UNIVERSAL DESIGN FOR LEARNING

INNOVATION IN PROMOTING INCLUSIVE BEST PRACTICE IN TODAY'S SCHOOLS

Nikolaos Nerantzis
Physicist in Special Education
(Greece)

TEACHER NETWORKING FORUM & WORKSHOP
SHARING GOOD PRACTICES FROM TEACHERS IN UDLnet PARTNER COUNTRIES

UDL Network Seminar
24.Nov.2015
Dublin

12-14…17+

15-17…20+

>> inclusion classes

>> autonomous special schools

mild difficulties

severe difficulties

…my Schools **…where do I teach?**

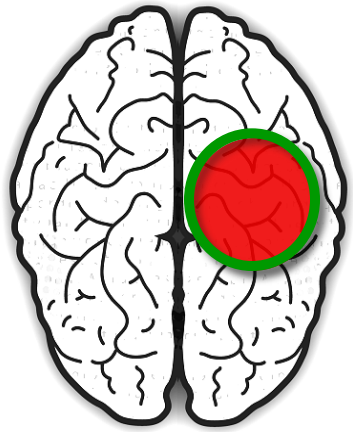
Students with SEN

>> *core scientific ideas* ⟷ *mathematics*

>> *difficulties in memory* (*short term / working / long term*)

>> *student's ideas …are universal & not easy to be modified**

** …"old ideas stay alive in particular contexts. Usually the best that could be achieved was a peripheral conceptual change…"*



D. HEYWOOD, J. PARKER, The Pedagogy of Physical Science, pg.12,ISBN 978-1-4020-5270-5, Springer, 2010.

Learning Difficulties

…Difficulties in Learning

mental retardation, autism, brain damage

…Difficulties in School Performance

specific learning disorders

(in writing, in reading, in arithmetic/math)

…Difficulties in Behavior

psychological, emotional, social

Learning Difficulties

& typical class' Teacher's judgments

…can help to early, valid
& reliable diagnosis…

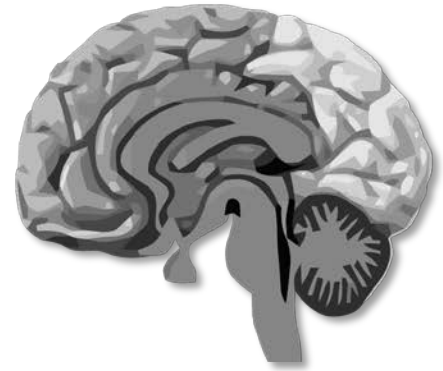
…91 % of the LD group,
…100% of the Low IQ group,
…95% of the LA group.

Three major brain networks involved in learning…

- the recognition network

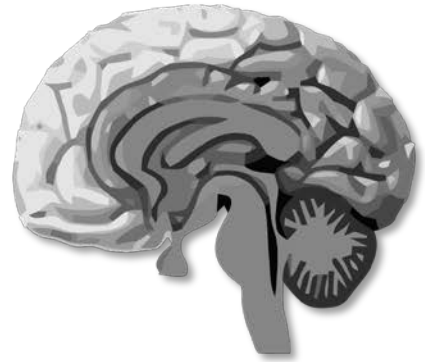
  …receives sensory information from the environment and transforms it into knowledge

  …identifies and categorizes what we see, hear or read.



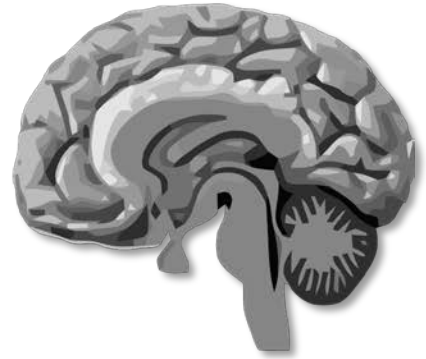
- the strategic network

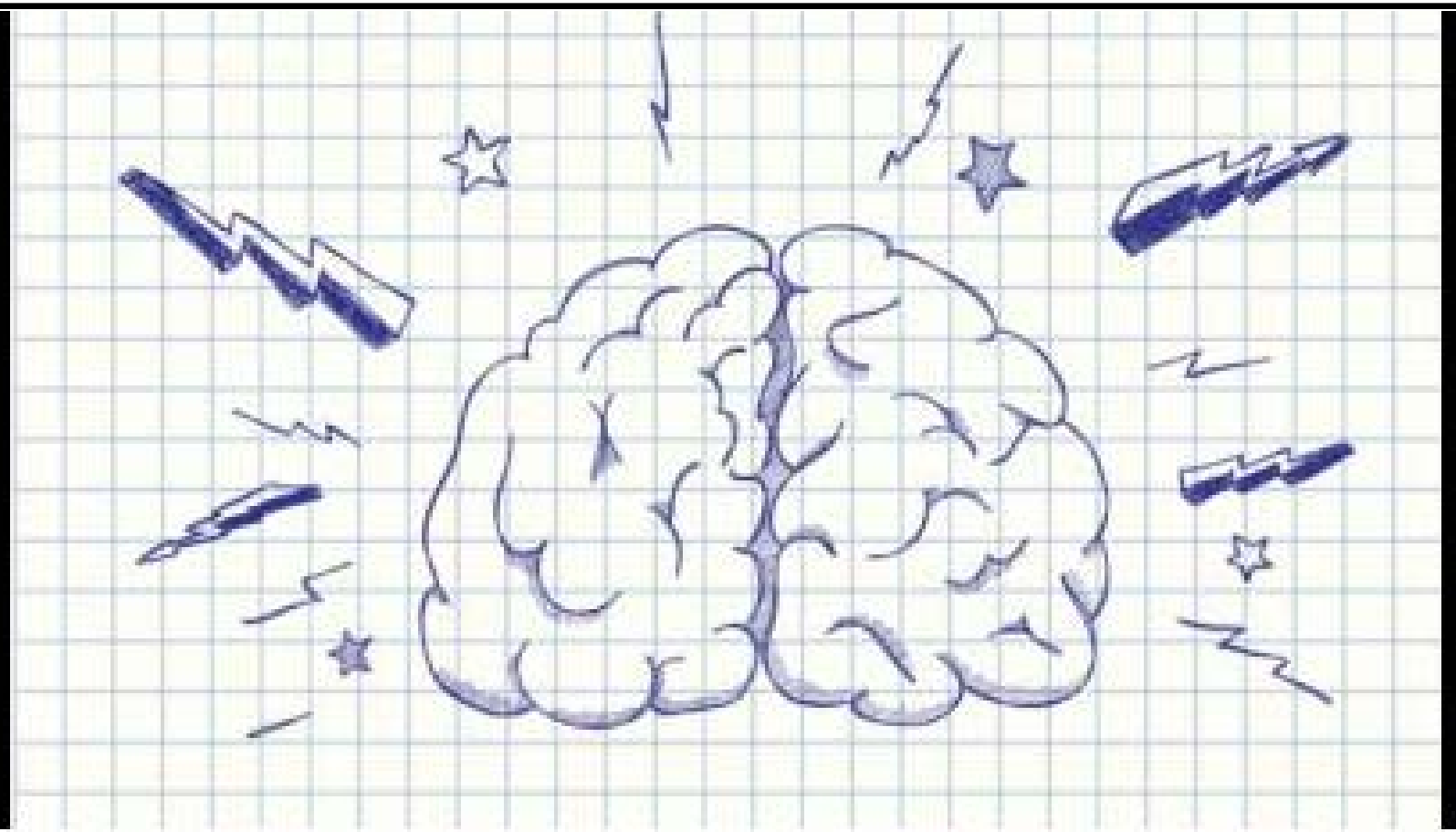
  …is recruited for planning and coordinating goal-oriented actions.



- the affective network

  …is involved in emotional dimensions of learning such as interest, motivation and stress.



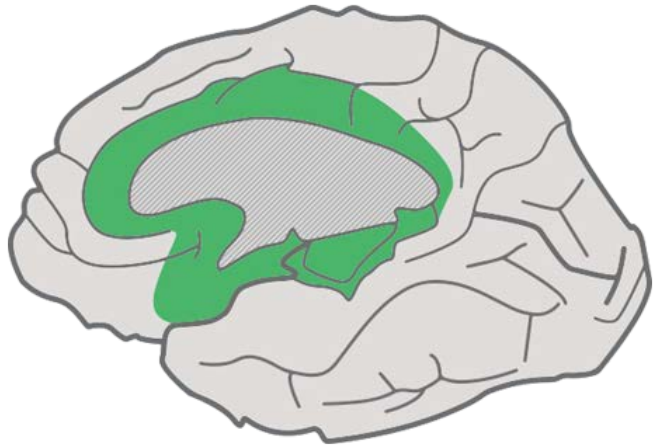


Mind Shift @MindShiftKQED · Apr 4

Why Talking About the Brain Can Empower Learners ow.ly/LbuRf #edchat #growthmindset #ptchat

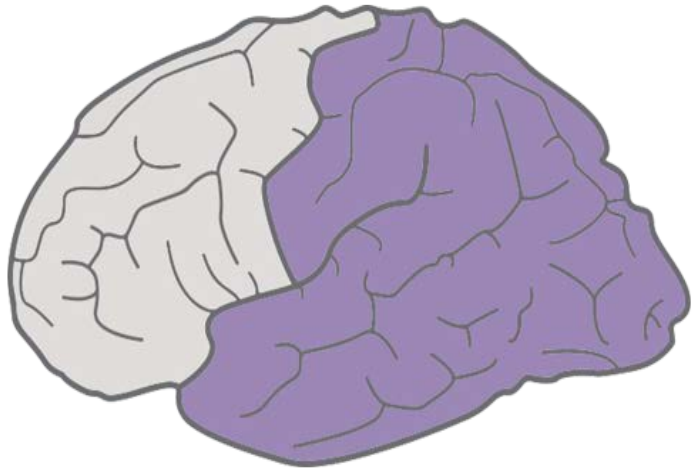
223 149

affective
network



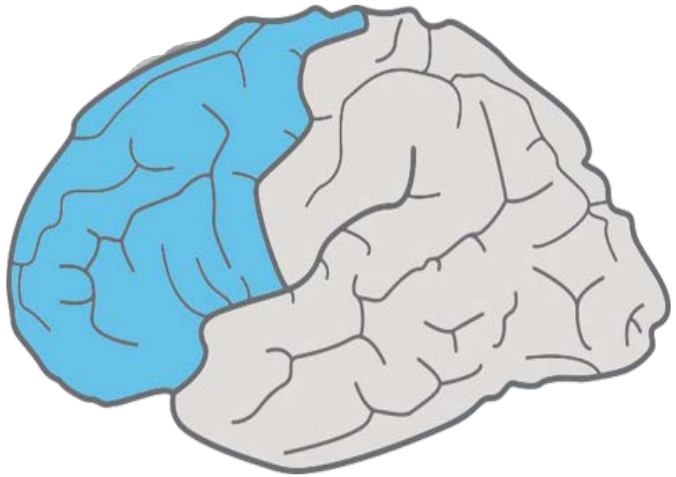
Why

strategic
network



What

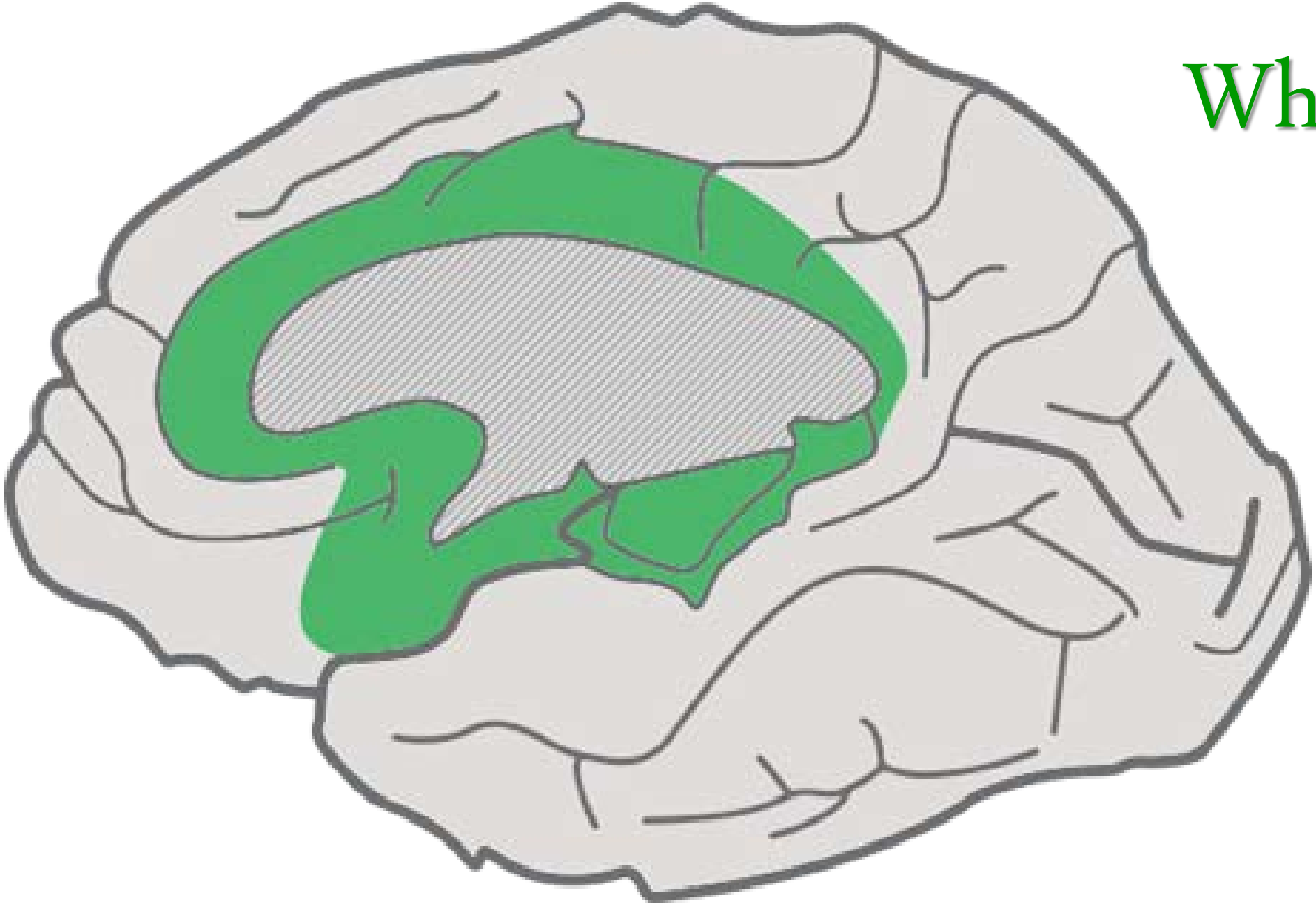
recognition
network



How

UDLnet

CAST



Why

I am a student: why do Physics ?

>> …I like the teacher

>> …hands-on activities

>> …I laugh

>> …I see “new” thinks

>> …I see our work being communicated

>> …I like science

>> built ‘bonds’

>> be sincerer / genuine

>> share my true thoughts

>> answer to any of their questions

>> support emotionally

>> be playful

>> accepting ideas

>> communicate our work

...school's site

...competitions

...conferences

>> video !


