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Man and the mountain: Mont Blanc

Theatre as way to promote scientific debating skills



This project **aims to investigate** the efficacy of theatrical arts as a means to disseminate geological topics. We focused on the following questions: (RQ1) Can “Scientific theatre” improve students’ debating skills in science? (RQ2); Is “Scientific theatre” useful to transfer specific knowledge”?

In order to answer RQ1 and RQ2, students were involved in a “**creative writing**” laboratory to create a theatrical script focused on climate change. Students performed their own script, and their debating skill was assessed using open questions before, during and after the experimentation.

Sample. Two groups of secondary students were involved in this study: an experimental group (21 students) and a control group (19 students). Students of both groups were 17-18 years old, attending a scientific high school and had not studied the topic during their curricular classroom activities before the experimentation.

Criteria	Percentage of students whose written text were coherent with each criteria		
	First step Spermental/Control	Second step Spermental/Control	Third step Spermental/Control
C1	Number of sentences Medium 5,52	Medium 4,2	Medium 8,36
C2	Specif words related to the topic 66,70 /36,80	81,00/15,70	80,90/52,60
C3	Complexity 61,90 /68,40	47,60/26,30	95,20/35,20
C4	Formal correctness 85,70/52,60	47,60/52,60	61,90/76,50
C5	Justification 85,70/42,10	80,90/42,10	100,00/94,00
C6	Statistic data 33,30/15,70	71,50/00,00	23,80/00,00
C7	Bibliographic references 23,80/10,50	0,00/00,00	14,20/00,00
C8	Opinion 100,00/94,70	80,90/63,20	76,20/100,00
C9	Scientific data 0,00/0,00	47,60/0,00	42,80/6,00
C10	To argue both for and agains 23,80/15,70	33,30/26,30	57,10/42,10
C11	To argues schematically using bulleted lists, tables, lists, etc. 4,80/0,00	0,00/0,00	14,20/0,00

Tab I: Criteria chosen to assess students’ debating skills and their percentage



Fig. 1 Students rehearse scenes for the opening performance (“ la prima”)

Preliminary **results** seem to **support the efficacy** of the theatre in promoting debating skills. Table I reports criteria chosen to assess students’ debating skills and the percentage of students whose written text were coherent with each criteria.

“As far as the propositions of science refer to reality they are not certain; and as far as they are certain, they do not refer to reality”

