Inclusive Science

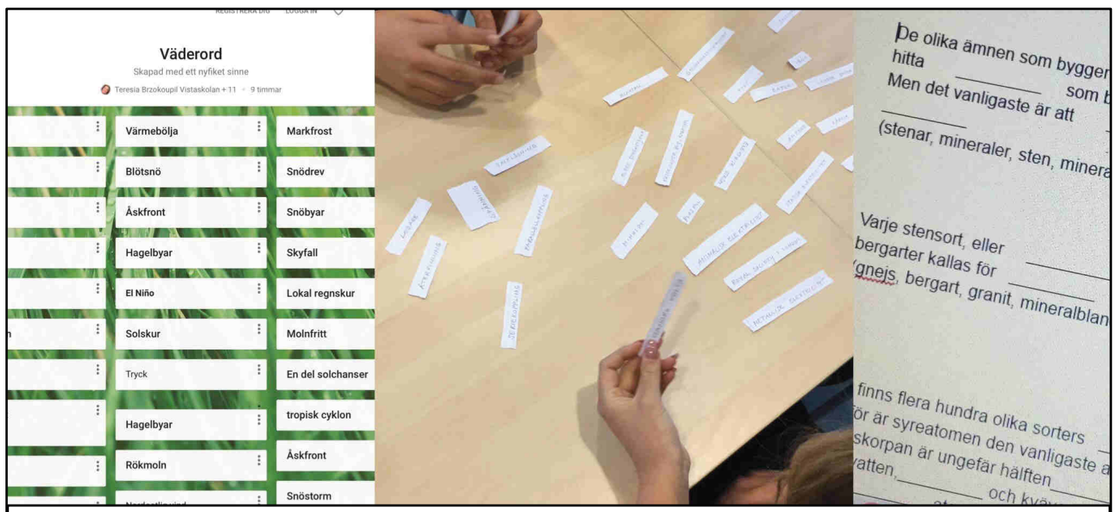
SCIENCE ON STAGE 2017 DEBRECEN
THE EUROPEAN NETWORK FOR SCIENCE TEACHERS

Teresia Brzokoupil | Vistaskolan| Huddinge| Sweden

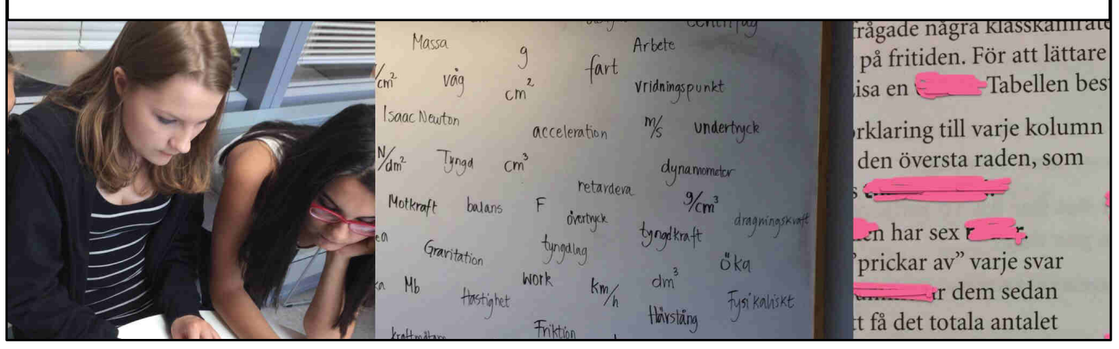
Language carries knowledge

My project is about an approach of working with concepts, and inner relations of concepts. It's about activities that helps students evolve their ability to reason, argue and learn.

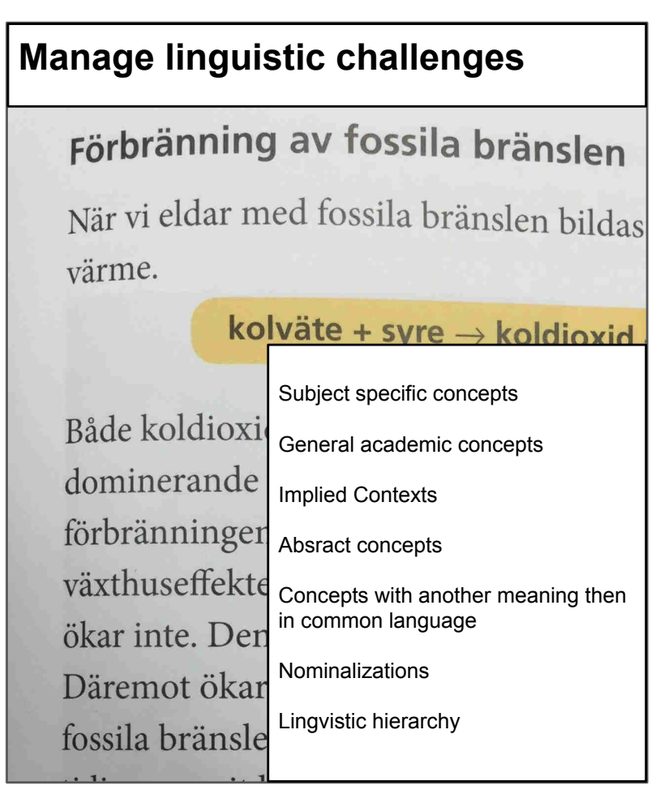
Alignment
Cooperation
Communication
Focus on concept
Models to reason and argue