FEAR. SACRIFICE. CONTACT.
EUROPA REPORT


SANDRA BULLOCK
GEORGE CLOONEY
FROM DIRECTOR ALFONSO CUARÓN
GRAVITY
WARNER BROS. PICTURES PRESENTS
AN ESPERANTO FILMOJ/HEYDAY FILMS PRODUCTION AN ALFONSO CUARÓN FILM SANDRA BULLOCK GEORGE CLOONEY "GRAVITY"
TIM WEBBER ALFONSO CUARÓN MARK SANGER ANDY NICHOLSON EMMANUEL LUBEZKI, A.S.C., A.M.C.
NIKKI PENNY STEPHEN JONES ALFONSO CUARÓN & JONÁS CUARÓN ALFONSO CUARÓN DAVID HEYMAN ALFONSO CUARÓN
PG-13
gravity-movie.com
SEE IT IN real 3D AND IMAX 3D 10.4.13

Starlab Portable Planetarium

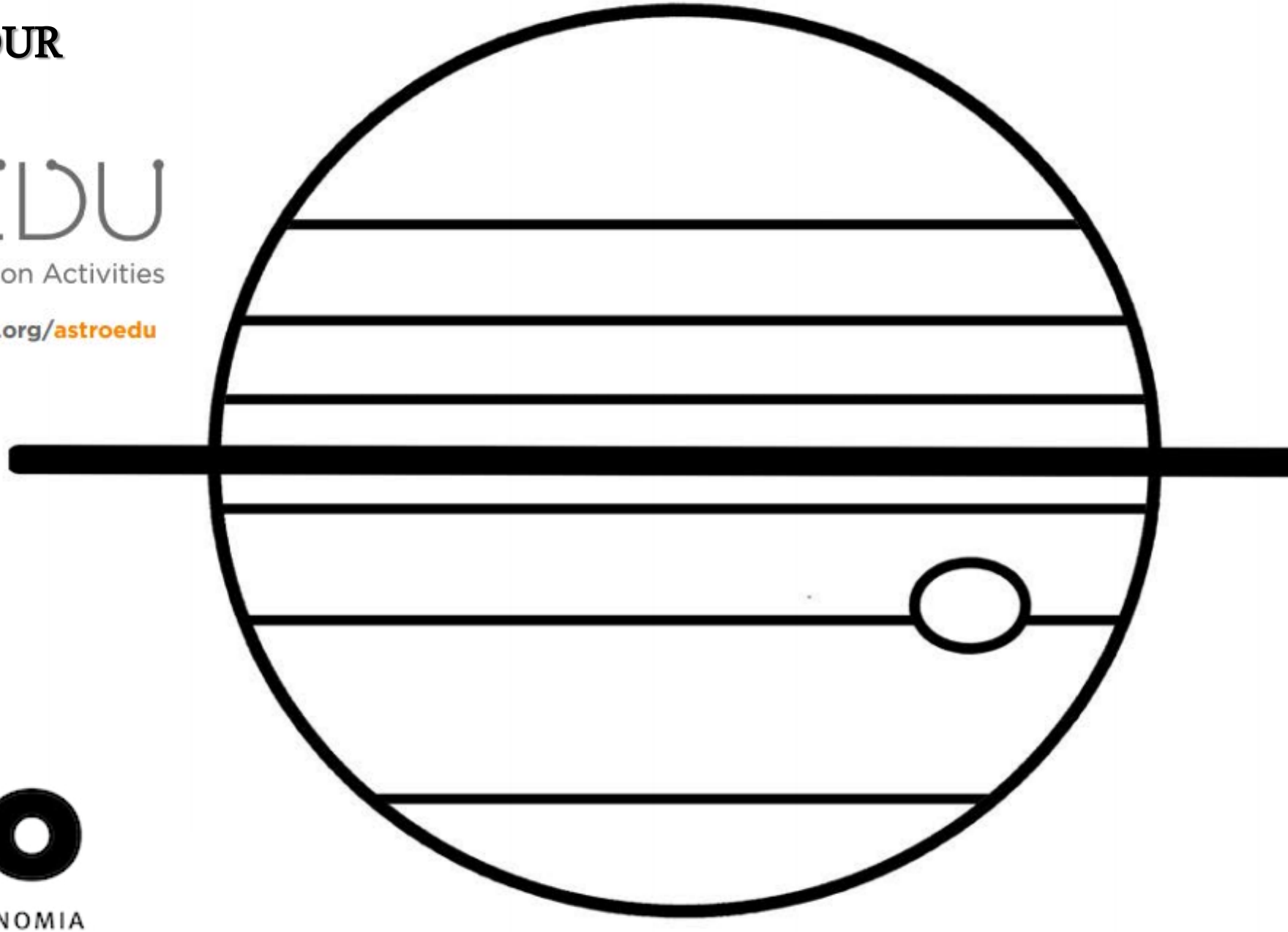
Πλανητάριο
ΘΕΣΣΑΛΟΝΙΚΗΣ

MEET OUR NEIGHTBOUR

ASTROEDU

Peer-reviewed Astronomy Education Activities

iau.org/astroedu



NUCLIO

Núcleo Interactivo de Astronomia

INTERNATIONAL YEAR OF LIGHT 2015

COSMIC EDU LIGHT kit

IAU

@IAU_org

InternationalAstronomicalUnion

SPECIAL JUNIOR HIGH SCHOOL OF THESSALONIKI GREECE

9 NOVEMBER 2015

GALILEO Teacher Training Program

COSMIC EDU LIGHT kit

INTERNATIONAL YEAR OF LIGHT 2015

COSMIC LIGHT

esa

{ROSETTA WAS LAUNCHED ON 2 MARCH 2004 AND TRAVELLED 6.4 BILLION KILOMETRES THROUGH THE SOLAR SYSTEM BEFORE ARRIVING AT THE COMET ON 6 AUGUST 2014.}

{PHILAE WAS LANDED ON THE COMET ON 12 NOVEMBER 2014, 17:32 UTC}

rosetta

→ RENDEZVOUS WITH A COMET

{COMET 67P/CHURYUMOV–GERASIMENKO}

European Space Agency

touchdown point

taken at 15:43

before

taken at 15:18

15:43

15:23

15:19

15:14

1

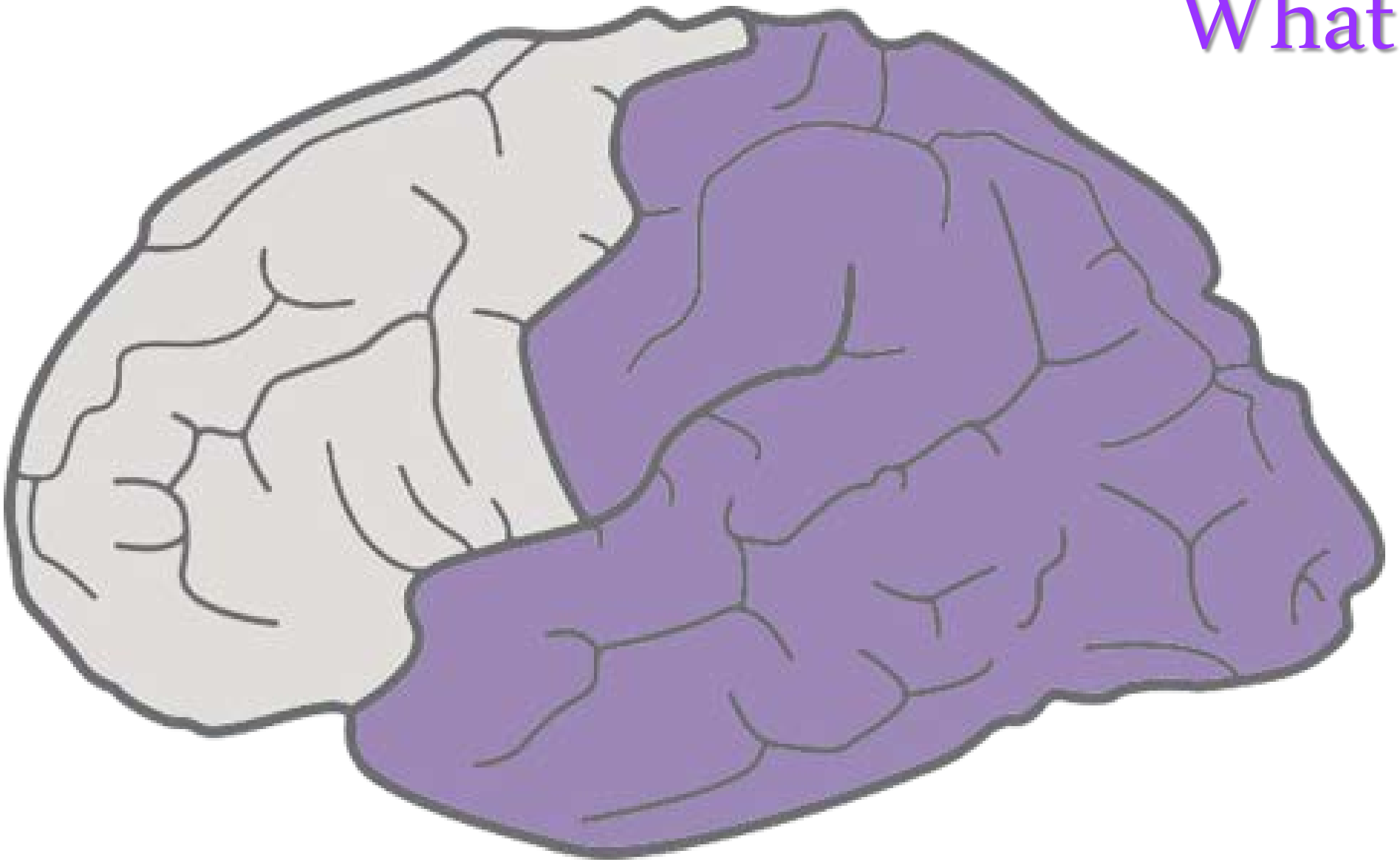
2

3

→ PHILAE'S LANDING SITE

esa

What



I am the teacher: what taught?

>> …energy, field, wave

>> …DC current

>> …free fall

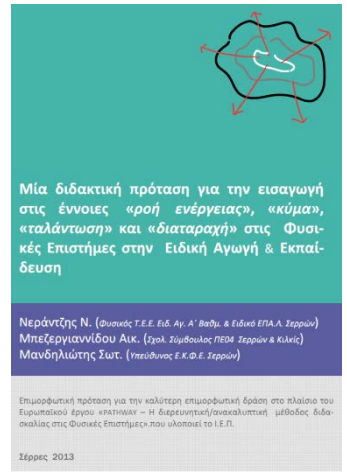
>> …light

>> …environment

A didactic proposal to introduce the concepts of "energy flow", "wave", "oscillation" and "disturbance"

(Nerantzis, Bezergiannidou, Mandiliotis, 2013)

3rd prize at IEP's / PATHWAY's on IBSE contest: "The Pathway to Inquiry Based Science Teaching" (266624/SiS-CT-2010)



>> The scenario includes the "water cycle ≈ DC electrical circuit" & the "matter ≈ energy" analogies, energy chains, storyline, posters, ICTs, scientific questions and experimental inquiries with experimental setups and 1D, 2D and 3D pendulums,

On simple DC circuits

(Nerantzis, 2014)

- 1st prize to 2014 GoLab's national teacher contest

** The initial idea was to emphasize the dialogue of reality (experiments) and models (virtual laboratory)*

>> The scenario Includes (in the ILS) virtual lab & hands-on experiments with "low cost" materials, the use of smartphone/ tablet for initial and final wireless recording students' responses, energy chains, comics, posters…

GO-LAB

Experimental (open) inquiry with low-cost materials, on the simultaneous freefall of two different bodies *from the same height*

(Nerantzis, Mandiliotis, 2015)

1st prize to 2015's GoLab's national teacher contest

>> This, IBSE proposal, aims students with disabilities and/or special educational needs (SEN), in order to investigate whether two bodies arrive simultaneously or not at the ground, using "low-cost" materials, posters, interactive whiteboard (IWB), photo and video editing software via a GoLab's Inquiry Learning Space (ILS).

GO-LAB

Environment & STEM Education

(Nerantzis, Mpezergiannidou, Tozakidis, Mandiliotis, 2015)

a highly commented entry at GreeNET's "How to shape environmental education for young people, so that their interest in the environment sector of the economy rises?" competition

>> As a starting point we set citizenship and we constructed a didactic proposal with three ILS (on watersheds, on waste & on wetlands) aimed at active learning, "framing" the concept of environment with the knowledge of European and Greek law. \ reuse, recycle, renewable energy

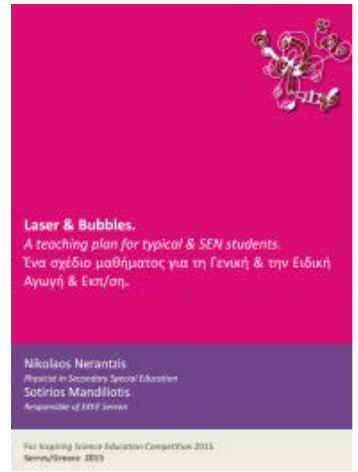
GreeNET


“If you feel you are in a black hole, don’t give up. There’s a way out.”
STEPHEN HAWKING
August 25th, 2015
The Economist
The Economist @TheEconomist · 27m
The Economist explains: Stephen Hawking's idea to solve a 40-year-old black-hole conundrum econ.st/1NWdWCs
157
132

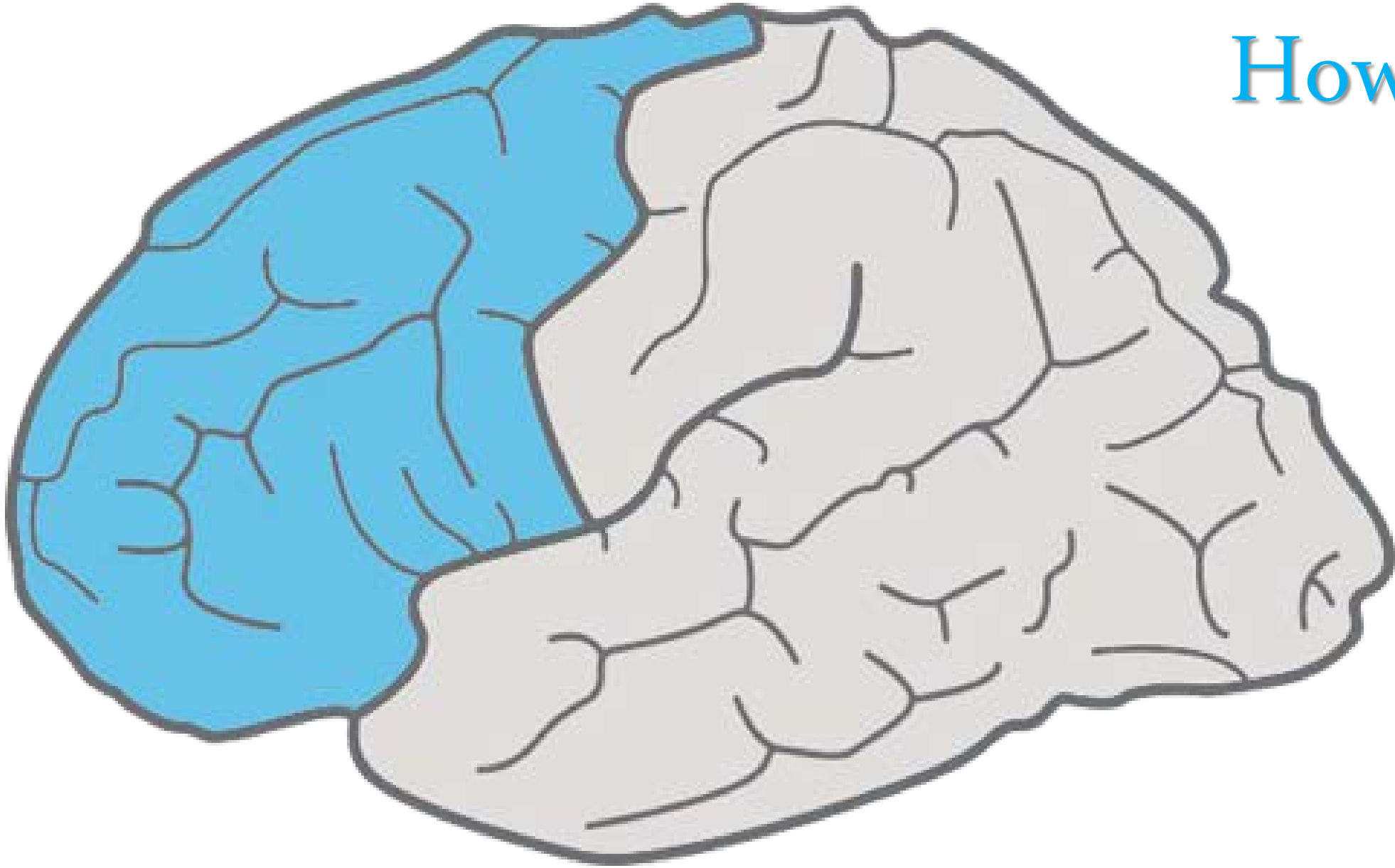
Lasers & Bubbles

(Nerantzis, Mandiliotis 2014)

- Top-5 at ISE “Learning with Light” 2015 Competition



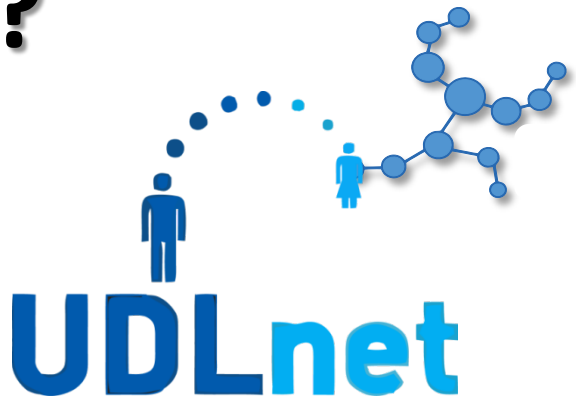
* “We repeat the [hands-on] activities [on light] with the same five students, whom also carried out the experiments two years ago”.



How

I am the teacher: how taught?