Popper paraphrasing Einstein

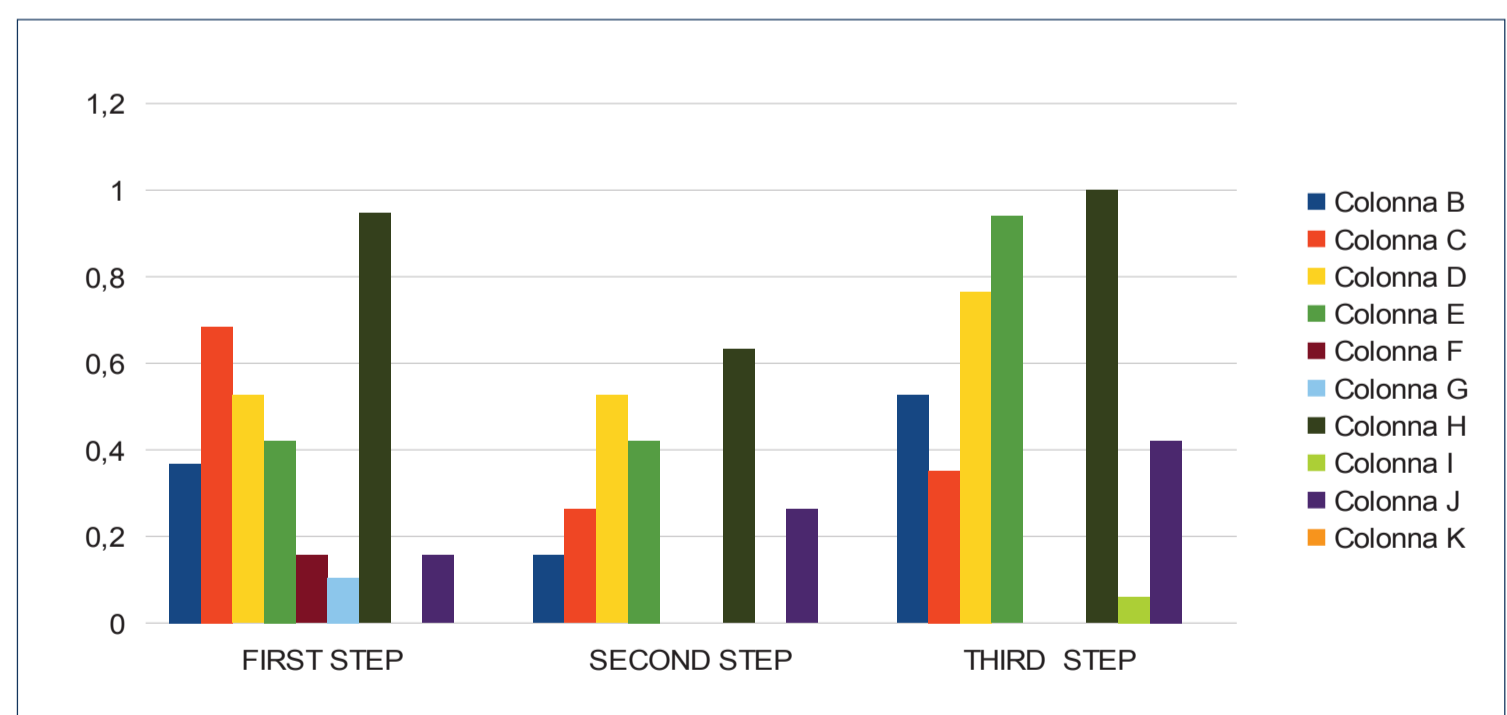


Fig. 2 Results of control classroom

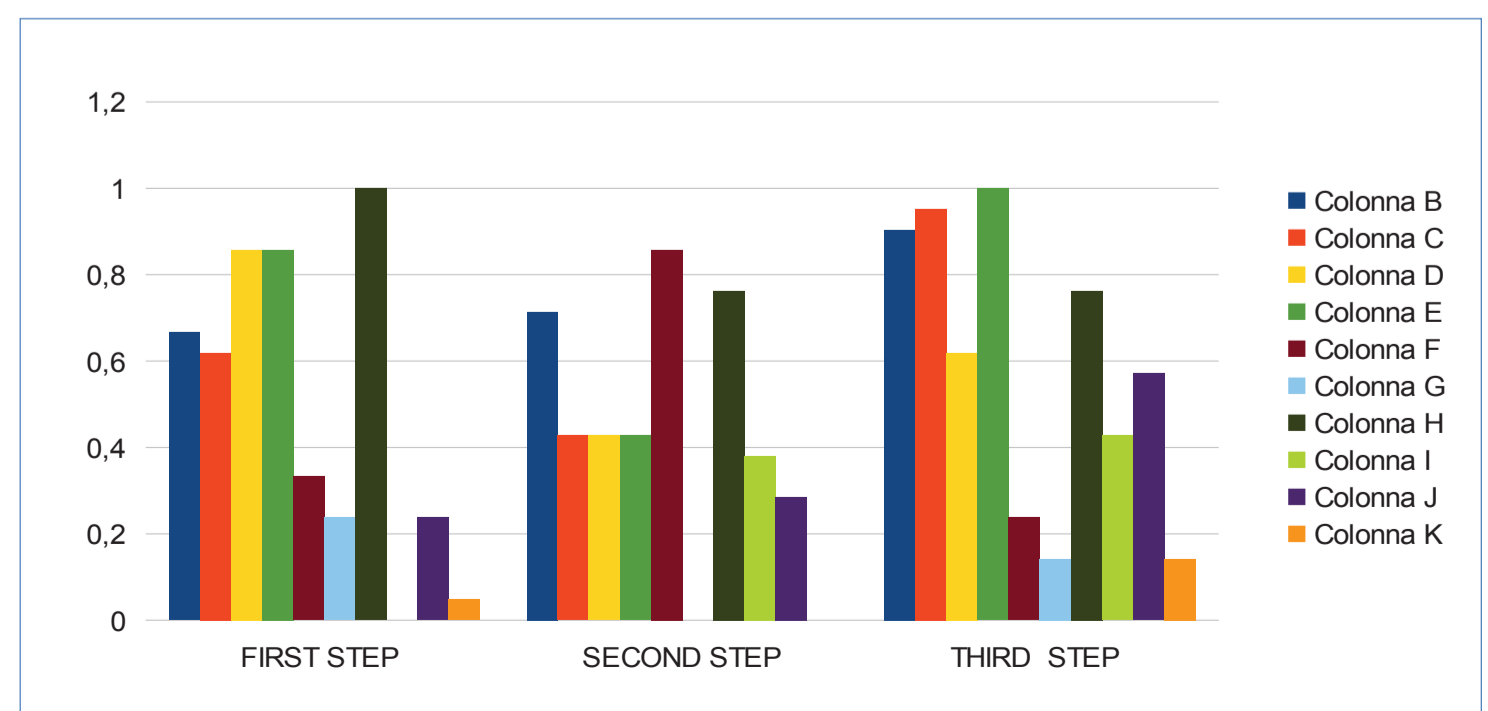


Fig. 3 Results of sperimental classroom

Stefan Preisig, Gjertrud Jenssen | Skjetlein Upper Secondary School | Trondheim | Norway