Working with concepts and inner relations with concepts



Manage linguistic challenges



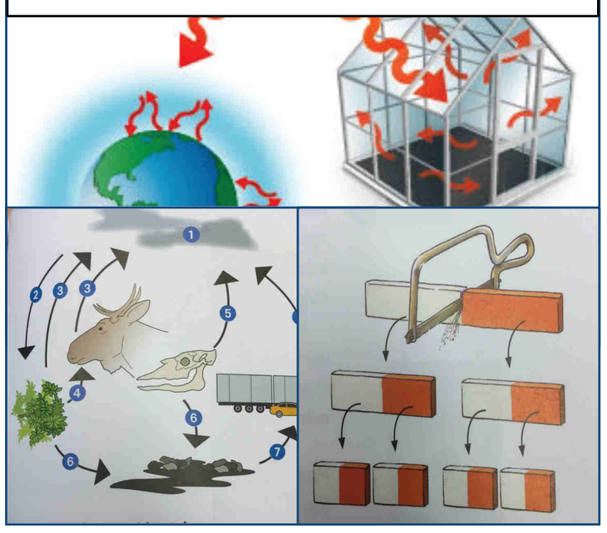
- Subject specific concepts
- General academic concepts
- Implied Contexts
- Absract concepts
- Concepts with another meaning then in common language
- Nominalizations
- Lingvistic hierarchy

Using pictures and models

Raising awerness that models can in itself be a source of misunderstanding.

Explain course of events

Why did the publicher put this picture here?



Skilja mellan fakta och värdering

Apelsin	Fakta	Värdering

Reasoning and arguing

Alignment

Modelling HOW TO discuss, write etc

Source criticism using venn-diagrams

Teaching language in science helps the students to read and understand a map and find their own way instead of we taking them by the hand blindfolded along the path.

HUDDINGE KOMMUN

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Vistaskolan

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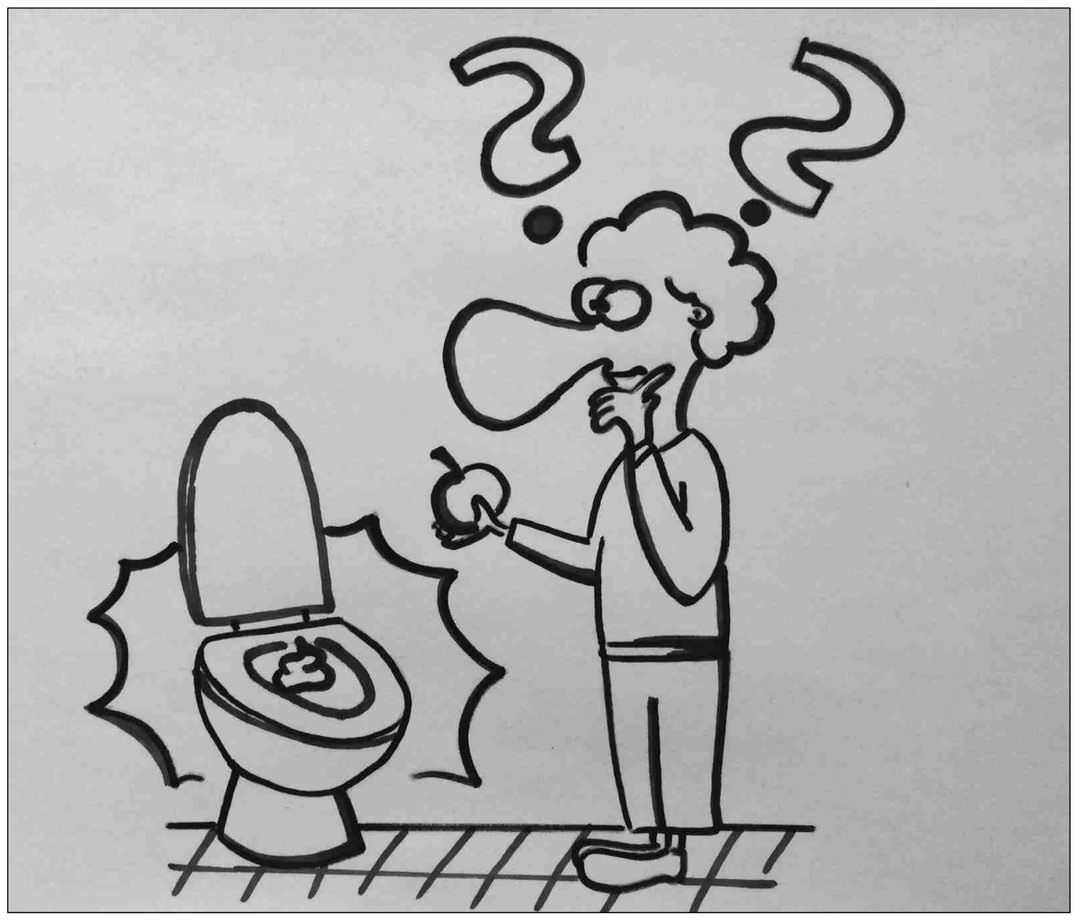
Germany
Mira Büllesbach I Albert-Schweitzer-Schule Bergheim Mitte
Stephanie Cremer I Lessingförderschule Freiburg

Discovering Our Digestive System

Digestion is what happens on a daily basis when food enters our bodies. This process can take between 20 and 120 hours.