- Inquiry Based Science Education - *extend phase*
- International Educational Practices
- Repositories / Connections
- Metacognition / Metamemory
- Brain Networks in Learning



- **Inquiry Based Science Education – “7E *model*”**

extend
evaluation
elaboration
explanation
exploration
engagement
elicit

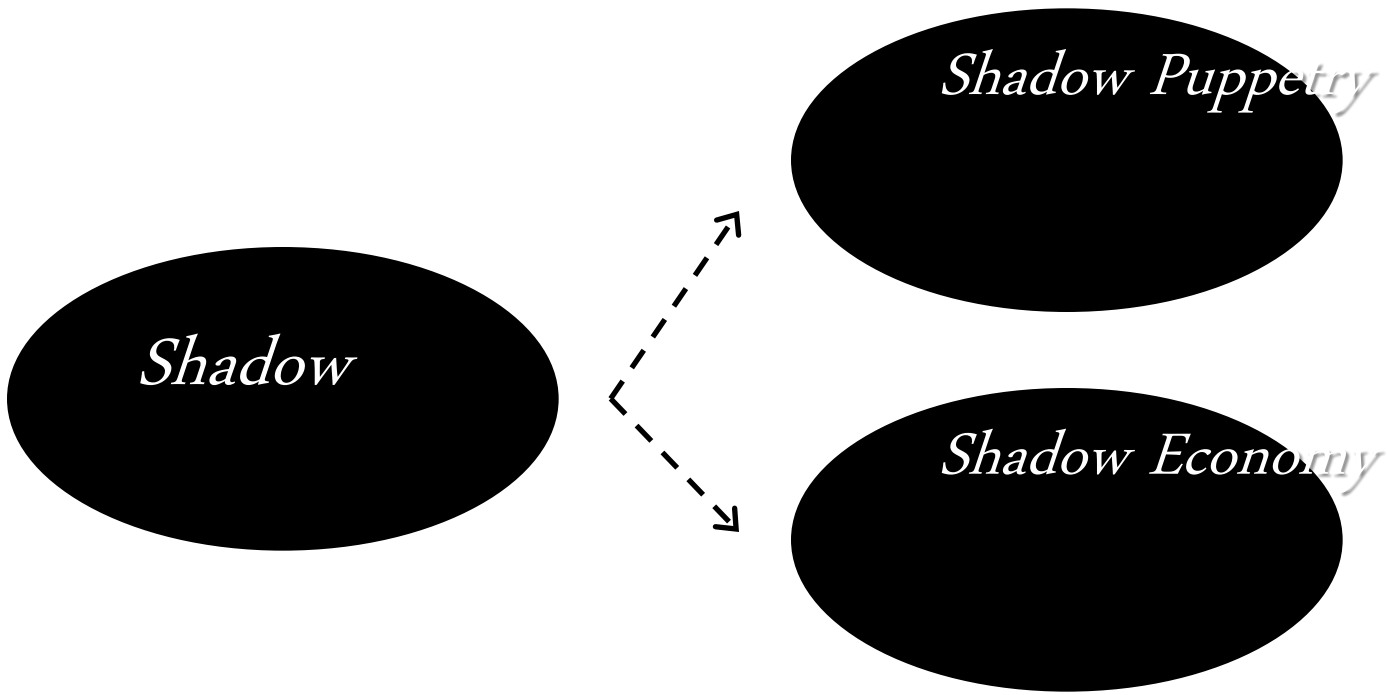
- **Inquiry Based Science Education**

extend

…a very important phase for

- for deep understanding of core scientific ideas,
- for knowledge transfer and
- the development of everyday life skills.

- **Inquiry Based Science Education**



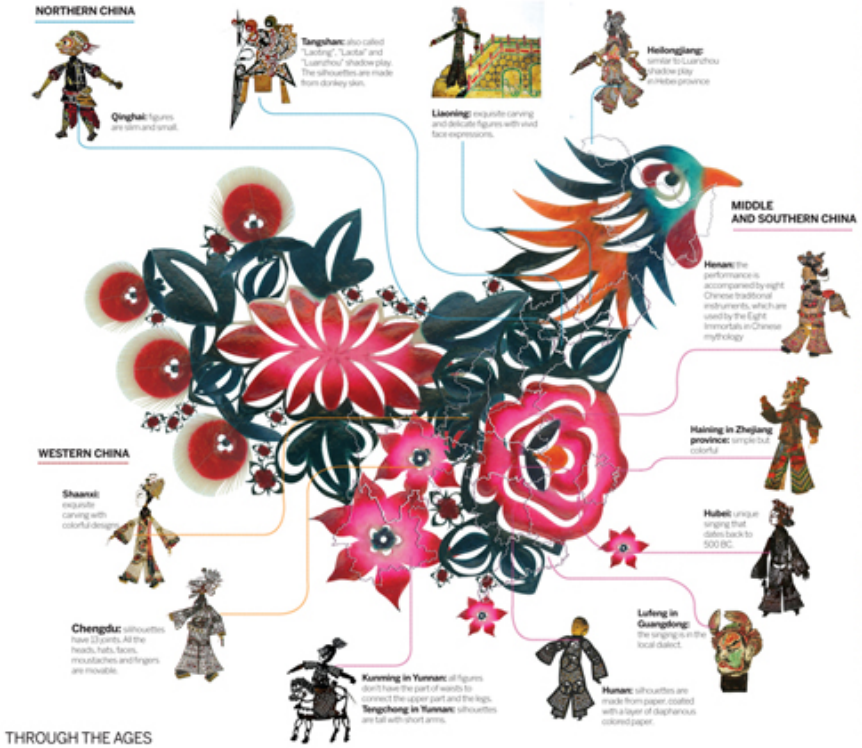
extend

Dancing in the Shadows

THREE SCHOOLS OF SHADOW PUPPETRY

After 1911, three schools of shadow play took shape: the western school which mainly referred to that in Shaanxi, the northern school dominated by artists in Luanzhou in Hebei and the southern school originating from Hangzhou in Zhejiang. With the development and integration of local music and culture, shadow play gained popularity in more than 20 provinces across China. Different counties even have their own unique shadow plays which incorporate local culture and flavor in terms of silhouette-making skills,singing and the images themselves.

12 TYPES OF LOCAL SHADOW PLAYS



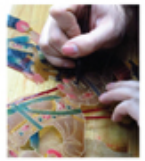
THE PROCESS

Shadow play puppets are made from many different materials such as leather, skins and paper. One of the most popular materials is leather. After removing flesh and fur, the leather is stretched onto a frame to dry.

Upon removing the leather from the frame, the puppetmaker marks the skin into different parts. Each portion of the leather will be made into a different body part.

Thinner pieces are used for the upperbody to ensure better movement whereas thicker parts are used to create a stable lower body.

The parts cut out from the marked leather joints are punched in, and the pieces are joined together with leather ropes. Continuous patterns are then drafted onto the different body parts.



Details such as facial features are carefully carved out of the material. Simple colors are added for detailing.

Once the patterns are carved out, the puppet is then painted with natural paints. The last step before the puppet is complete is the installation of control rods.

THROUGH THE AGES

1023 - 1063 The origin of shadow puppetry is disputed, but the first record was found at the time of the emperor of Ren Zhong of the Song Dyansty (960-1279). The prosperity of the society fueled the popularity of the shadow play among civilians and the wealthy.

1127 - 1279 Shadow puppetry reached a level of unprecedented prosperity. Professional craftsmen making puppets, artists and organizations sprung up around Hangzhou where the southern school of shadow play originated.

1369 - 1644 Ming Dynasty moved the capital city to Northern China. Southern shadow puppet artists flowed to the North such as Leting and Luanzhou in Hebei province, which influenced and boosted the development of the art in the North.

1767 - 1781 Shadow puppetry was introduced to France, Germany and England. It gradually spread around the world.

1796 - 1900 Shadow puppetry was so popular that even farmers organized their own part-time troupes. Because of the uprising inside and invasion outside, this folk art was forbidden by the ruling power and then declined sharply.

1913 - 1949 The art is revived across the whole country after the Qing Dynasty (1644-1912). Some famous record companies in Shanghai and Japan produced albums of renowned shadow puppet artists.

1966 - 1976 The "cultural revolution" destroyed the industry with puppets and scripts burned.

1982 China Puppetry and Shadow Arts Association was set up.

2011 Chinese shadow puppetry was added to UNESCO's list of "intangible cultural heritage" of humanity.

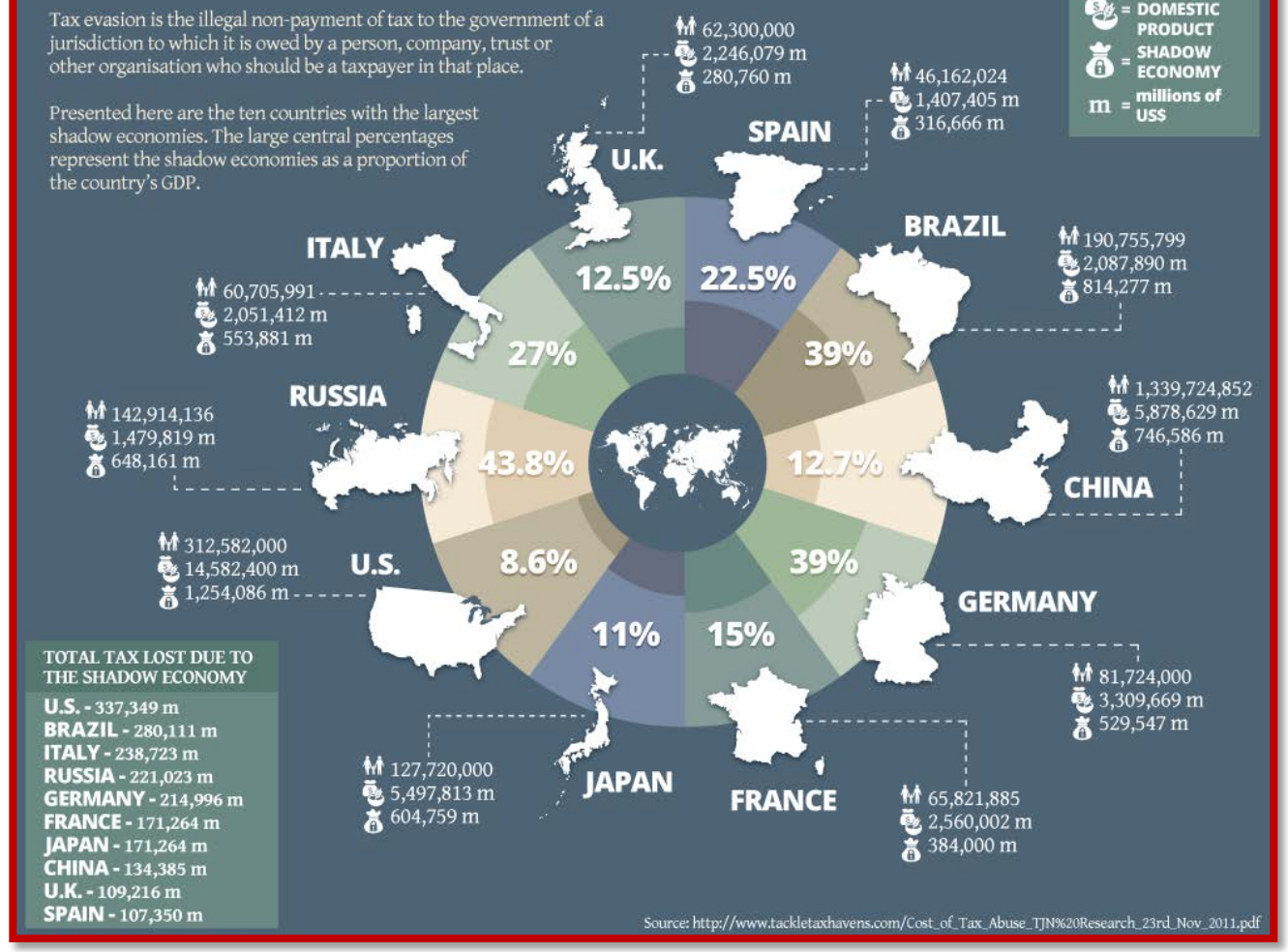
GUILLERMO MUNRO / DONG ZHANGYU / CHINA DAILY

THE SHADOW ECONOMY

Tax evasion is the illegal non-payment of tax to the government of a jurisdiction to which it is owed by a person, company, trust or other organisation who should be a taxpayer in that place.

Presented here are the ten countries with the largest shadow economies. The large central percentages represent the shadow economies as a proportion of the country's GDP.

= POPULATION
= GROSS DOMESTIC PRODUCT
= SHADOW ECONOMY
m = millions of US$

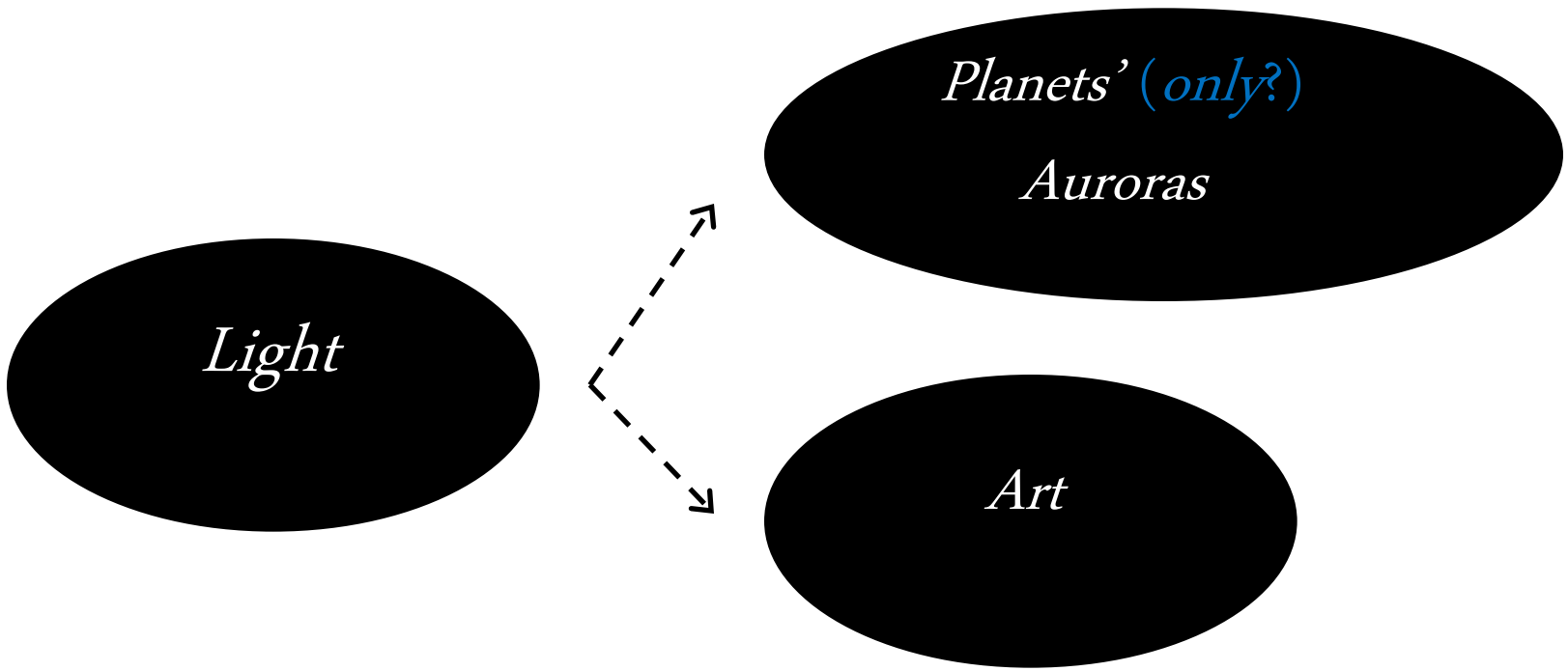


TOTAL TAX LOST DUE TO THE SHADOW ECONOMY

U.S. - 337,349 m
BRAZIL - 280,111 m
ITALY - 238,723 m
RUSSIA - 221,023 m
GERMANY - 214,996 m
FRANCE - 171,264 m
JAPAN - 171,264 m
CHINA - 134,385 m
U.K. - 109,216 m
SPAIN - 107,350 m

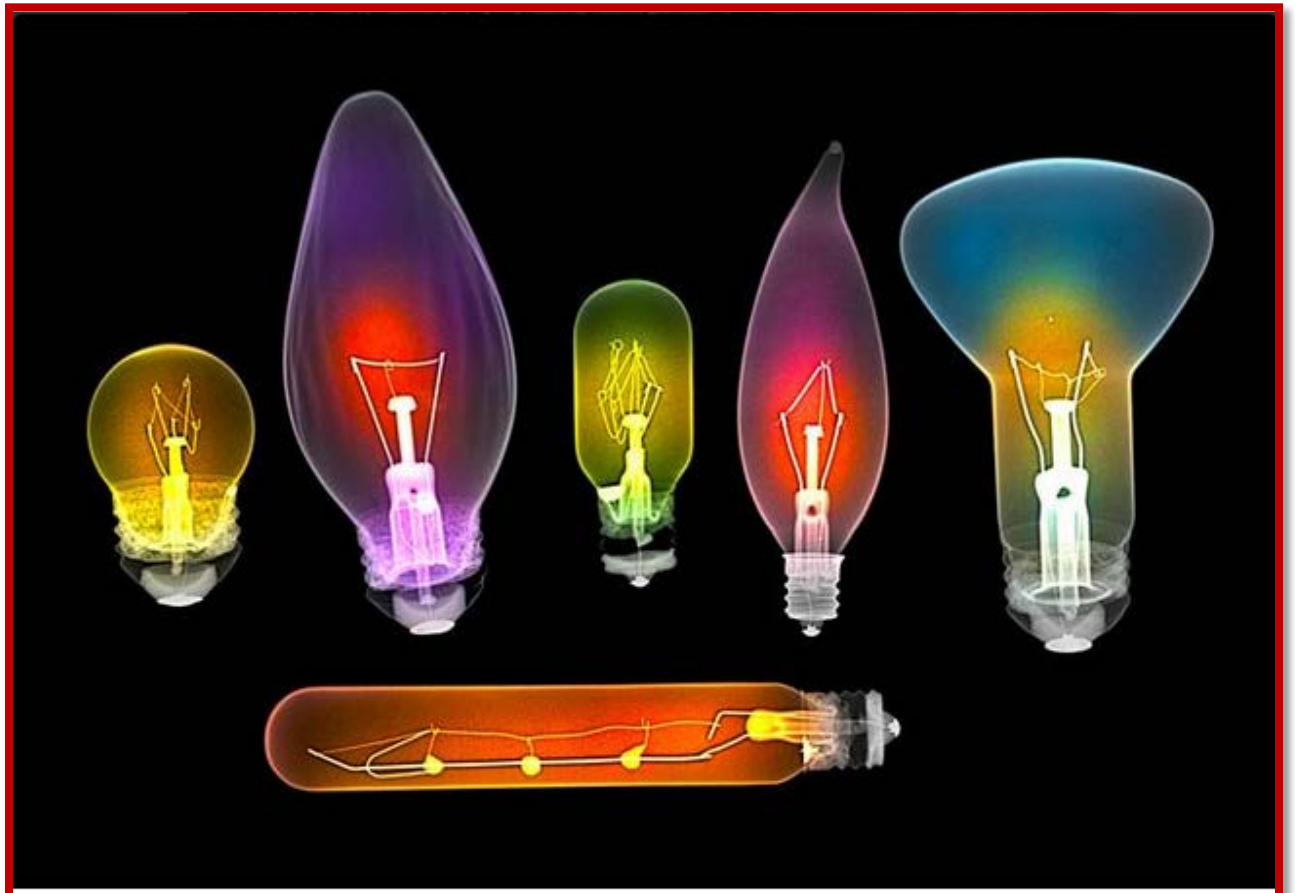
Source: http://www.tackletaxhavens.com/Cost_of_Tax_Abuse_TJN%20Research_23rd_Nov_2011.pdf