Sustainable Development and Biofuel

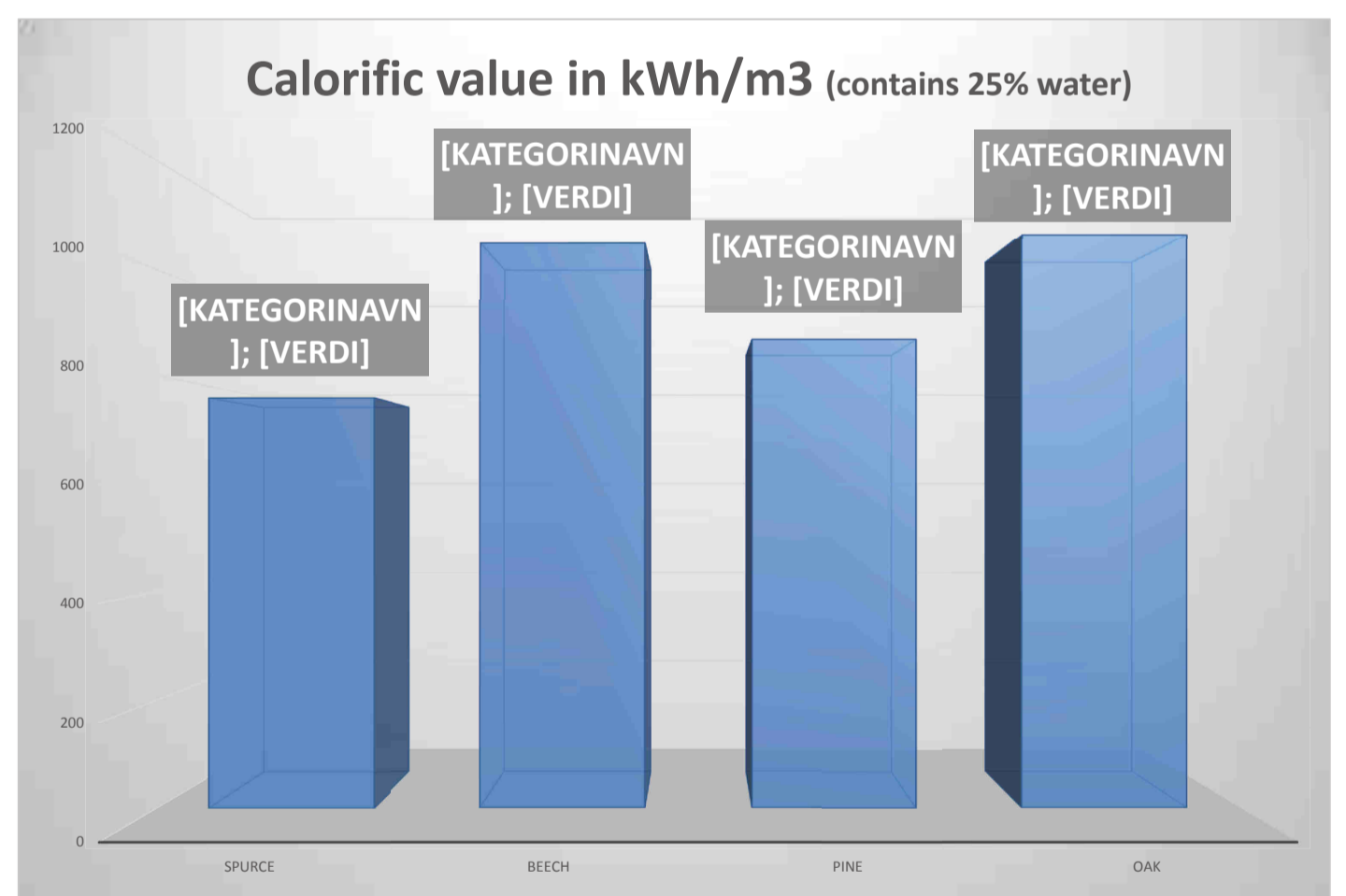
Energy from wood

Skjetlein Upper-Secondary school owns a large area of forest. Therefore the School's teachers choose to use local resources of wood to design a day-long project for the students.

The objective of the project is: calculate and produce renewable energy from wood.

The project is transdisciplinary, with a combination of the subjects

Mathematics, Combined Sciences and also the core subject of the agricultural curriculum have to be combined to solve the problems.



Picture top: a student calculating the height of a tree. Down left: students calculate the density of different types of wood. Down right: The graph illustrates the heat value of different types of wood.

100%
Awesome!

Conclusion: This project will engage students. They will better understand the link between density in wood, energy outcome and cost-benefit.

Anne und Malte Puck | Hoffmann-von-Fallersleben-Schulzentrum Lütjenburg / Germany

Lütje Natur

biology, natural science, a.o.

On the 1.5-hectare outdoor area of the Hoffmann-von-Fallersleben school center, a nature trail leads through the herb garden, the school pond, the school forest and the orchard. The Lütje Natur is also an out-of-school learning center for primary schools, which can book various modules with us and are guided by student guides through the program.

www.luetje-natur.de



Simon Lewis | The Thomas Hardy School | Dorchester | United Kingdom

The genetics of Lyme disease.