Description:
At different stations students simulate the digestive processes **step by step**, learning **independently** through play. Additional displays (torso, pictures, feeling on the body) help the students understand how digestion works **in their own bodies**.

This method lets the subject be explored with **fun** and **fascination** in inclusive settings, while creating a **lasting learning effect**.

Project Goal:
To make the digestive processes **comprehensible** to **all** students by involving imagination and multiple senses: seeing, touching, feeling.

"Students were especially proud when they managed to explain physical phenomena, such as burping, all on their own by intuitively exploring them."

Conclusion: By **proposing individualised, differentiated, and action-centric tasks** students **can explore and understand** the complex process of digestion **together** in inclusive settings – each to their own ability.

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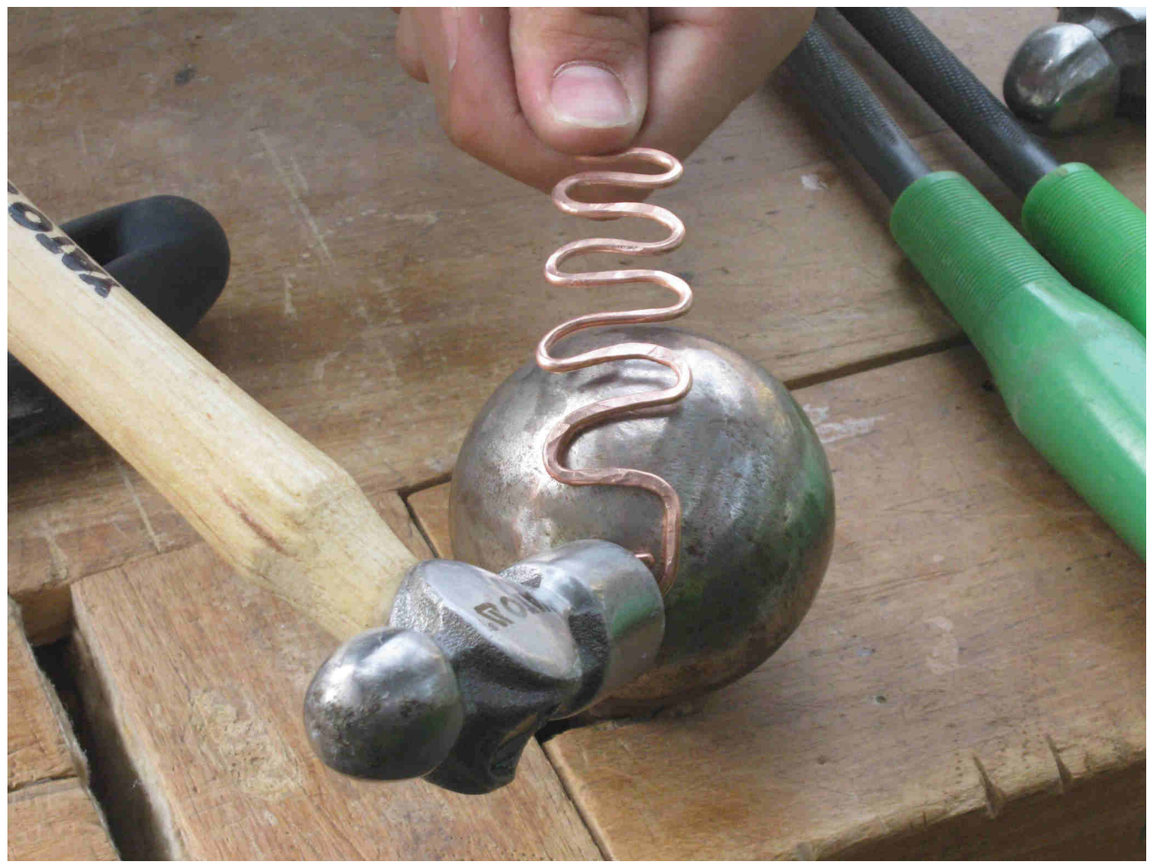
Rita Chalupnikova| Elementary school | Sec| Czech Republic

Technology of Metal Manufacturing

The aim of the project was to get pupils familiar with the characteristics and technology of metal manufacturing.
Pupils experienced mechanical manufacturing and shaping of copper. They made simple copper jewellery, like our ancestors used to do. They also observed and experienced other metal manufacturing processes – smelting of tin and tin casting in tufa stone made by students themselves.



Pupils gained knowledge in the characteristics of some metals and alloys, they experienced craftwork using simple tools, and using old techniques they understood how today´s blast furnaces work.

Conclusion: Pupils' own effort and skill practice helped them awake their interest in craftwork and respect to honest work.

