασμάτων



3. Με τη βοήθεια της Φυσικής

Με το θερμόμετρο μετράμε τη θερμοκρασία του νερού και του αέρα. Συγκρίνουμε τις τιμές. Τι παρατηρείτε;

Όργανα Υλικά: Θερμόμετρα οινόπνευματος

Βυθίστε το ένα θερμόμετρο μέσα στο νερό και κρατήστε το δεύτερο θερμόμετρο στον αέρα σε ένα σκιερό μέρος. Σημειώστε τις θερμοκρασίες.

Θερμοκρασία Νερού (°C)	Θερμοκρασία Αέρα (°C)
	23

Παρατήρηση:

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