- **Inquiry Based Science Education**



extend

STEAM



IYL2015 @IYL2015 · 19h
Take a look at the new #IYL2015 image gallery light2015.org/Home/About/Res... Find all images from Light:Beyond the Bulb #LBTB

34 24

https://twitter.com/IYL2015/status/583964050746429440

Old Pics Archive
@oldpicsarchive

Following

Picasso

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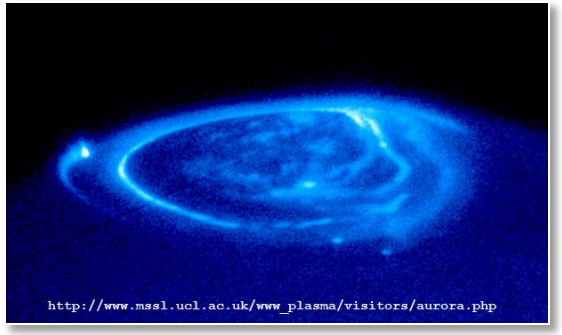
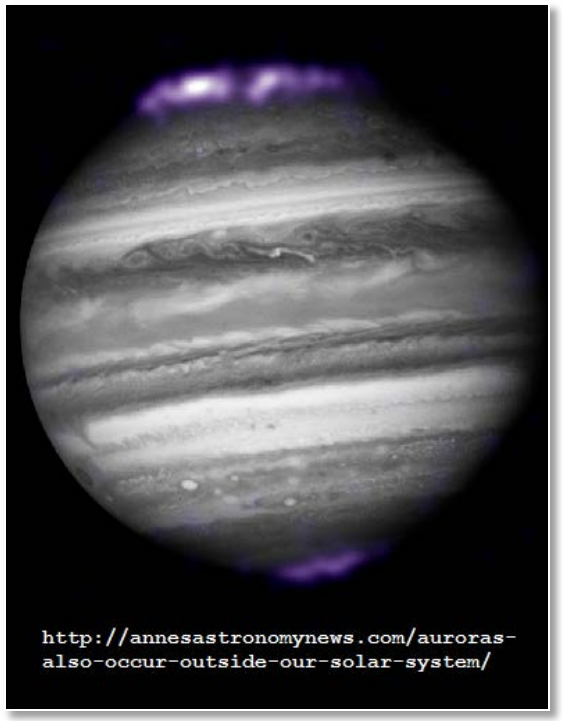
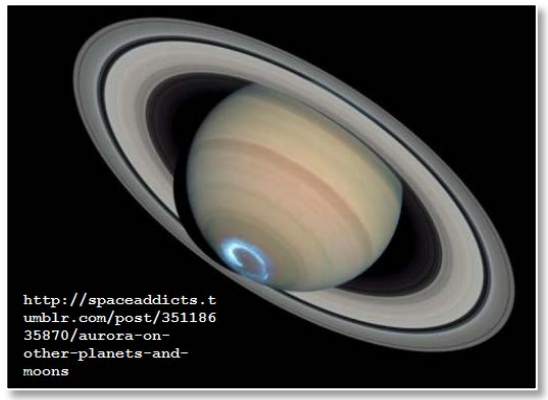
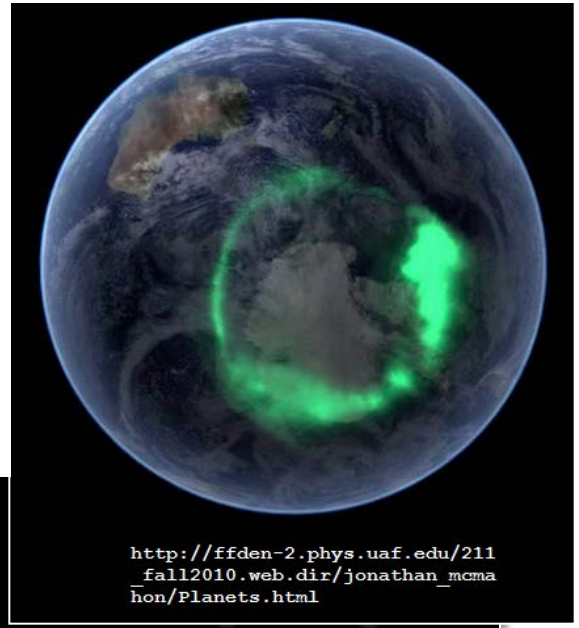
2:08 PM - 2 Apr 2015

https://twitter.com/oldpicsarchive/status/583586684199141377









nC7QroiDVQw

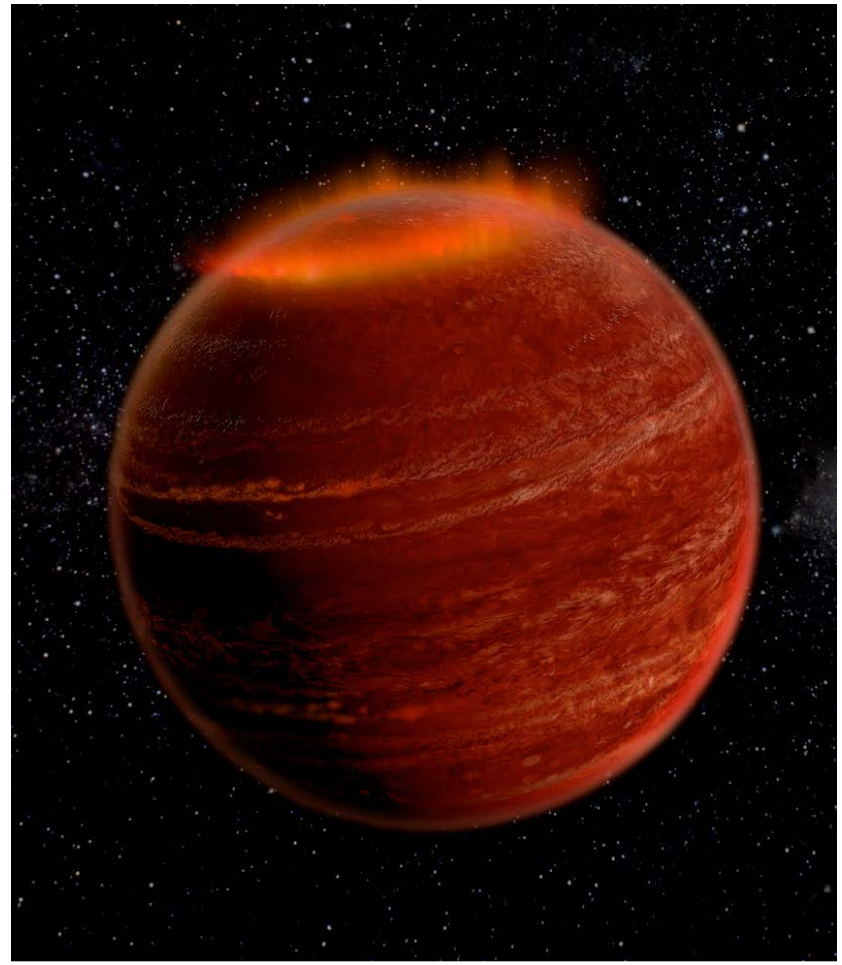
/node/107349

http://portal.opendiscoveryspace.eu/edu-object/aurora-borealis-13547

>> **brown dwarf** LSR J1835+3259

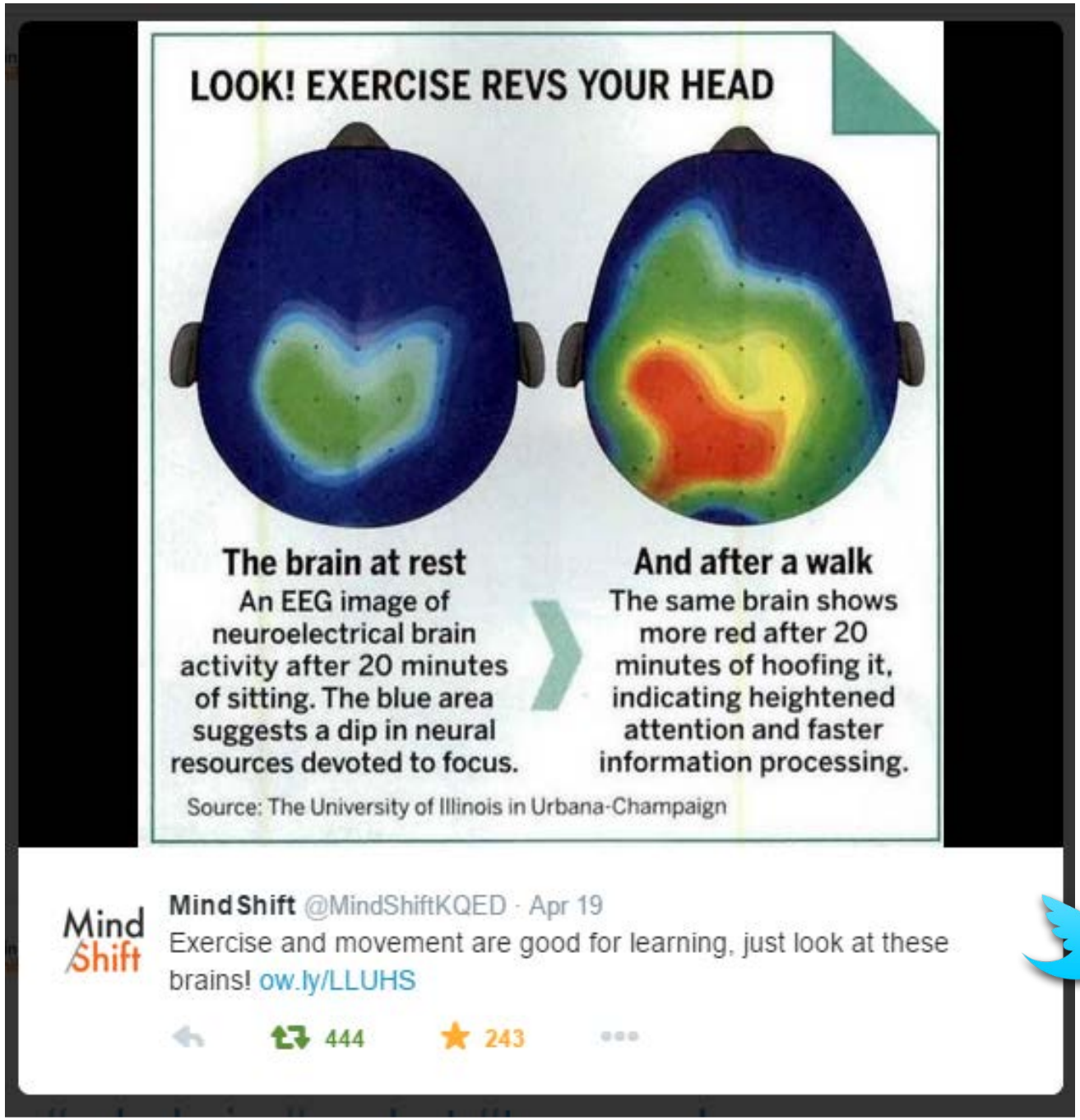
18 ly from Earth

>> the radio signal generated by its aurora was detected using the Karl G. Jansky Very Large Array (VLA) in New Mexico

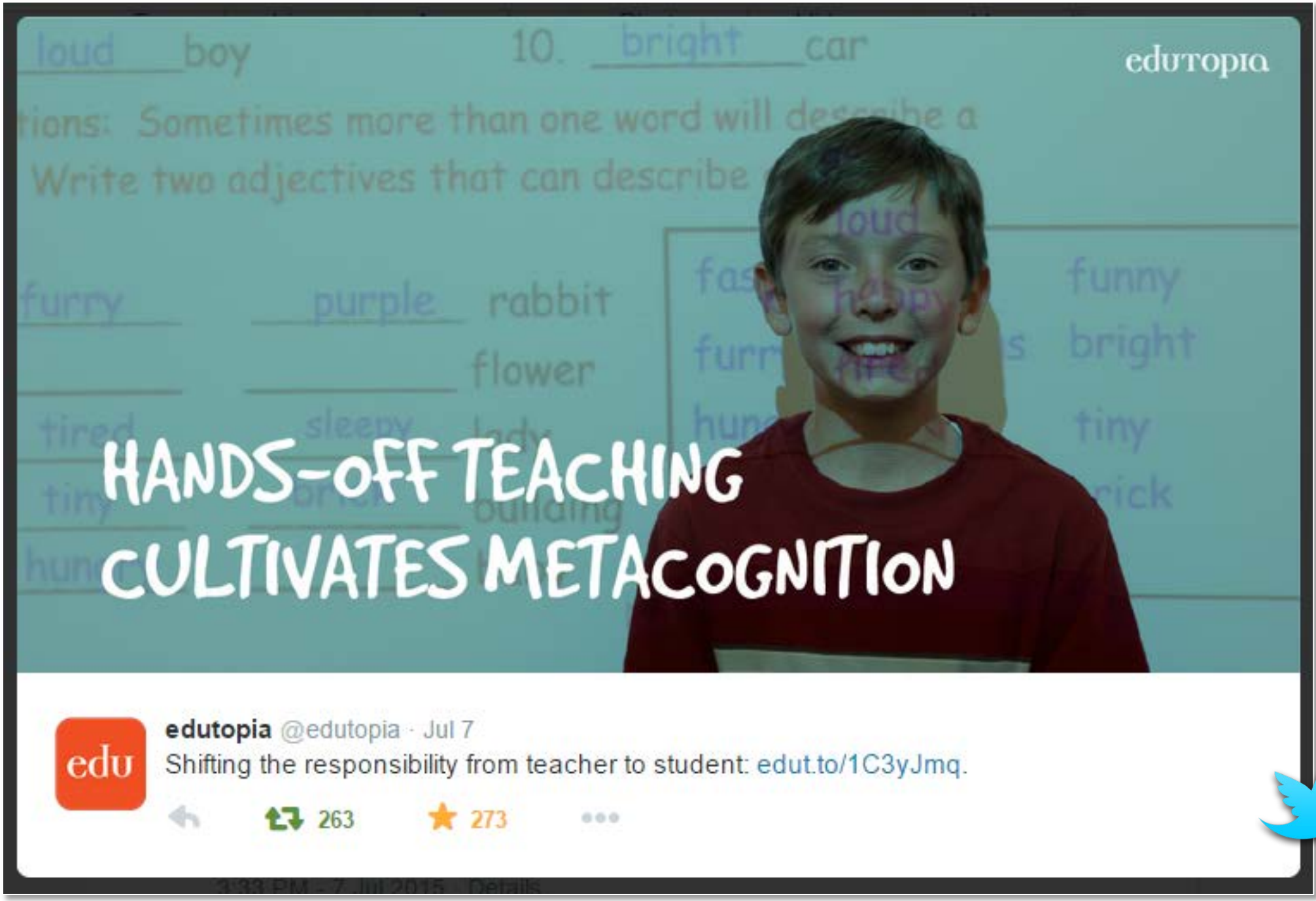


Artist conception of an aurora over the polar region of a brown dwarf. CREDIT: Chuck Carter and Gregg Hallinan, Caltech.

after 20 min of sitting



20 minutes after a walk


edutopia
HANDS-OFF TEACHING
CULTIVATES METACOGNITION
edu
edutopia @edutopia · Jul 7
Shifting the responsibility from teacher to student: edut.to/1C3yJmq.
263
273

Metacognition

evaluation

>> What I did liked in this research?
>> What was difficult for me in this research?
>> How did I worked?
>> Am I satisfied with my performance?
>> Am I satisfied with my group’s performance?