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Eric Martinet| Cité Scolaire Internationale & GIANT@school| Grenoble| France

GIANT@school Collaborative Science

A Scientific Community from Preschool to University

GIANT@school Educational Outreach

• 4 programs with 1 day immersion in Grenoble research facilities & a project endorsed by the *new* French science curriculum (2013)
• inquiry-based activities in science & innovation for high school students & their teachers
• a hub to foster collaborative creativity among scientists & educators

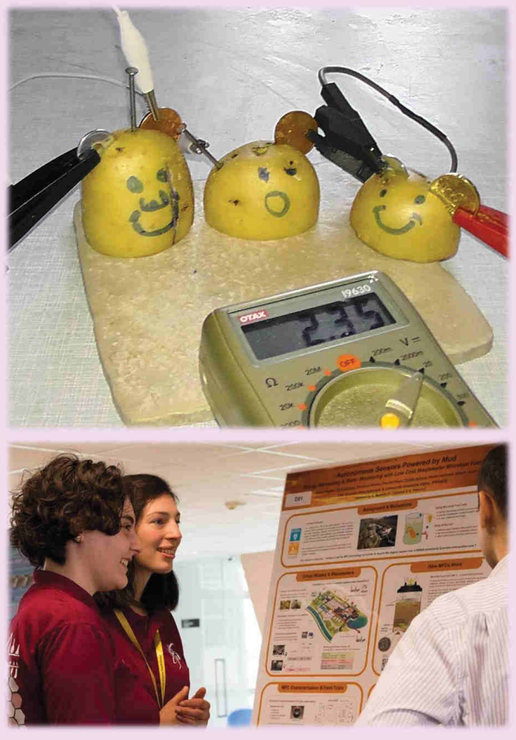
Inquiry-Based Science for kids

Can you make a battery with food waste ?
Where do fallen leaves go when they disappear ?
Is food a solid or a liquid ?

Does investigating these simple questions makes me a scientist ?

Collaborative science : a community of schools fostering inclusive science

150 primary school kids (5 to 9 yr) with limited access to outreach programs,
20 high school students, 10 engineering students from Phelma :
• oral & poster presentations at Phelma workshop (“Sharing Science”, May 2017)
• invited speakers (8 to 21 yr) to Midi-MINATEC® seminars
in front of 250 professional scientists (2016, 2017)
• working within a Global Science Network (MIT Boston, San Francisco, Okayama, Singapore)



Sharing
Challenged
Proud !

Giant@school : a framework for inclusive science.
Classes acting as the “laboratories” of a scientific community, validating their research through collaborations & formal communication (workshops & seminars)

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Georgios Villias| Varvakeio Model High School | Athens | Greece

Nemesis Virus: The pandemic

An educational escape room game activity

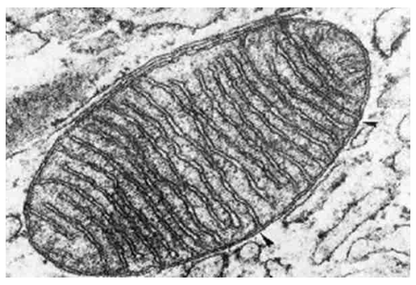
This project is proposing **an alternative way of teaching** in which students participate in an engaging escape room activity. Based on the structure of escape room games, this educational activity **stimulates students' creativity and critical thinking**, favors team-working methodology and **develops problem-solving & social skills**.

Some of the activity's key **learning objectives** are:

- ✓ Recognizing eukaryotic cell organelles.
- ✓ Familiarizing with Electron Microscopy cell images.
- ✓ Connecting cell structures and functions.
- ✓ Comparing the size of cells, cell organelles and viruses.
- ✓ Learning more about viruses and their vast diversity.

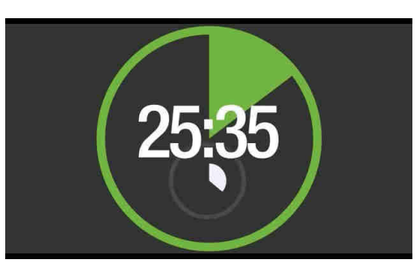
Students are being subjected to challenges like **study and analysis of Electron Microscopy images, 3D models of viruses and real data from epidemiology studies** related to some of the most dangerous and lethal viruses. Due to time constraints, they need to cooperate in order to succeed, solve the puzzles and escape the room.

A "STORY" +



SCIENCE DATA +

CHALLENGES +



COUNTDOWN +

COOPERATION

Escaping didactic routines can lead us to the discovery of new learning paths!
Maybe it's time to escape your ordinary classroom ...

This game was created as part of my TED-Ed Innovative project and was sponsored by **TEDEd**.

If you are interested in a future cooperation with me regarding educational escape room activities, please do not hesitate to contact me: ✉ *gvillias@hotmail.com*

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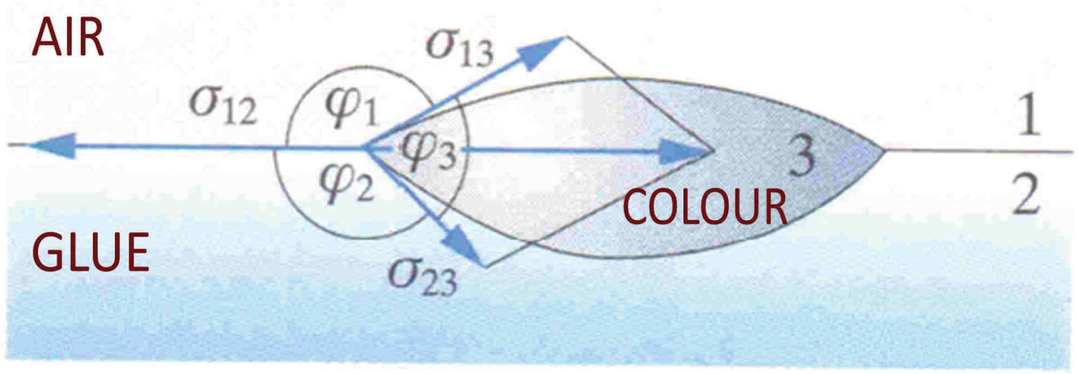
Hans G. Hofbauer | Gymnasium Waidhofen | Waidhofen /TH |Austria