Research using ticks, PCR and electrophoresis.



Lyme disease is a tick borne bacteria infection that causes inflammation and fatigue in infected animals and humans that are bitten.

More than 400 ticks were collected in the rural county of Dorset by volunteers who removed them from their animals. Using an approved procedure ticks were killed and preserved by dropping them into ethanol.

Students (aged 16-18) were trained to use PCR and gel electrophoresis to amplify and visualize DNA extracted from ticks. Students aimed to find the frequency of ticks hosting *Borrelia*, the bacterium which causes Lyme disease, and their location within Dorset. Information which is at present unknown.

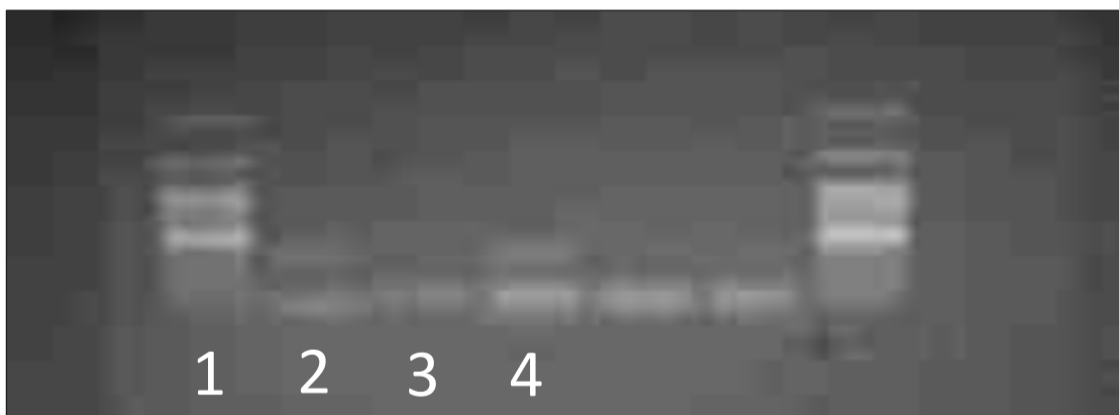


Fig. 2. An electrophoresis gel containing DNA samples. DNA ladder (1), Positive control (2), Negative Tick DNA (3), Positive tick DNA (4).

Students tested 137 individual ticks, identifying one (Fig. 2) from Weymouth that contained the DNA for *Borrelia*. A frequency that was in the range other scientists have found for different parts of the UK.

Students presented their work and raised awareness of Lyme disease at a number of events, they gained advanced experimental skills and the opportunity to engage in scientific discussion with their peers and other scientists.

Conclusion: Projects that are relevant to the community that students live in, can be used to develop advanced scientific skills. Local interest in their research can provide opportunities for them to discuss their research with others.