Metamemory → metamnemonic questions

EOL

JOL

FOK

prio
r

TASK

after

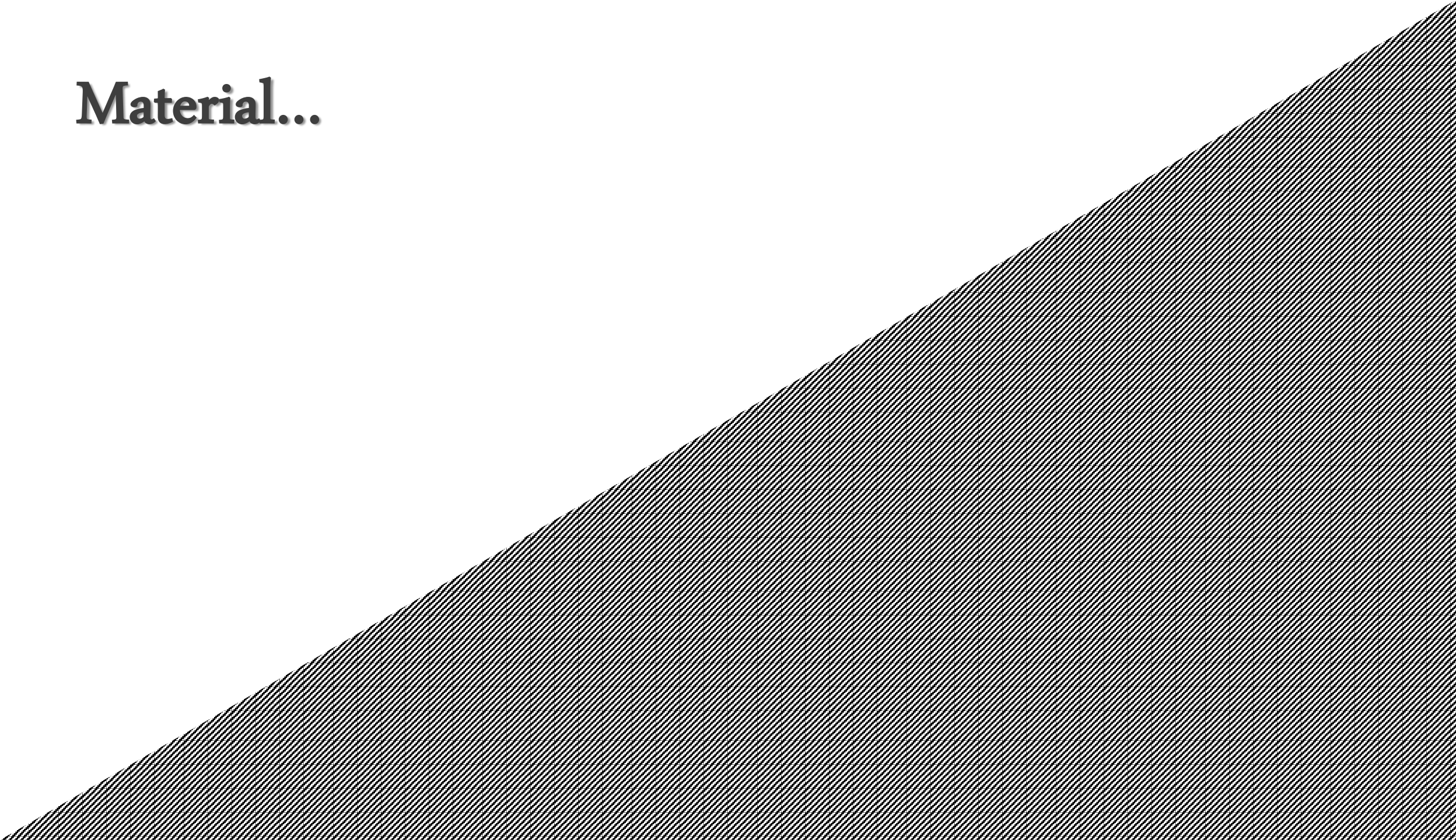
What do you think, is this an easy TASK ?

So, at the end, it was an easy TASK ?

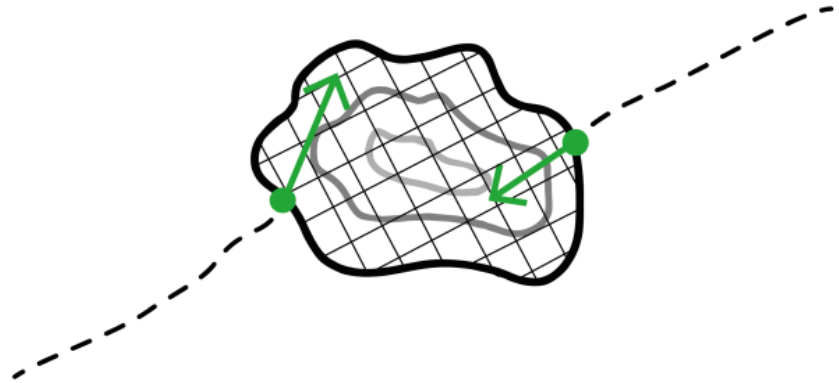
evaluation

So, in the future, how difficult it would be something like this TASK ?

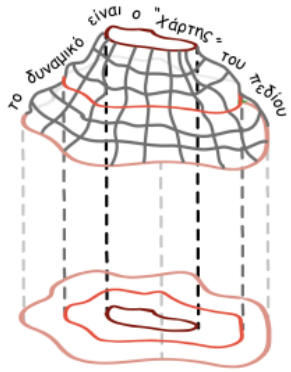
Material…



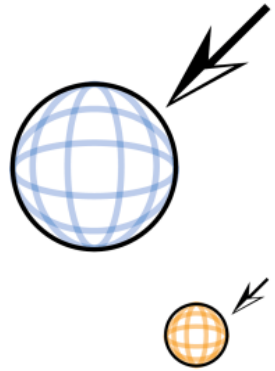
πεδίο ονομάζεται ο χώρος μέσα στον οποίο (σε κατάλληλο σωματίδιο) ασκούνται **δυνάμεις**



το πεδίο χαρακτηρίζεται από τα φυσικά μεγέθη **δυναμικό** (μονόμετρο) και **ένταση** (διανυσματικό)



η κίνηση στο πεδίο (για θετικό σωματίδιο) γίνεται από τα "ψηλά" στα "χαμηλά", δηλαδή, από το μεγαλύτερο δυναμικό προς το μικρότερο δυναμικό



η **ένταση** μας "λέει" πόσο ισχυρό είναι ένα πεδίο. Π.χ. η ένταση του βαρυτικού πεδίου (κοντά στην επιφάνεια) στη Γη έχει μέτρο* g=9.8 ενώ στον Άρη έχει μέτρο g=3.7 .

(*το g μετριέται σε m/s^2)

τα πεδία δυνάμεων τα οποία γνωρίζουμε σήμερα είναι τα παρακάτω:

βαρυτικό πεδίο

η βαρύτητα περιγράφει την έλξη μεταξύ μαζών και τις αλληλεπιδράσεις ύλης καί ενέργειας μέσω της καμπύλωσης που αυτές προκαλούν στο χώρο και στο χρόνο - σημαντικοί επιστήμονες Newton, Einstein,

ισχυρό πεδίο

σε "μεγάλη κλίμακα" περιγράφει πώς τα πρωτόνια και νετρόνια "κάθονται μαζί" στους πυρήνες των ατόμων - σε "μικρή κλίμακα" περιγράφει τις αλληλεπιδράσεις των κουάρκ (quark) - από τα οποία αποτελούνται τα πρωτόνια, τα νετρόνια, κ.ά. - - σημαντικοί επιστήμονες Politzer, Wilczek, Gross

ηλεκτρομαγνητικό πεδίο

περιγράφει τις αλληλεπιδράσεις (ακίνητων και κινούμενων) ηλεκτρικά φορτίων και μαγνητών - σημαντικοί επιστήμονες Faraday, Oersted, Ampere, Maxwell, Feynmann κ.λπ.

ασθενές πεδίο

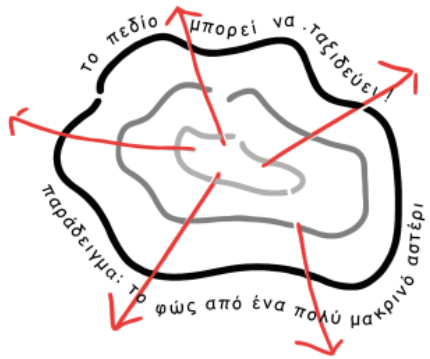
το πιο 'σύνηθες' αποτέλεσμα της ασθενής αλληλεπίδρασης είναι η λεγόμενη 'διάσπαση β' η οποία περιγράφει πώς ηλεκτρόνια "πετάγονται" από τους πυρήνες ορισμένων ατόμων (καθώς 'διασπωνται' τα νετρόνια) - σημαντικοί επιστήμονες Glashow, Salam, Weinberg

Τ.Ε.Ε. Ειδικής Αγωγής Α' Βαθμίδας
& Ειδικού ΕΠΑ.Λ. Ν. Σερρών
Σχολ. Έτος 2013-2014
Ν. Νεραντζής , ΦΥΣΙΚΟΣ ΠΕ04.01

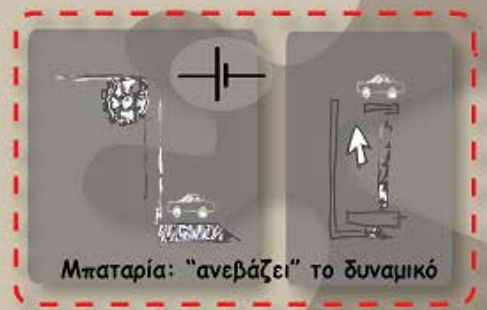
Ο όρος θεμελιώδεις αλληλεπίδρασεις ή (θεμελιώδεις δυνάμεις) αφορά το μηχανισμό σύμφωνα με τον οποίο ύλη και ενέργεια αλληλεπιδρούν μεταξύ τους. Σήμερα γνωρίζουμε τέσσερις θεμελιώδεις αλληλεπιδράσεις: τη βαρυτική, την ηλεκτρομαγνητική, την ισχυρή και την ασθενή αλληλεπίδραση.

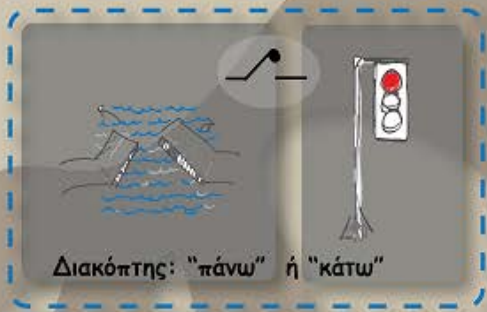
Οι σύγχρονες θεωρίες υποστηρίζουν ύλη και ενέργεια δεν αλληλεπιδρούν απ' ευθείας μεταξύ τους, αλλά η αλληλεπίδραση λαμβάνει μέσω της ανταλλαγής συγκεκριμένων σωματιδίων (των φορέων) της εκάστοτε αλληλεπίδρασης - λ.χ. το φωτόνιο για την ηλεκ- τρομαγνητική αλλλεπίδραση.

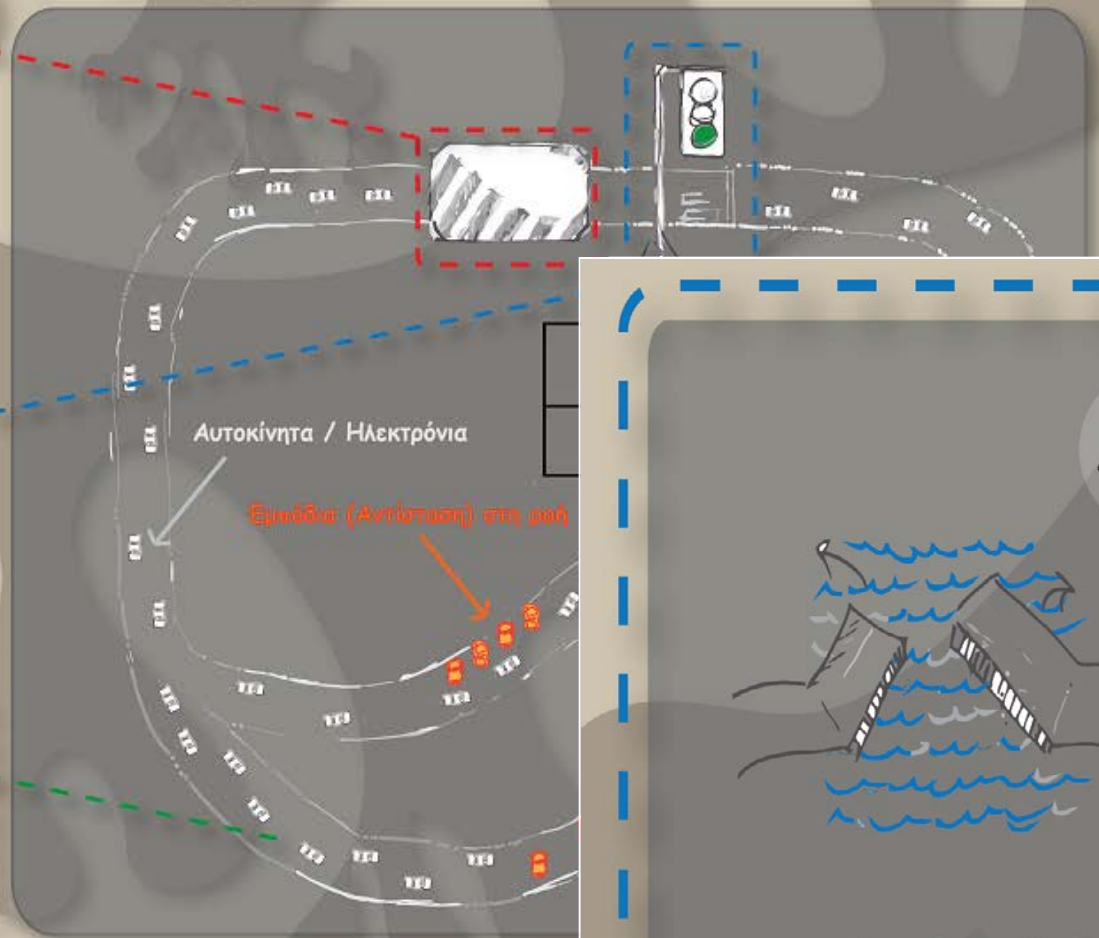
Μεγάλο κομμάτι της έρευνας σήμερα στο πεδίο της θεωρητικής φυσικής στρέφεται στην ενοποίηση των αλληλεπιδράσεων. Την περιγραφή τους, δηλαδή, μέσω κοινών μαθηματικών σχέσεων. Το πρώτο βήμα έγινε με την ενοποίηση του ηλεκτρισμού και του μαγνητισμού σε ηλεκτρομαγνητισμό. Ακολούθησε η ενοποίηση του ηλεκ/σμού με την ασθενη αλλη/ση σε **ηλεκτρασθενή** και οι 'μεγάλες ενοποιημένες θεωρίες' ενοποιούν την **ηλεκτρασθενή** και την ισχυρή αλληλεπίδραση. Προς το παρόν, η βαρύτητα αποτελεί το 'σκληρό καρύδι' σε αυτή τη διαδικασία ενοποιήσεων.