Marbling with Tension

From playing with colours to mastering tensions with vectors

$$\frac{\sigma_{12}^2 - \sigma_{13}^2 - \sigma_{23}^2}{2 \cdot \sigma_{13} \cdot \sigma_{23}} = \cos \varphi_3$$



Interacting surface tensions:

$$\sigma_{12}^2 = \sigma_{13}^2 + \sigma_{23}^2 - 2 \cdot \sigma_{13} \cdot \sigma_{23} \cdot (-\cos \varphi_3)$$

From kindergarten to highschool, everybody is fascinated by interesting colour - structures. Younger children care about colours, older ones care about physics or algebra.

Less is more!

Students of different levels of education can interact in an inclusive scientific learning - environment. Science is fun, even if you don't understand every detail.

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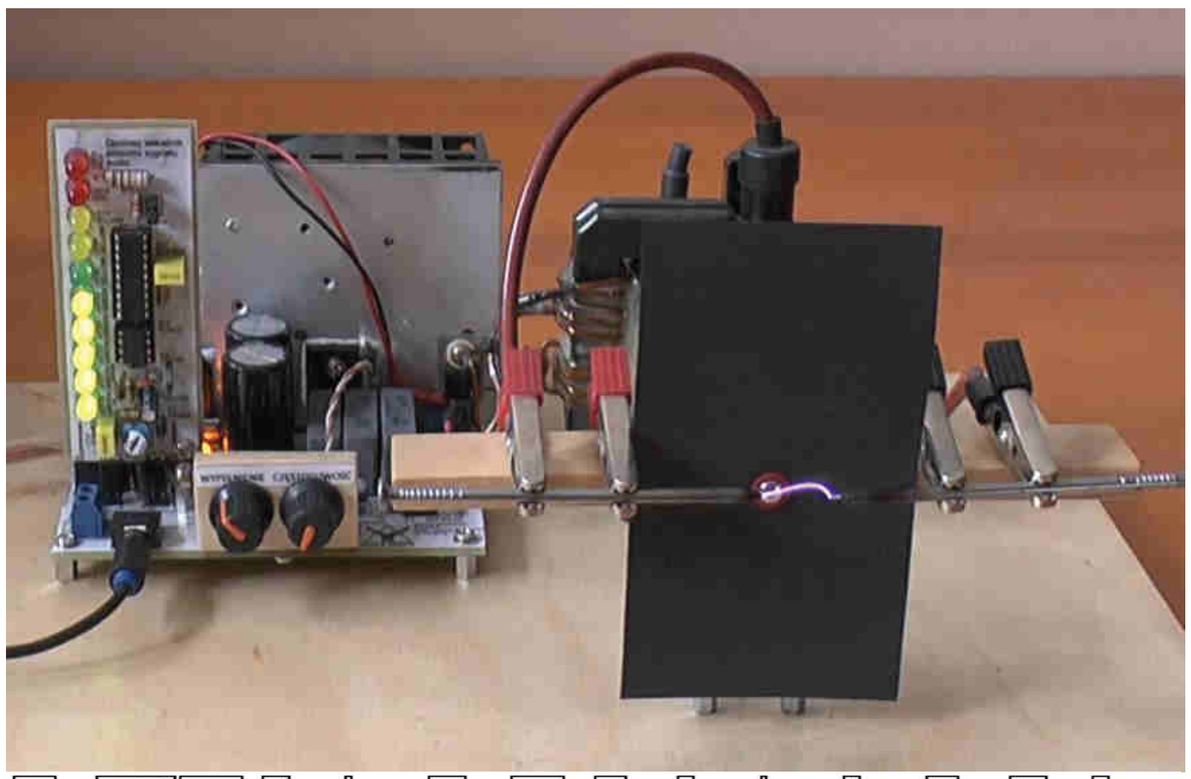
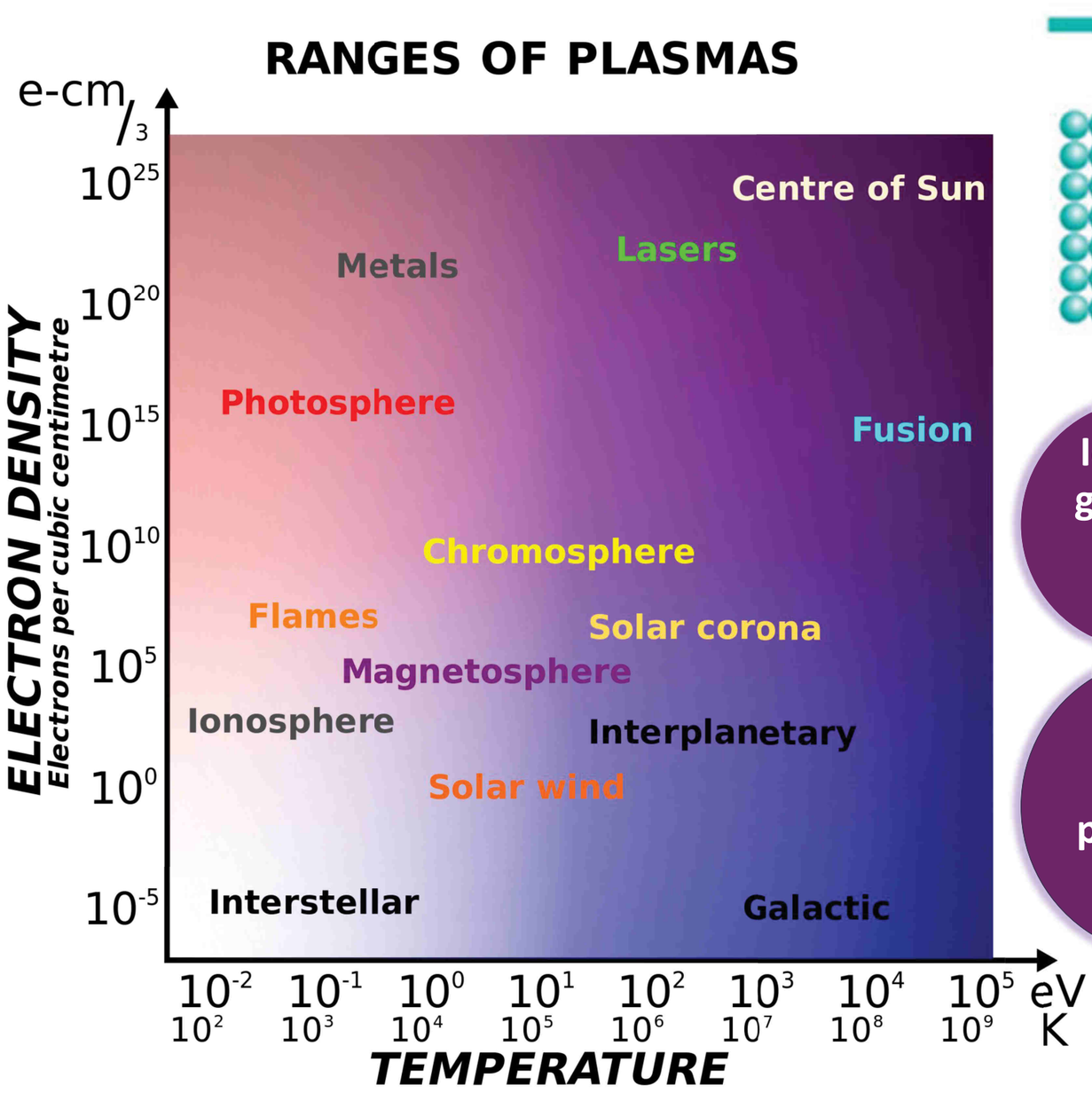
| PhD Małgorzata Kramer-Wachowiak | Liceum Ogólnokształcące im. Józefa Wybickiego | |Śrem | Poland |