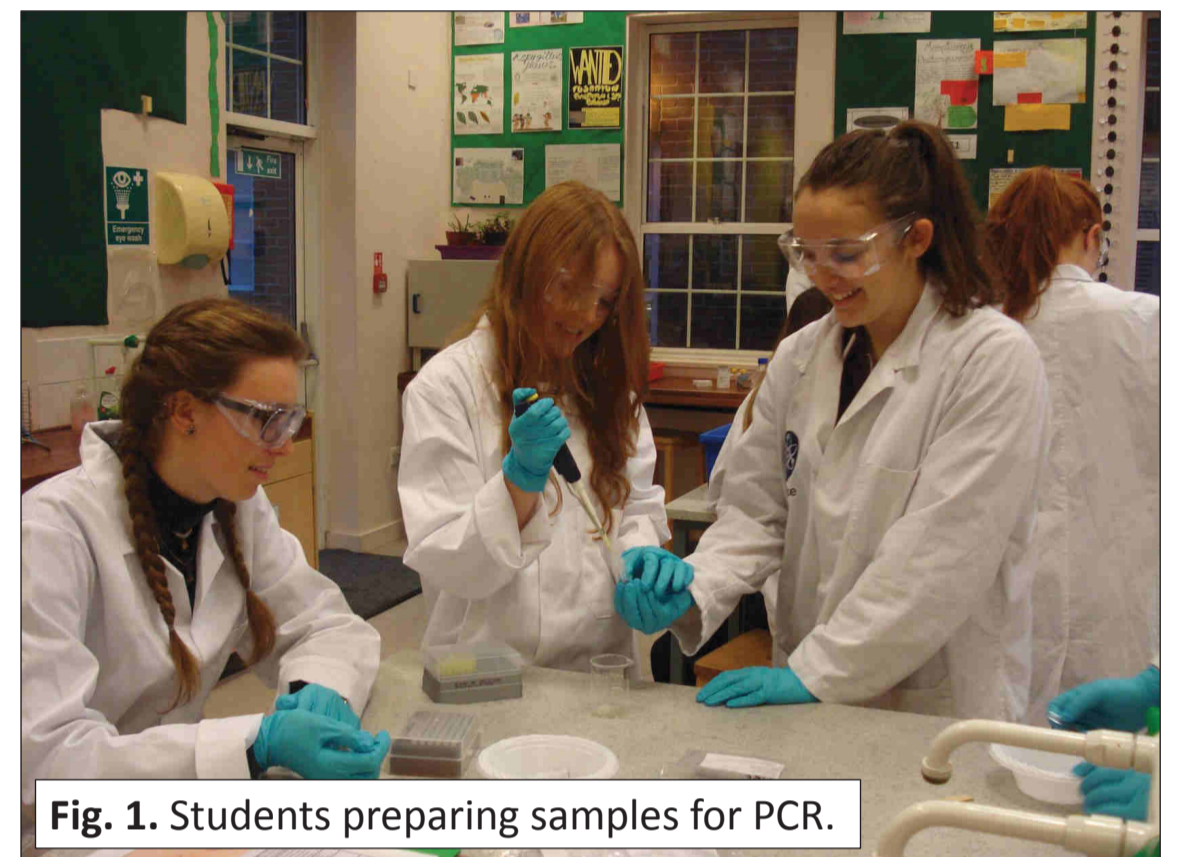


Fig. 1. Students preparing samples for PCR.



Fig. 3. Loading an electrophoresis gel with tick DNA.

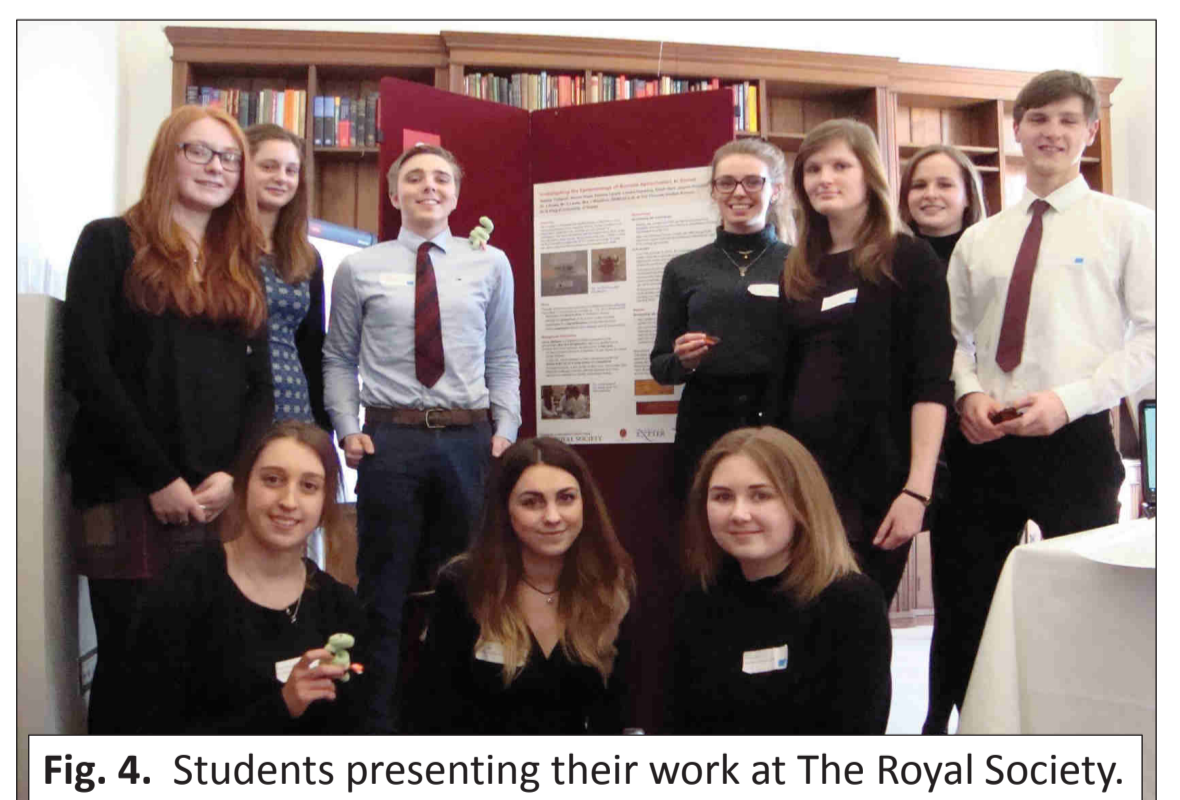


Fig. 4. Students presenting their work at The Royal Society.