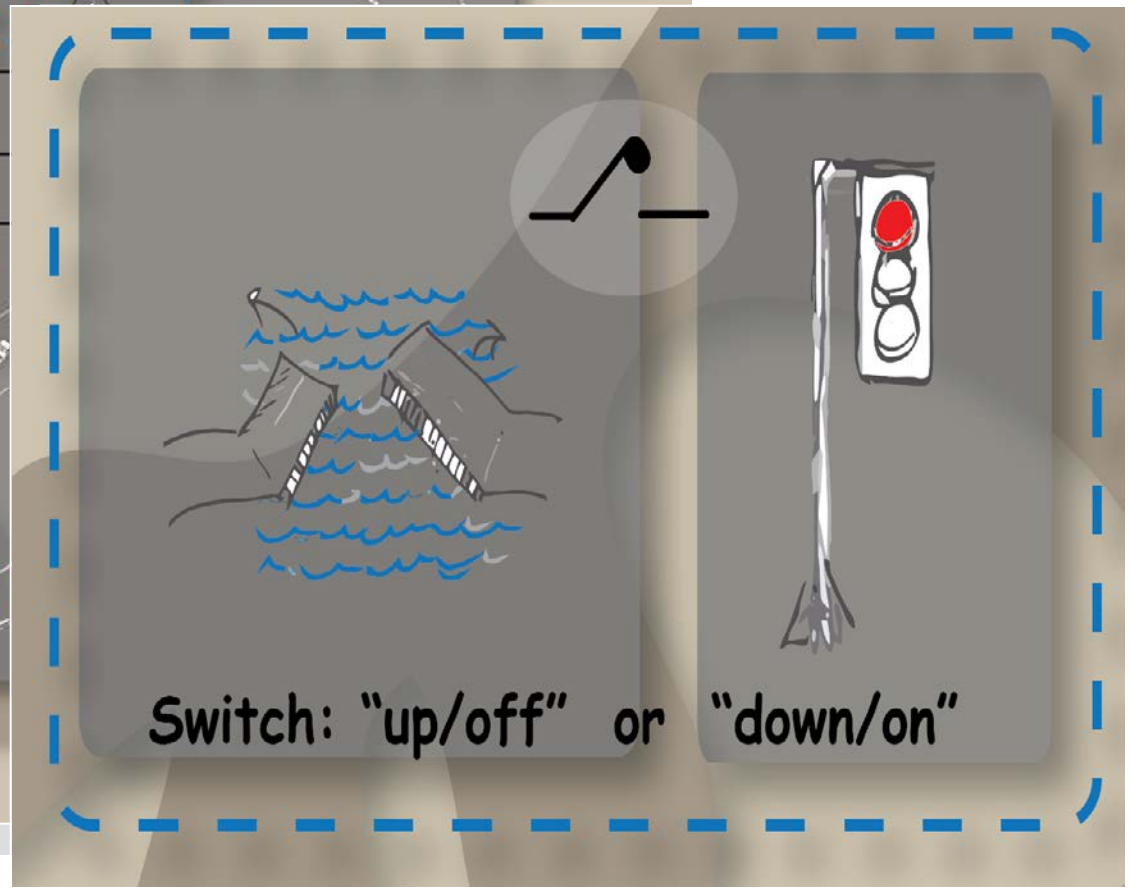
ΑΝΑΛΟΓΟ "ΗΛΕΚΤΡΙΚΟ ΚΥΚΛΩΜΑ - ΑΥΤΟΚΙΝΗΤΟΔΡΟΜΟΣ"

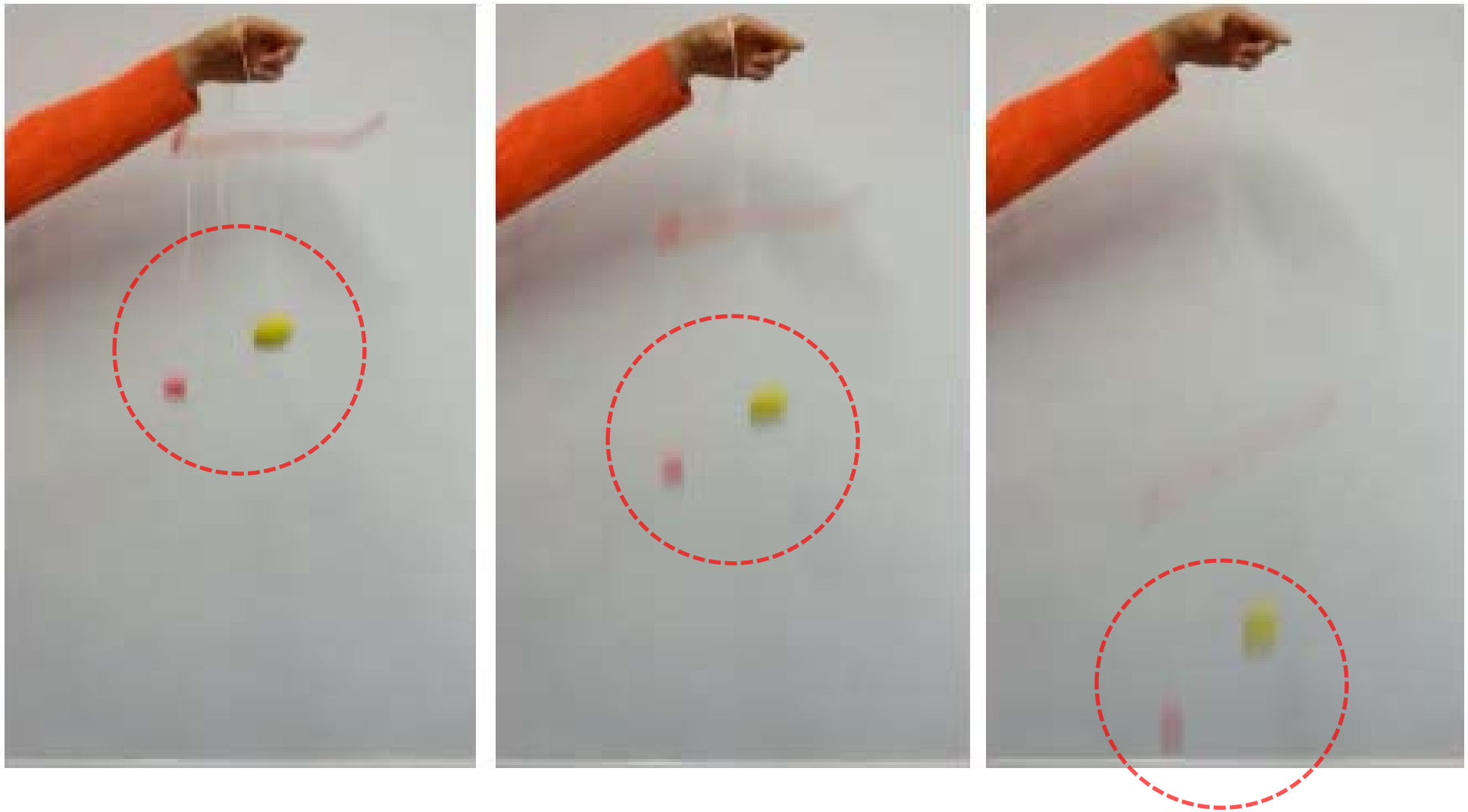






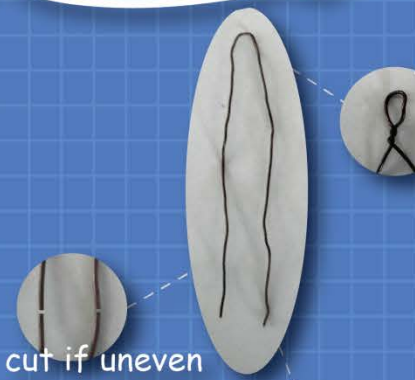
CIRCUIT's POLYGON





THE "FALLING OBJECTS" EXPERIMENT

1 the ...device



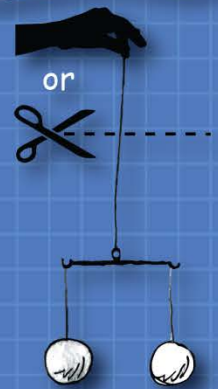
choose the angle

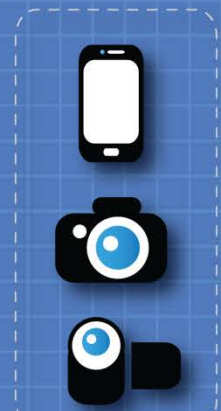
2 choose the materials

or

water, oil, rock(s), sand, paper, wood, magnet(s), cotton, cork, cooper coin(s), screw(s), futher(s), air, ...

3 perform





4 analyse

photo/video

Ν. Νεράντζης , ΦΥΣΙΚΟΣ ΠΕ04.01
στην Ειδική Αγωγή & Εκπαίδευση
Σχολ. Έτος 2013-2014

http://4myfiles.wordpress.com/

4MYFILES

Νικόλαος Νεράντζης (Φυσικός στην Ειδική Αγωγή & Εκπαίδευση)
Nikolaos Nerantzis (Physicist in Special Education)

Environment & STEM Education

January 26, 2015 Leave a comment

Περιβάλλον = ό,τι μας περιβάλλει !

The snow landed, soft and silent / Coating Mother Nature with a layer of serene / Night made even quieter as the snow falls / I'm in awe and wonder as I look on mother earth(από το ποίημα "Mother to mother" της Ife Piankhi) link

Λεκάνες Απορροής ⊛ Νόμοι ⊛ ⊛ Χάρτες ⊛ ⊛ Υλικό ⊛

The future is a picture(από το ποίημα "The future" της Dolapo Ogunwale) link

Απόβλητα ⊛ Νόμοι ⊛ ⊛ Χάρτες ⊛ ⊛ Υλικό ⊛

the moon refuses to step out. / dark clouds happily file in, /pushing the stars away. / the cold winds follow decisively. / feelings heighten in the environment(από το ποίημα "The burning rose" της Brenda Bakomora Dokmah) link

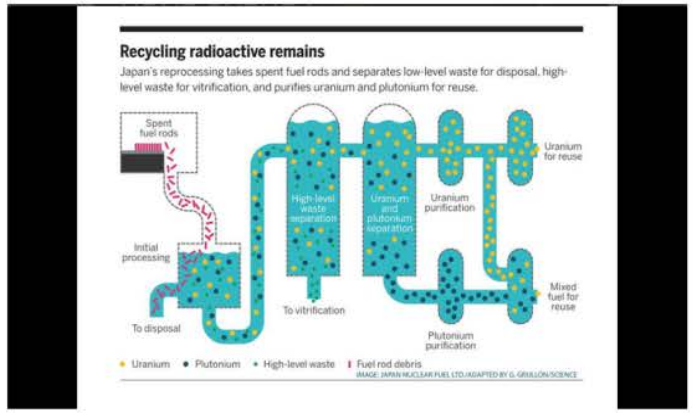
Υδροβιότοποι ⊛ Νόμοι ⊛ ⊛ Χάρτες ⊛ ⊛ Υλικό ⊛

From that heaven of leaves, of cool / earth and nothing to fear. How far. / How lush your bed. How heavy your / prey. Day arrives. You gorge, sleep, / wade the stream. Night kneels at your / feet like a gypsy glistening with jewels. / You raise your head and the great / mouth yawns. You swallow the light.(από το ποίημα "Water, Shade" της Tracy K Smith) link

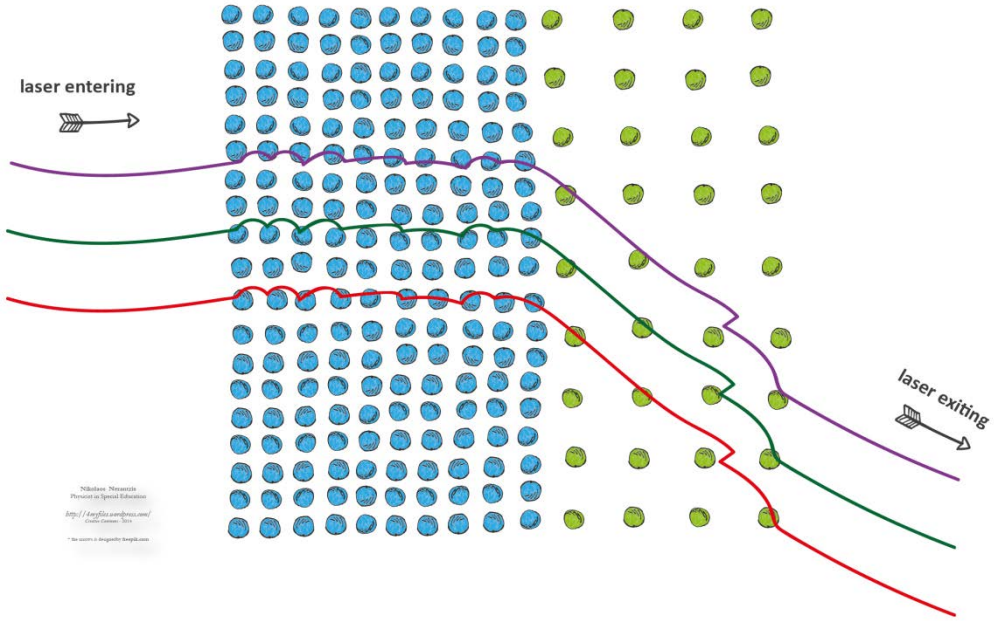
Ανακύκλωση (link)

Νομοθεσία

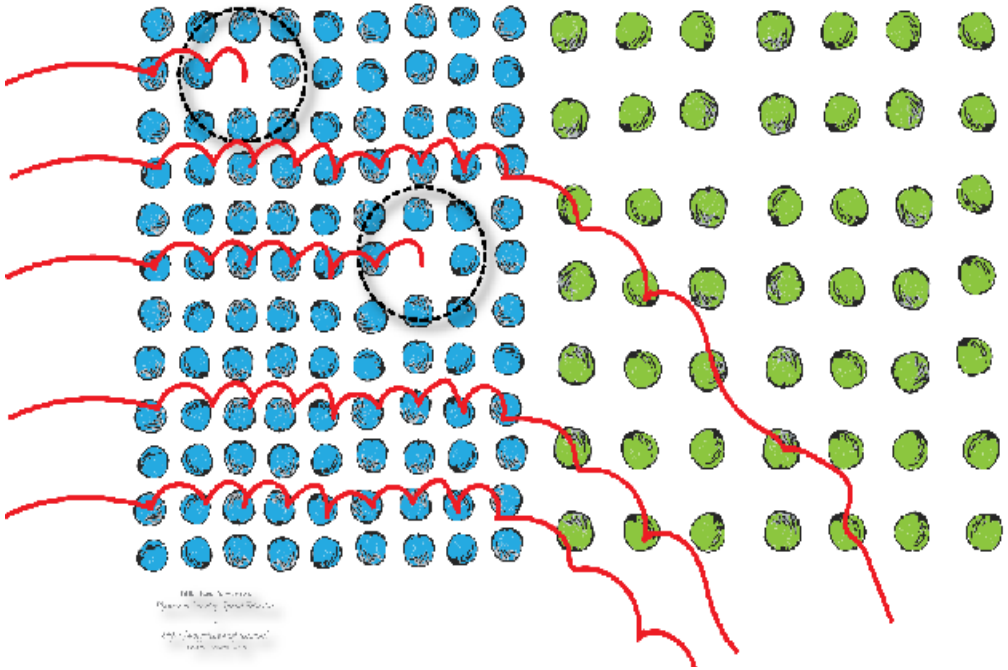
Έλαια

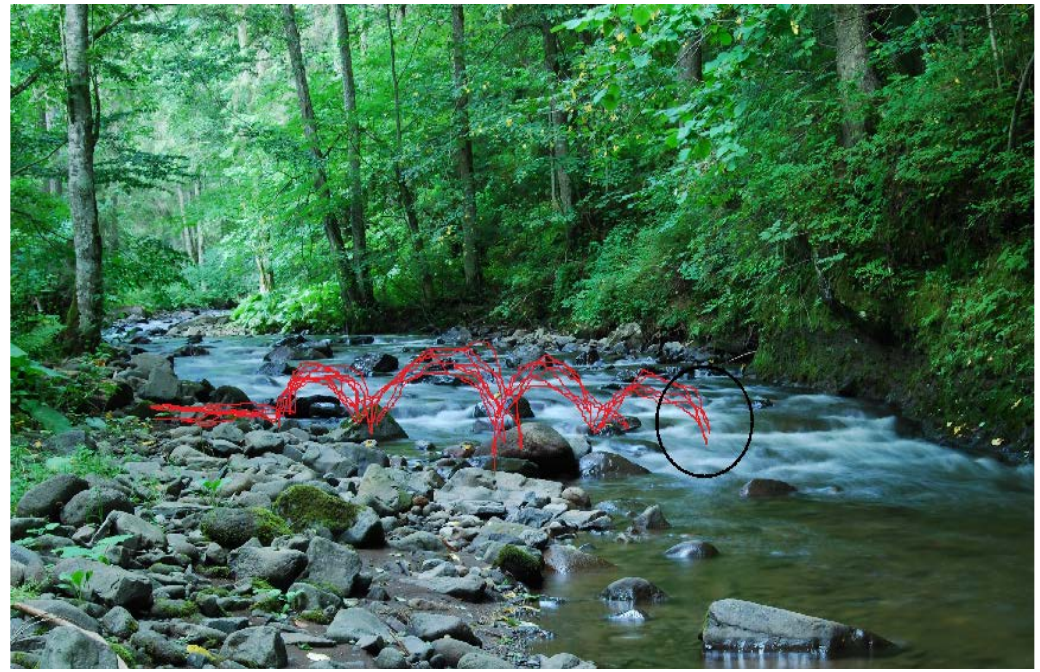


Science Magazine @sciencemagazine · Jan 27
Japan's #nuclear waste reprocessing is years late; repository in limbo bit.ly/1yK5T72
37 28


laser entering
laser exiting


from http://www.luterra.com/essays/superiormay081.html





THE ATOM-RIVER ANALOGY
OR HOW LIGHT ...JUMPS !

THE PREPERATIONS

WE USE LIGHT BLUE & LIGHTGREEN A4 PAPERS IN ORDER TO MAKE ...2D CRYSTAL PATERNS.

OUTCOMES

- OUTDOOR ACTIVITY ✓
- CONNECTING WITH BIG IDEAS OF SCIENCE ✓
- EMOTIONAL COMPONENET OF LEARNING ✓
- EVERYBODY ACTIVE & PARTICIPATED ✓
- QUESTIONS ✓
- FUN ✓

THE IDEA

PHOTONS, DEPENDING ON THEIR ENERGY, CAN BE COSMIC RAY PHOTONS, PURPLE COLOR PHOTONS, RED COLOR PHOTONS, RADIO WAVES PHOTONS, ETC.

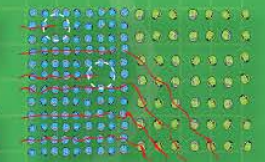
WHEN A RADIATION "HITS" THE MATTER, THE ATOMS ABSORB AND RE-EMIT (EVEN PARTIALLY) THE RADIATION. ...JUST LIKE WHEN WE PASS ACROSS A RIVER BY TROTTING ON THE STONES! IN A "PERFECT" MATERIAL, WHERE ATOMS ARE IN THEIR EXACT "SEATS", LIGHT AS "...IT COMES IN ...IT COMES OUT" ! IN A MATERIAL WHERE THE ATOMS ARE NOT IN THEIR PLACES, LIGHT ...IS 'TRAP- PED' ...JUST THAT WE WOULD NOT PASS ACROSS A RIVER, AS IF MISSING ONE STONE!