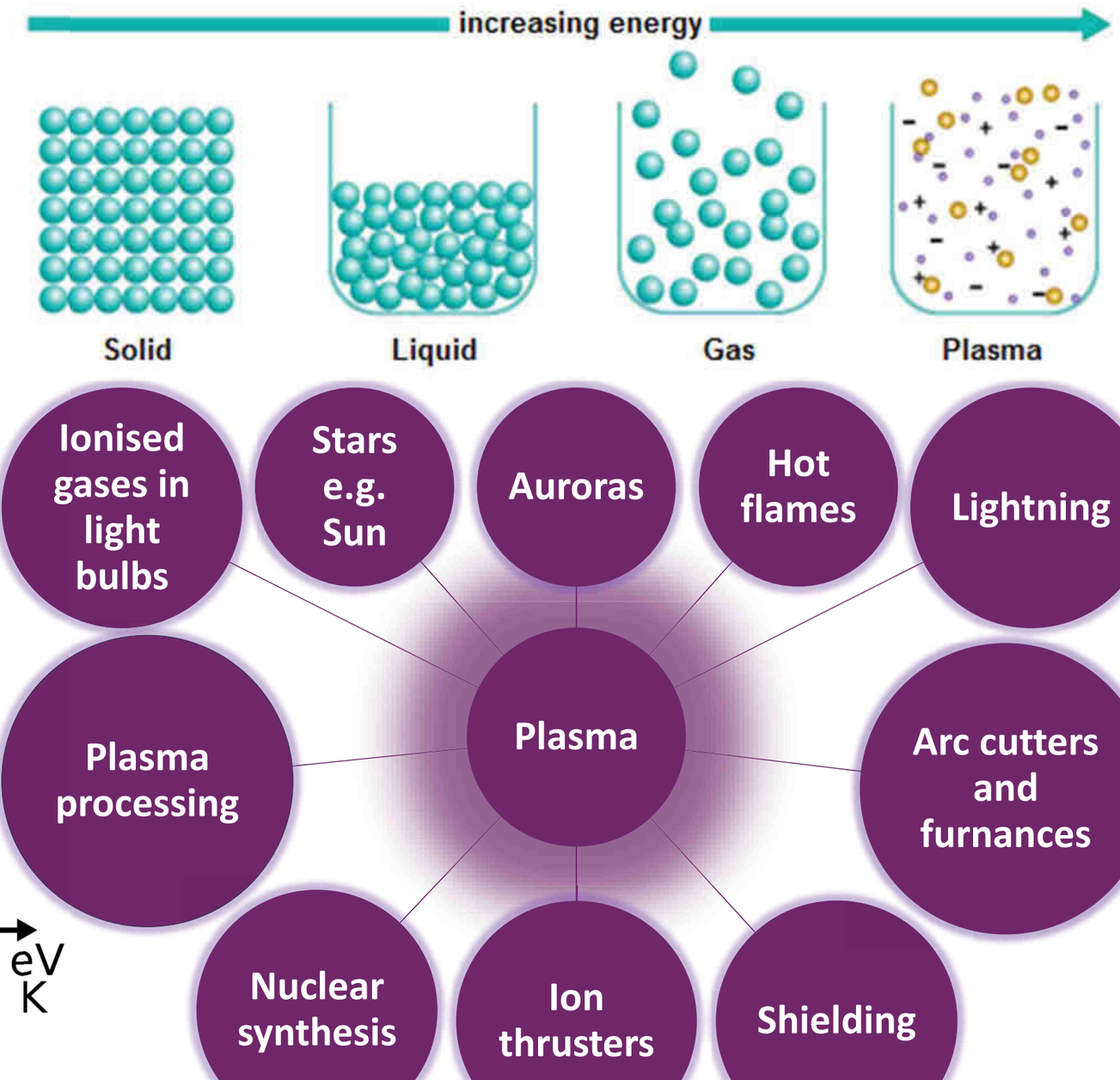
“Plasma speaker: Plasma and it's unusual properties”