Reto Speerli / Felix Speerli | Die Denkschule | Oberägeri | Switzerland

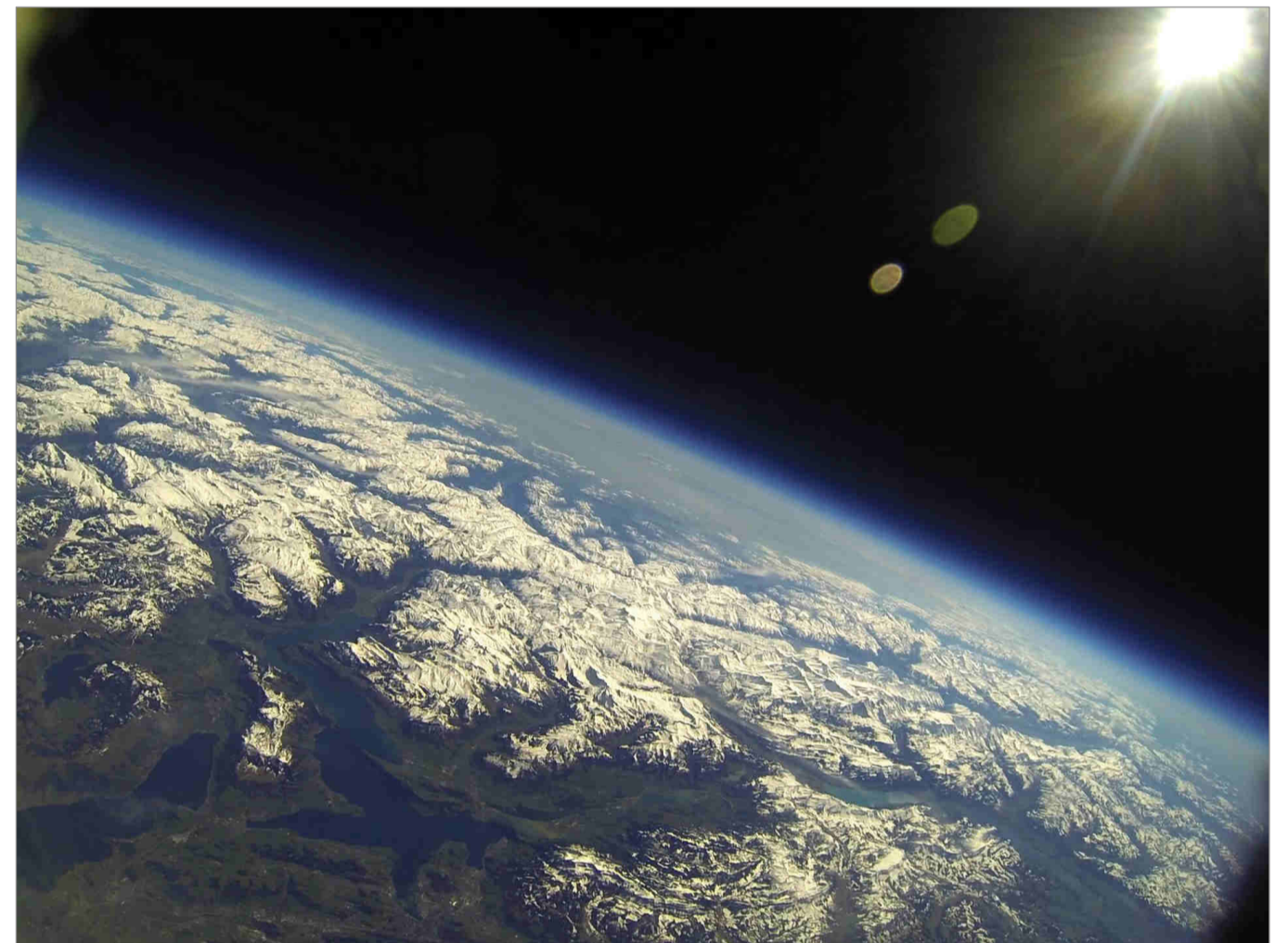
Project IKARUS

DIE DENKSCHULE
www.die-denkschule.ch

From the classroom to the edge of space

We choose to go to space! Not because it is easy, but because it is hard! The crowning conclusion of this project were several weather balloon missions to the edge of space.

The balloon probes have reached an altitude of **34'000 meters** above ground level and captured spectacular aerial photographs of Switzerland with a built-in camera.



Lake Lucerne and the Swiss Alps seen from 34,000 meters altitude.