UNDER THE GUIDANCE OF THE SCIENCE'S TEACHER, OUR STUDENTS (WITH SPECIAL EDUCATIONAL NEEDS) AS PHOTONS, UNDERGO THE CHANGES IN THEIR (LIGHT) PATH VIA TWO DIFFERENT MATERIALS. THE ANALOGY DEMONSTRATES LIGHTS CAPABILITY TO ...JUMP ON ATOMS – IN ORDER TO PASS THROUGH A CRYSTAL MATERIAL – JUST LIKE WE JUMP ON ROCKS TO PASS ACROSS A RIVER.

THE ANALOGY ALSO DEMONSTRATES HOW A NON-CRYSTAL MATERIAL TRAPS LIGHT – JUST LIKE WE WILL FELL INTO THE RIVER'S ROCK END! IN MORE DE- TAIL: EVERYTHING AROUND US IS MADE OF VERY VERY SMALL PARTICLES. IN OTHER WORDS, MATTER IS COMPOSED OF ATOMS (BIG IDEA OF SCIENCE). THE MORE "CLOSER" IS ONE ATOM TO ANO- THER, THE DENSER IS THE MATERIAL. ON THE CONTRARY, THE MORE "APART" IS ONE ATOM TO ANOTHER, THE LESS DENSE IS THAT MATERIAL.

THIS ANALOGY DEMONSTRATES ALSO WHY LIGHT "TURNS", WHEN IT PASSES FROM ONE MEDIA TO ANOTHER. THE ANALOGY WAS PART OF THE TOP-5 FINALIST DIDACTIC SCENARIO OF ISE "LEARNING WITH LIGHT" COMPETITION (HTTP://WP.ME/P3ORIZ-H9)
2015

...BUT IT WASN'T DRAMATIZED AT THIS TIME. THIS, NON-TYPICAL FOR THE HELLENIC SCHOOLS, APPROACH IS ALL ABOUT PROVIDING THE OPPORTUNITY TO OUR STUDENTS TO ACT, TO DECIDE, TO BE PLAYFUL AND TO BE INSPIRED.



...ANY COMMENTS ?

THE IMPLEMENTATION

WE FORM ROWS OF 3-4 STUDENTS AND (WITH HOLDING HANDS ...AS PHOTONS WE) WALK ON THESE PATERNS!

THE REFLECTION

AFTERWARDS, IN THE CLASSROOM, WE REVIEW & REFLECT ON OUR ACTIVITY...

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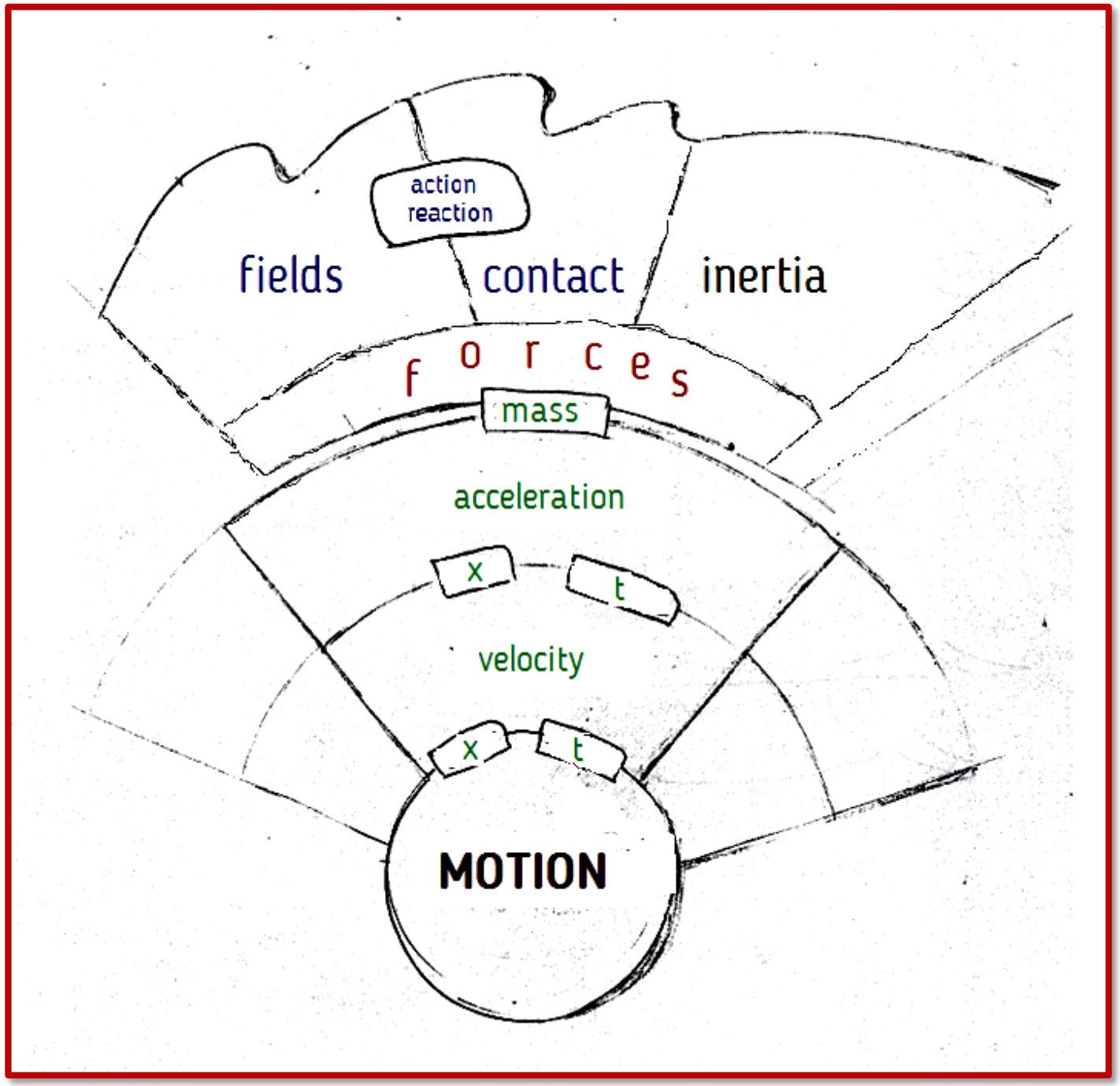
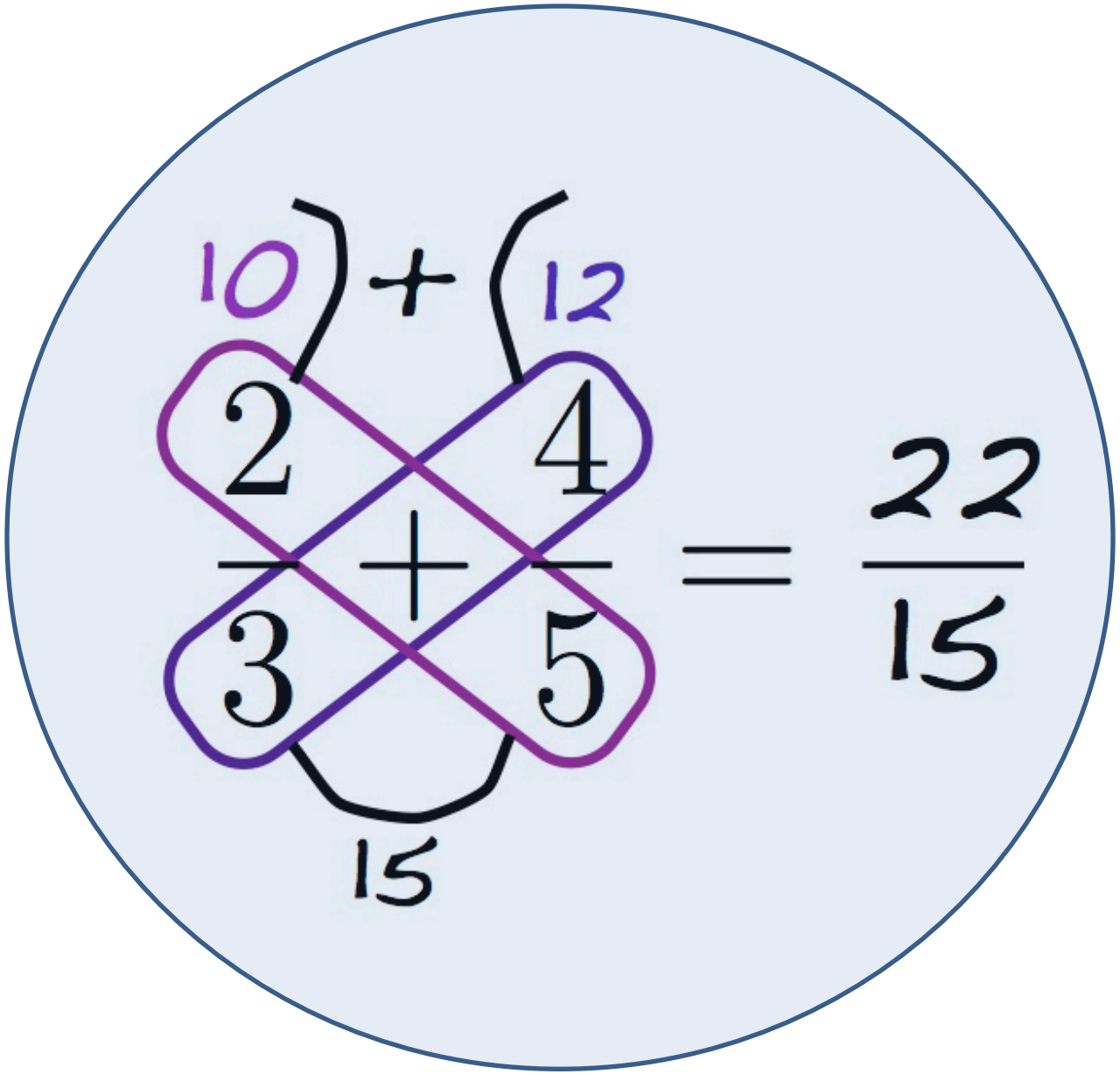
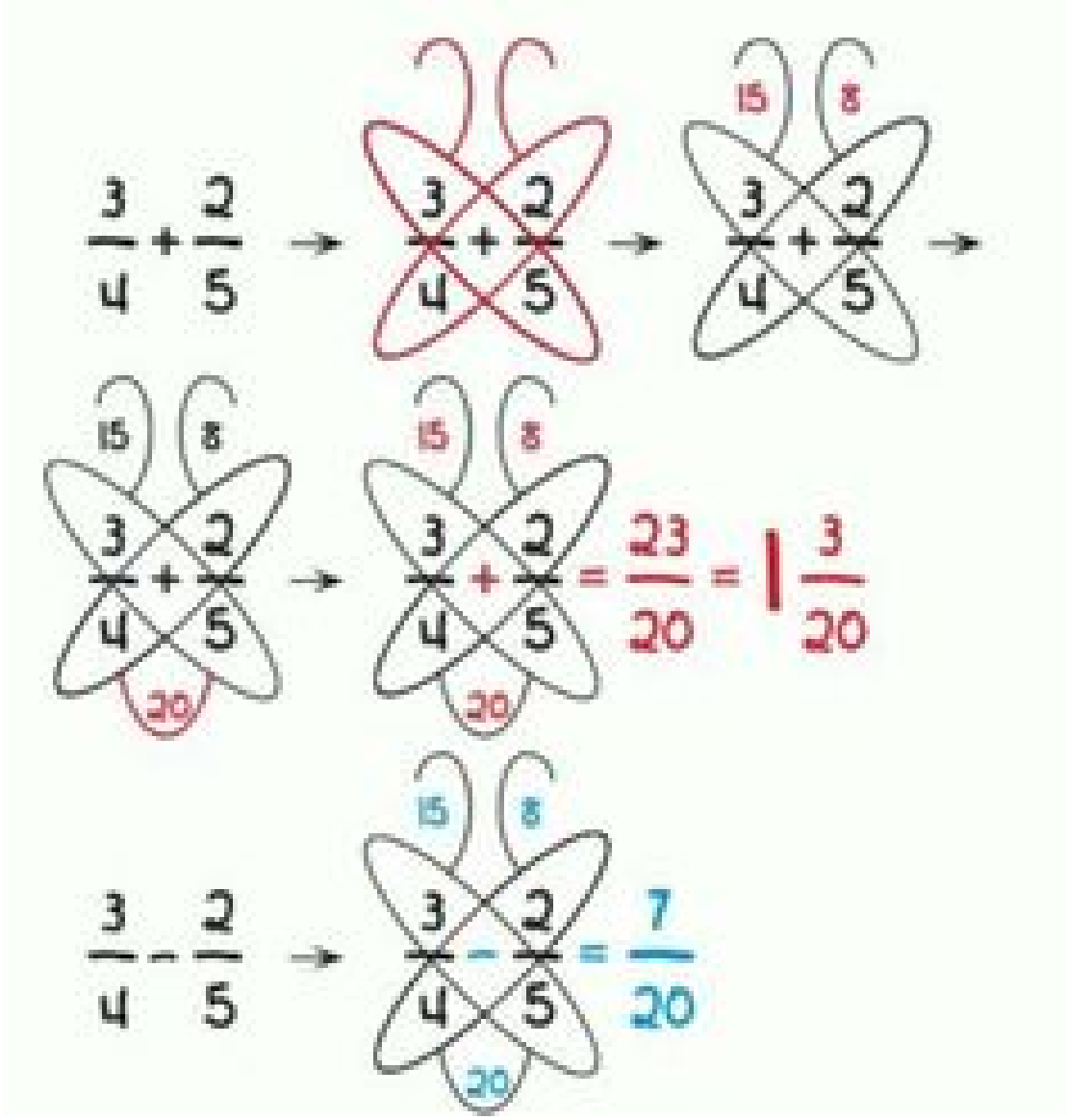
Physicist in Secondary Special Education
http://4myfiles.wordpress.com/
*
Special Junior High School pf Thessaloniki
http://eidgymthess.wordpress.com/

*

SCIENTIX iSe CreatIT

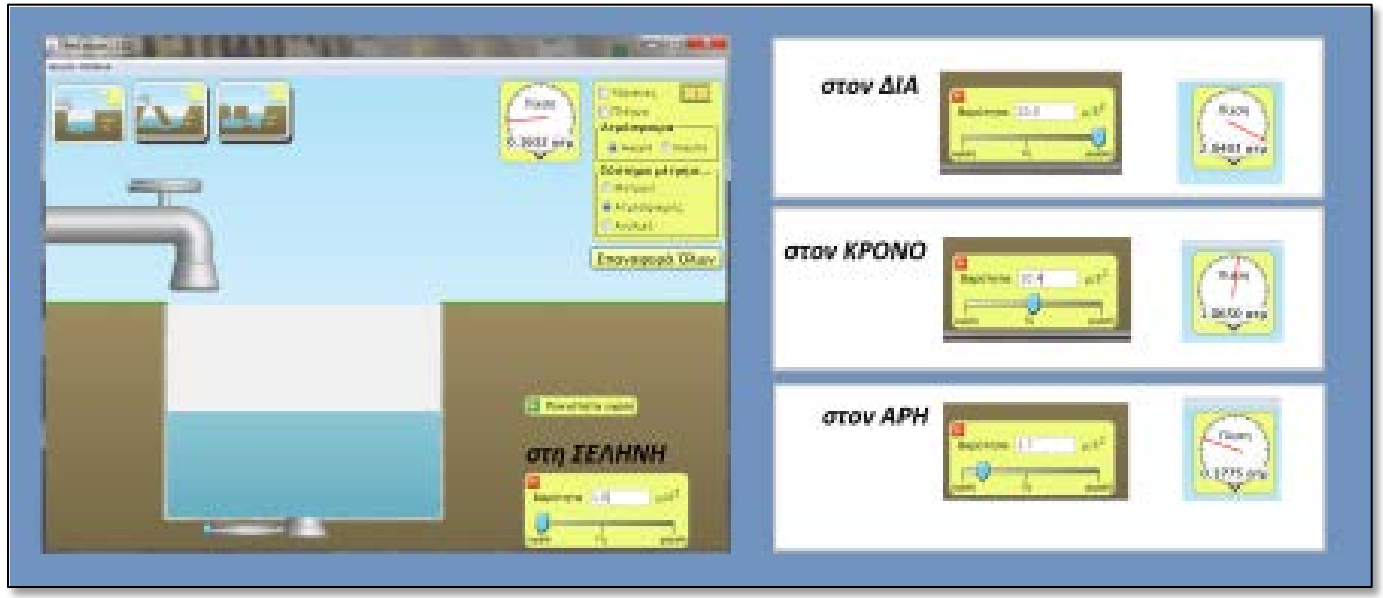

action
reaction
fields
contact
inertia
forces
mass
acceleration
x
t
velocity
x
t
MOTION