Plasma, which seems an uncommon state of matter is actually the most popular of all. Witness the plasma under the shape of an electric arc and acknowledge its properties by a series of experiments with plasma speaker device. Hear it recreate sound, check it’s temperature, find out what particles it is made of and what other forms it may be represented by. Meet the state full of intricate relations and unsolved problems. Draw conculsions, become familiar with it and fascintated by it’s future applications.



Electrical sound signal → PWM generator → „Condesations and rarefactions” of the steering signal → Changes in voltage and current of the output HV signal → „Condensati-ons and rarefactions” of plasma (changes in density) → Creation of an acoustic wave





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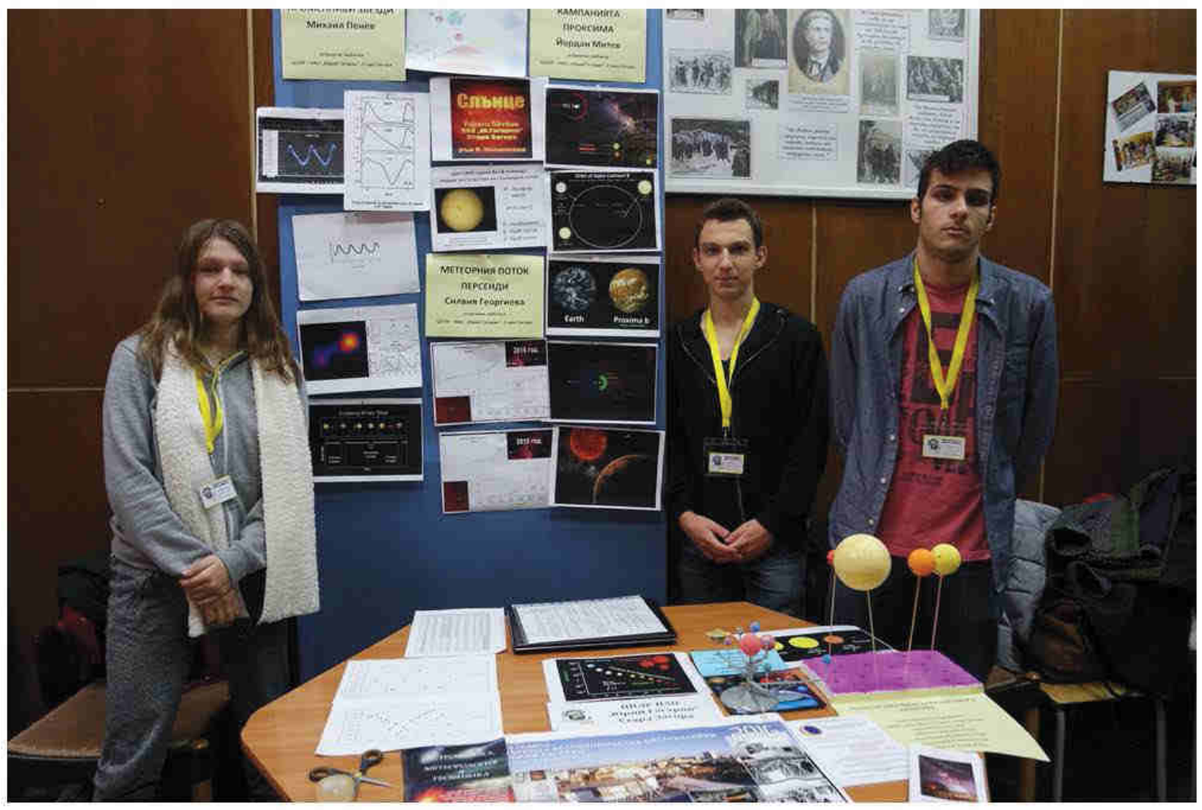
Nadya Kiskinova | People's Astronomical Observatory „Yuri Gagarin"|Stara Zagora | Bulgaria

Amateur Astronomy in Bulgaria

Astronomy for Amateurs in Internet

The site http://astronomy4all.com/ offers material for self training of amateur astronomers in Bulgarian language. The site offers lectures and Power Point presentations for better understanding of the topics, and also other info in the form of text files giving other points of view on each topic. It has been used for 10 years by students preparing for Astronomy exams in different universities around the world, as well as Physics and Astronomy teachers and people of all ages who are eager to enrich their knowledge.