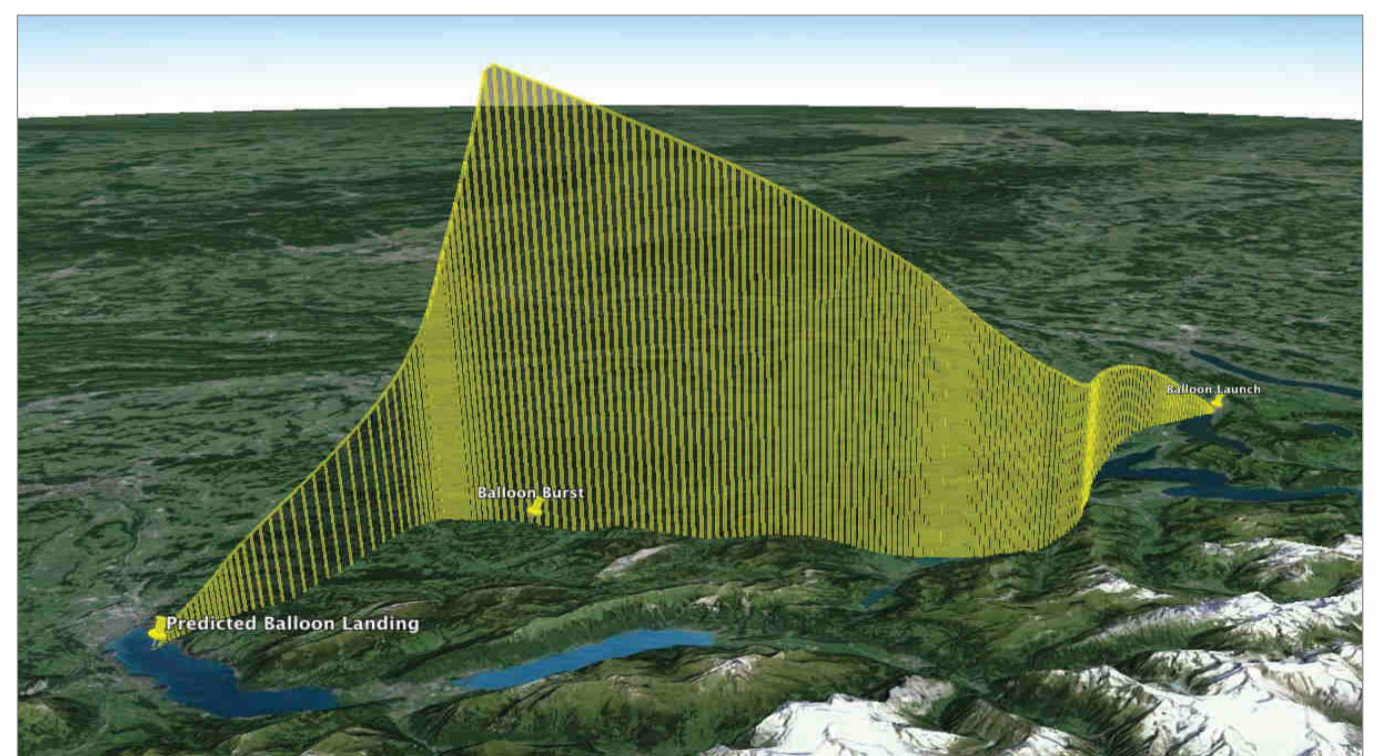
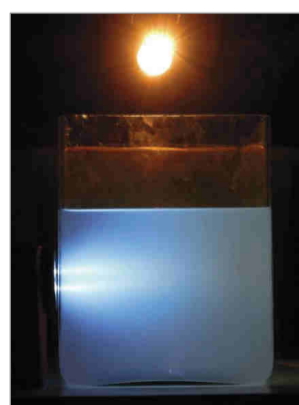
A weather balloon before launch

Interdisciplinary Teaching

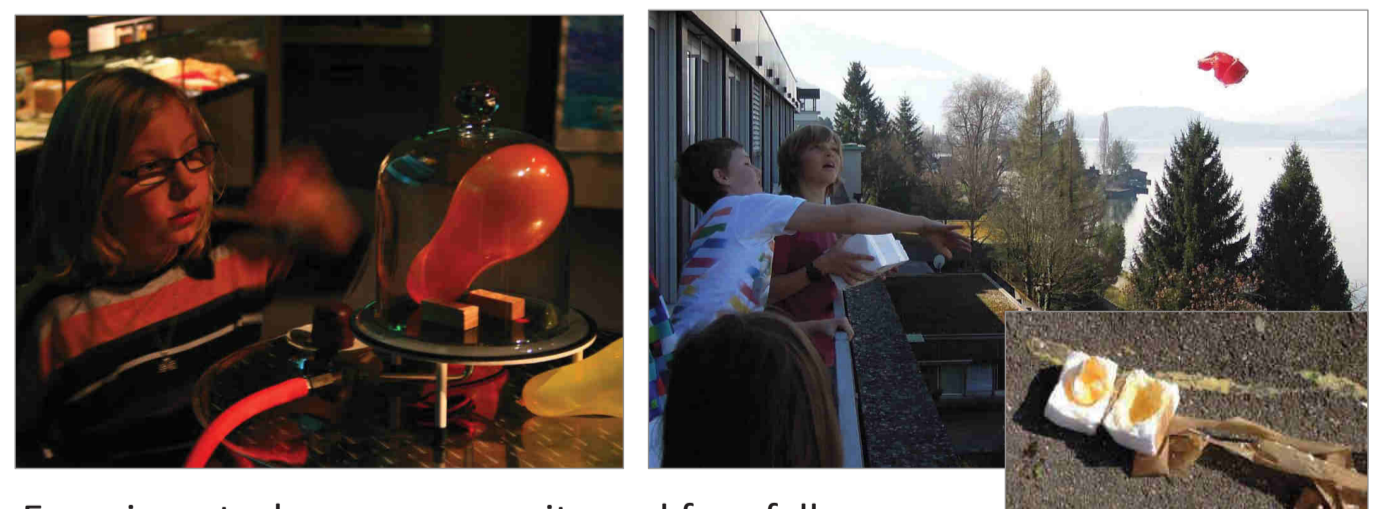
The main teaching objectives were **natural sciences, physics, meteorology, Swiss geography** and rocket science. The students used their skills in **mathematics** to predict the landing zone or determine the range of sight and documented the development of the project and presented the results in a lecture to the public.