10
12
2
4
3
+
5
15
= 22/15


3/4 + 2/5
15
8
20
= 23/20 = 1 3/20
3/4 − 2/5
= 7/20

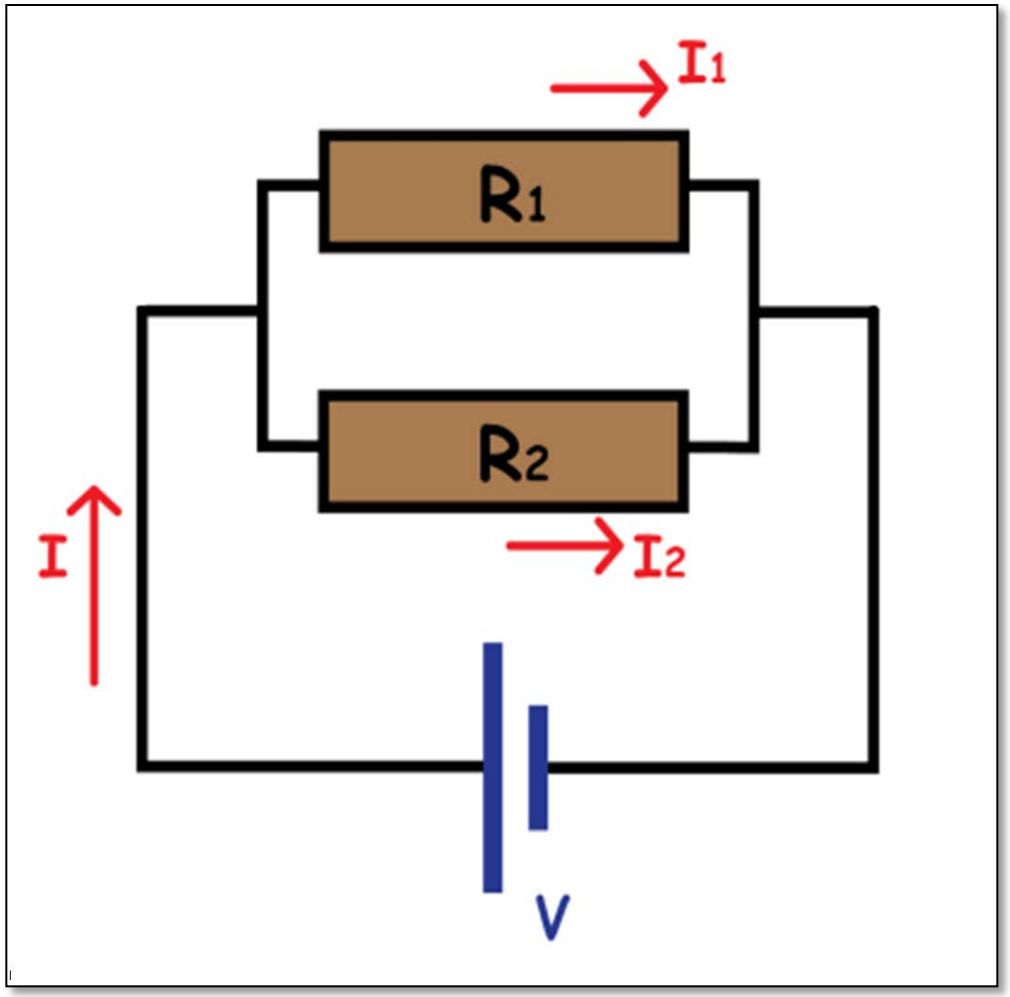
tests…

- **Hands-on & PhET**



PhET

under-pressure_el.jar



$$R_{23} = \frac{R_2 \cdot R_3}{R_2 + R_3} = \frac{4 \cdot 12}{4 + 12} = 3\Omega$$

combination	*cross*	●
successful	*sum*	+

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} \quad \text{ή} \quad \frac{1}{R} = \frac{1}{20\Omega} + \frac{1}{60\Omega} \quad \text{ή} \quad \frac{1}{R} = \frac{60\Omega + 20\Omega}{(20\Omega)\cdot(60\Omega)} \quad \text{ή} \quad R = 15\ \Omega.$$

Tracker

File Edit Video Track Coordinate System View Help

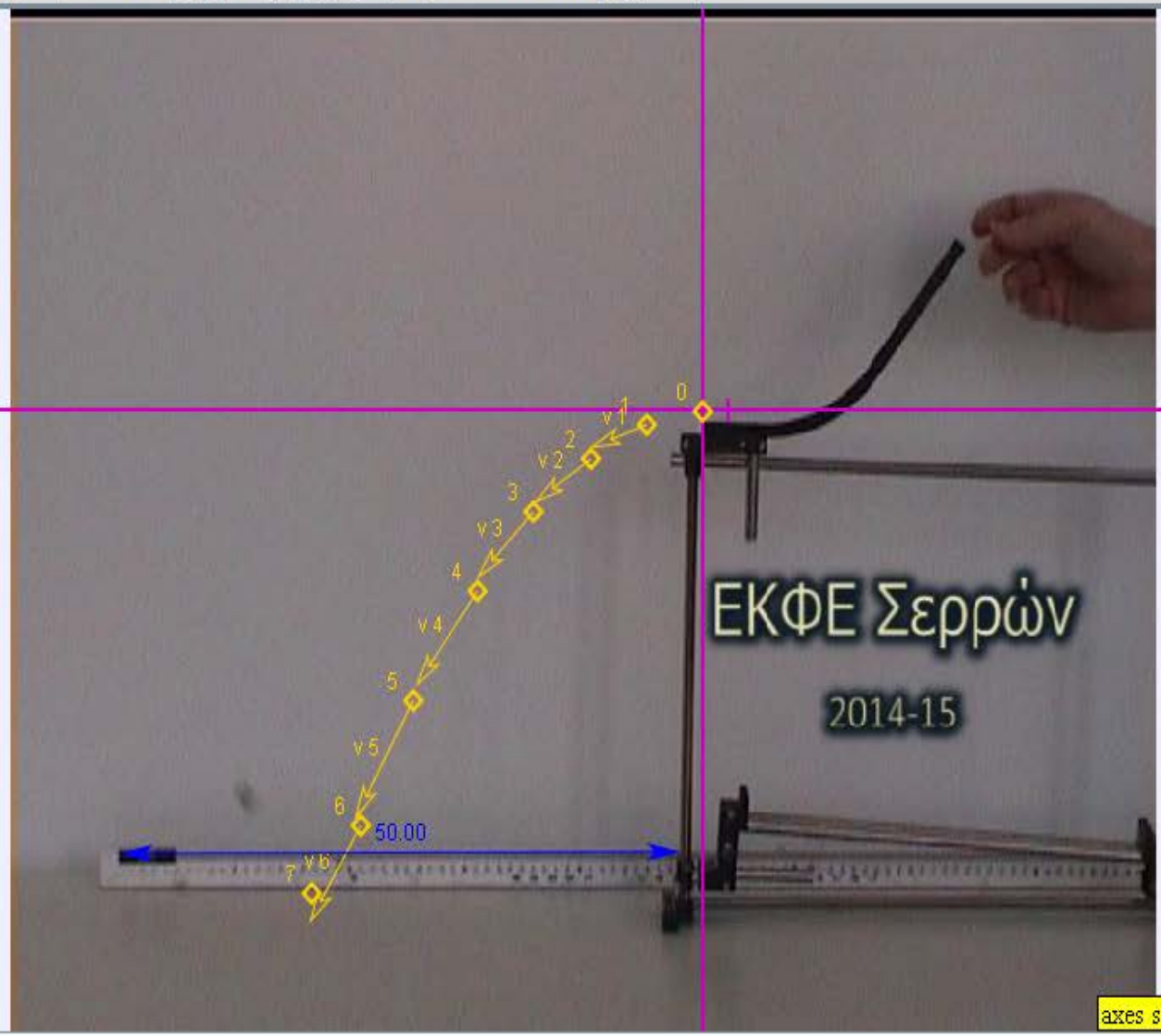
Create 94%

axes Grid origin pixel position x 435.06 y 225.72 angle from horizontal 0.0°

memory in use: 20MB of 247MB

Track Control

Sfaira 3

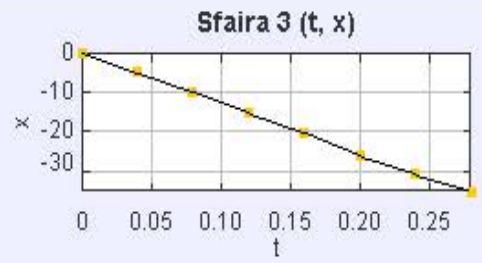


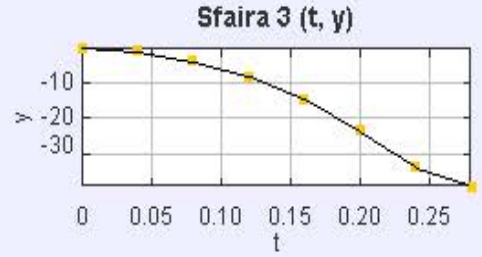
x=56.78 y=-41.10

axes selected (set angle to change tilt)

513 100%

Plot Sfaira 3 Sync





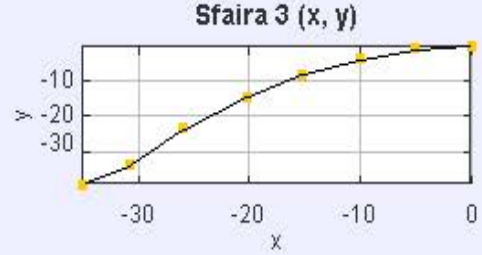
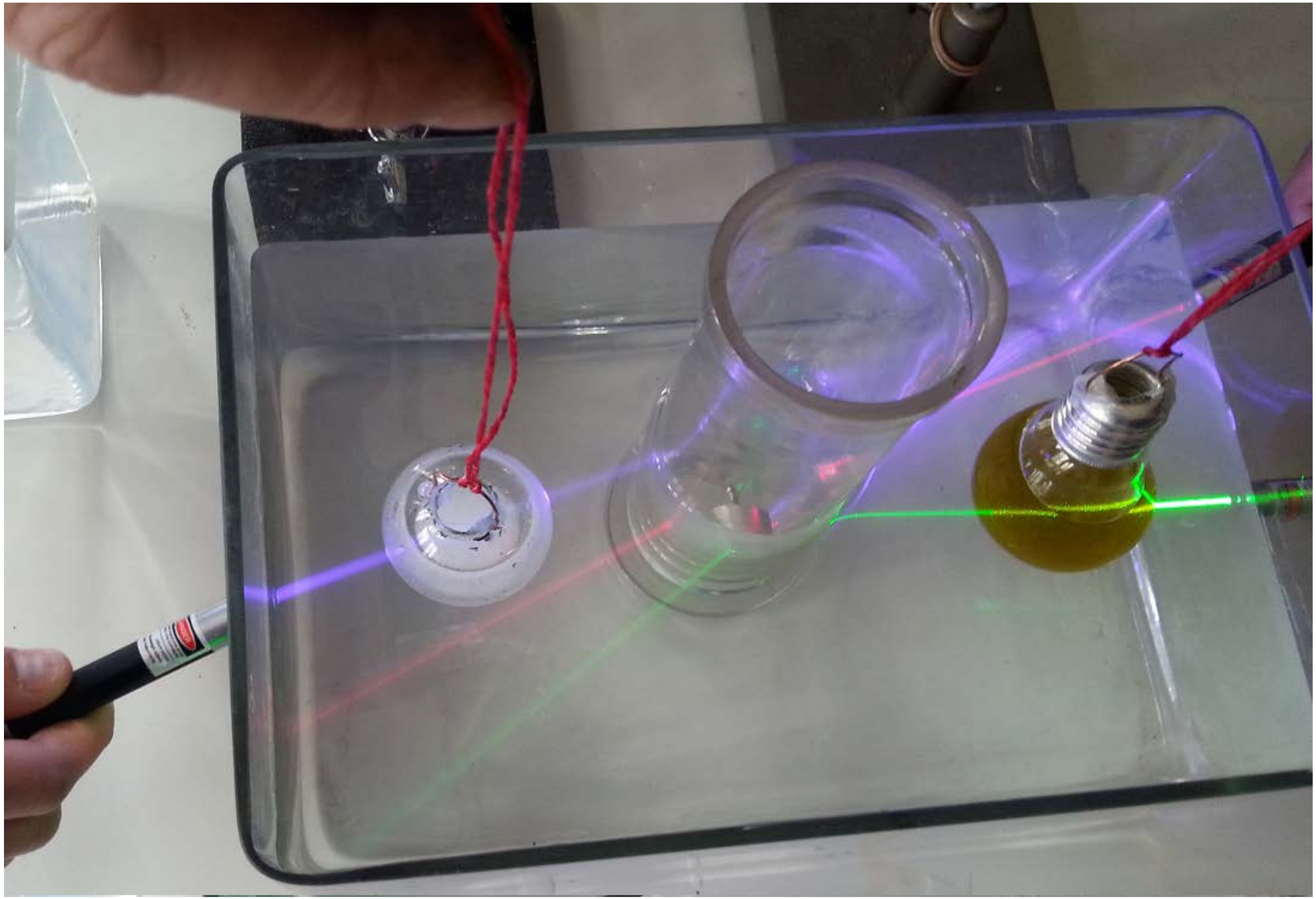


Table Sfaira 3

t	x	y
0	0	-0.152
0.04	-5.024	-1.218
0.08	-10.047	-3.958



LASERS & BUBBLES

Phase I

total reflection

...happens when a wave strikes a medium boundary at an angle larger than a particular critical angle with respect to the normal to the surface. If the refractive index is lower on the other side of the boundary and the incident angle is greater than the critical angle, the wave cannot pass through and is entirely reflected. (http://en.wikipedia.org/wiki/Total_internal_reflection)

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Physicist in Secondary Special Education

Sotirios Mandiliotis
Responsible of 'Serres' Laboratory Center of Natural Science

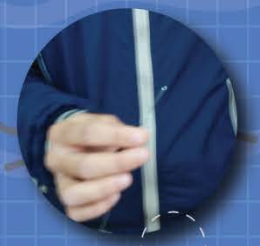
http://4myfiles.wordpress.com/
http://ekfe.ser.sch.gr/site/

bending light with sugar

...we put a lot of raw brown sugar into water and after a few minutes we saw that we can bend ligh - Why ?

fiber optics

...“real” fiber using for intenet & telecommunications



the Morse code

students & teachers are separated into two (2) groups, sending text using a fiber optic and a flash light via the Morse code (encrypt - send/receive - decrypt)

LASERS & BUBBLES

Phase II

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Physicist in Secondary Special Education

Sotirios Mandiliotis
Responsible of Serres' Laboratory Center of Natural Science

http://4myfiles.wordpress.com/
http://ekfe.ser.sch.gr/site/

...empty the light bulbs

...fill the bulbs with oil, salt solution etc

...make adjustements

preperations

apparatus

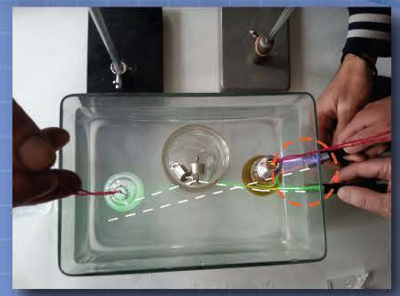
observations

...if you want to immerse empty/hollow objects you gonna need to add weight

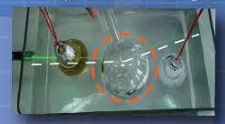
...immerse the bulbs into water

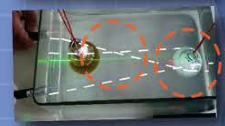
...light the ...lasers!

...shoot with 2 or more lasers at the samre time!



...try to bend the light beam

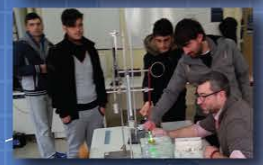


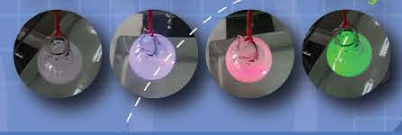


BE VERY CAREFULL WITH LASERS !

LASERS ARE VERY DANGEROUS TO EYES !

DON'T AIM THEM TO HEAD OR TO EYES !





Phase I | Phase II | Phase III

LASERS & BUBBLES

Phase III

http://www.vecteezy.com/

ΣΟΦΟΣ ΑΛΛΑ

ΘΕΟΣ ΜΥΑΛΑ

ΕΙΧΕΣ ΓΥΡΝΩ

...only the words on the left do have a horizontal axis of symmetry

colladon apparatus

reflector

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http://4myfiles.wordpress.com/
http://ekfe.ser.sch.gr/site/

Phase I Phase II Phase III

SO…

- The educational activities presented here, involve SEN students working in teams and as researchers;

SO…

- The educational outcomes (among others) are:

  >> knowledge on the core scientific ideas,

  >> better relationships (teachers & students),

  >> boost of students' self-esteem;

SO…

- …integrated the emotional component in learning._

AND...

- The first pillar is to remove any “obstacles” and to offer students educational activities in order

>> to facilitate their learning and

>> to provide them the experiences for life necessary.

AND…

- The second pillar has been the design of innovative educational activities…

  …a process that has been facilitated with the participation in networks, such as **UDLnet**…

AND…FINALLY

- All the above are objectives to an effort for an inclusive education (and fun thematic learning).

[…] because the only people for me are the mad ones, the ones who are mad to live, mad to talk, mad to be saved, desirous of everything at the same time, the ones who never yawn or say a commonplace thing, but burn, burn, burn like fabulous yellow roman candles exploding like spiders across the stars and in the middle you see the blue centerlight pop and everybody goes "Awww!" […]

ON THE ROAD \ JACK KEROUAC
Part One \ 1

Thank you

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