The site for amateurs astronomers is a contemporary way of accessing a whole course for self training for anyone who feels the need of developing the themselves throughout all their live.

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Kameliya Todorova | CHILDREN'S COMPLEX "YOVKO YOVKOV" | Sevlievo | Bulgaria

The First Experiments – Frodo's Challenge

The main goal of this project is to provoke interest in children who are now just getting familiar with Chemistry. Furthermore, the project will encourage young students to expand their existing knowledge in Biology.

The presentation is made through theatrical performance, which consists of two chemical experiments and a Biology trivia.
The plot develops during the Halloween preparations in the laboratory of a young chemist named Dennis, who goes by the nickname „Mr. Frodo“. He is visited by his old friend Mrs. Todorova – a passionate biologyst. During their conversations, they get into an argument about whether **Chemistry or Biology** is the more important subject.

100% Great!

Conclusion: The entertaining performance is a great way to reach the children and encourage them to learn more about sciences. What is more, the introduction of a competitive element like trivia serves as another form of motivation for students to participate in the educational process.

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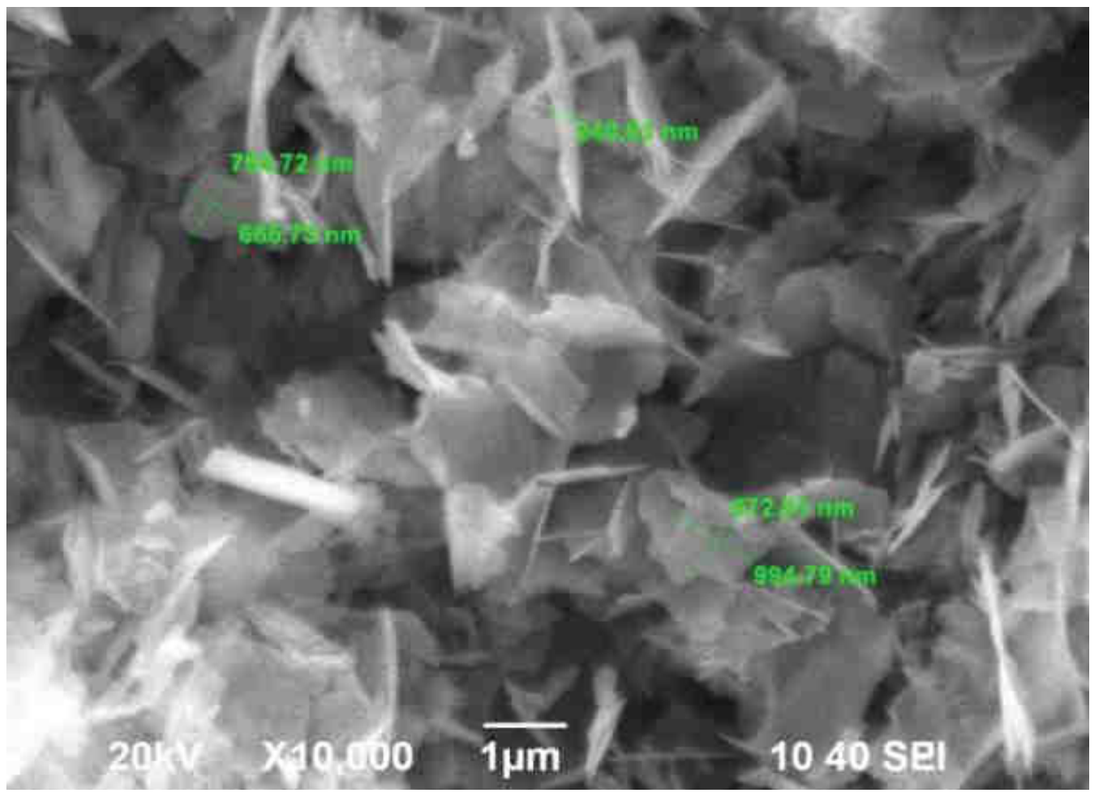
Zlatka Garova | Secondary School "Asen Zlatarov'' | Parvomay | Bulgaria

"Enriching the scientific literacy of students through additional activities in autumn school Nanochemistry and Nanotechnology"

Nanotechnologies are the phenomenon of XXI century and in the new curricular in Bulgarian schools there is not even a hint of modern science - nanosciences and nanotechnologies. The content of the project includes: Theoretical part - learning by meeting with scientists; Nanopracticum - learning through research; School projects - experiential learning and experience. The subject of this experiment is to synthesize zinc nanofertilizer in Agriculture University.



Width of nano particles

Option	Control	1	2	3	4
Yield, 20 м², kg	18.22	19.30	20.46	21.92	19.84
Yield, Acre, kg	911	965	1023	1096	922
		On average 1.75 % Zn			

It provides conditions for formation of a system of physical and chemical knowledge about nano-objects and nanoparticles, improving the skills that are directly related to aspects of competences in science and technology. The synthesis of zinc nanoparticles by students, which is a leaf nanofertilizer improves the growth and yield of the corn.