Experiments

In order to achieve a deep understanding of the physics phenomena associated with the space missions, the students carry out experiments examining **aerostatics, thermodynamics, gravity, and mechanics**. To lower the cost, we use everyday materials.



Predicted flight path shown with Google Earth



Experiments: buoyancy, gravity and free fall, thermodynamics (heat insulation), optical refraction and negative acceleration on impact



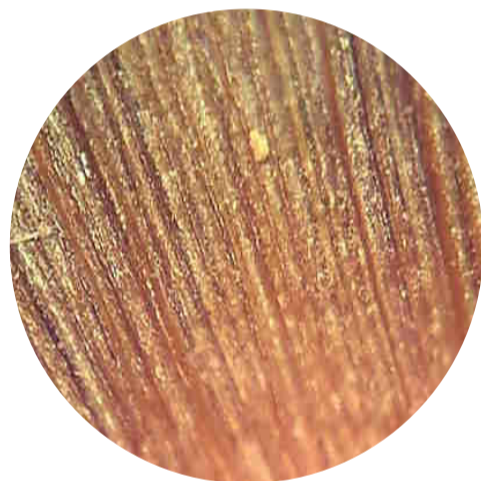
The IKARUS project inspires children to engage themselves for STEM learning. By “going to space”, science and technology become challenging, very exciting and entertaining at the same time!

Dr. Budayné dr. Kálóczi Ildikó – Gőz József – SYM-BIO Group
Tóth Árpád Gimnázium | Debrecen | Hungary

A Stereoscopic World

Micro world is waiting to be discovered

Interactive microscopy research provides students with a spectacular view of Nature's beauty.



Protecting the values and wonders of the living world by recognition and improved way of thinking.



TÁG TermészettUDományos lab**OR**
Öveges labor és szellemi műhely

Nature, Science and Life represented as a unity in the spirit of sustainability

T. Ivanova | High School of Economics „Knyaz Simeon Tarnovski” | Stara Zagora | Bulgaria

To build up a science

If we succeed here, we will succeed everywhere

We can make the **science of Physics** more available and more understandable. We offer something to everyone, united by the idea of the constant learning - a constant process throughout the whole life, which is based on the fact that people from all ages can participate in it, can show attitude and can have fun.

Eco-friendly Stara Zagora is a town with 8000 years of history. One of the most ancient towns in the world. Our students have investigated several previous sources of pollution, which have turned into centers with safe ecological surroundings.



The falling cat - We know that if we drop a cat, it never falls on its back, but it is on its feet. Even the cat without a tail demonstrates this curious skill to rotate in 180° .

The insatiable bird - A glass bird is leaning forwards and backwards and it is drinking water from a cup. What does make it move?

Sieving sugar – while sieving powdered sugar, first it falls straight downwards then it starts falling with a slight diversion towards the sides. Why?

Soap and pepper – We put a small piece of soap in a Bowl with water, in which we have previously Scattered seeds of pepper. The seed of pepper will Immediately flee away from the piece of soap. Why? With what speed according to you the seeds will move away?

What if the sun is made of bananas – If the sun was made of bananas it would be as hot as is now.

Don't you believe it? Does it sound impossible to you?

Conclusion: Physics is everywhere around us!

We have seen this, take a look, too!

Hopefully we have helped climb one more step on the ladder of science.

100%
Great!



Thomas Schubatzky | BRG Keplerstraße | Graz | Austria

Light Pollution in the classroom

100 %
Enlightening

What is light pollution?

Light pollution is the brightening of the night sky produced via excessive misdirected or obstrusive artificial light which is preferably caused by the rapid development of lightning technology.

The awareness of light pollution as an environmental issue is not yet deeply rooted in society, although it strongly influences people and their quality of life.



<https://missmacraegeo.files.wordpress.com/2013/02/map-of-the-lights.png>

Developed materials

Various approaches to address light pollution have been developed, for example:

Determination of light pollution using apps



“Counting stars”



Model-experiments



Role-playing games



Light pollution is a high-interest topic, which provides opportunities to strengthen the assessment competencies of students!

Science and our Environment

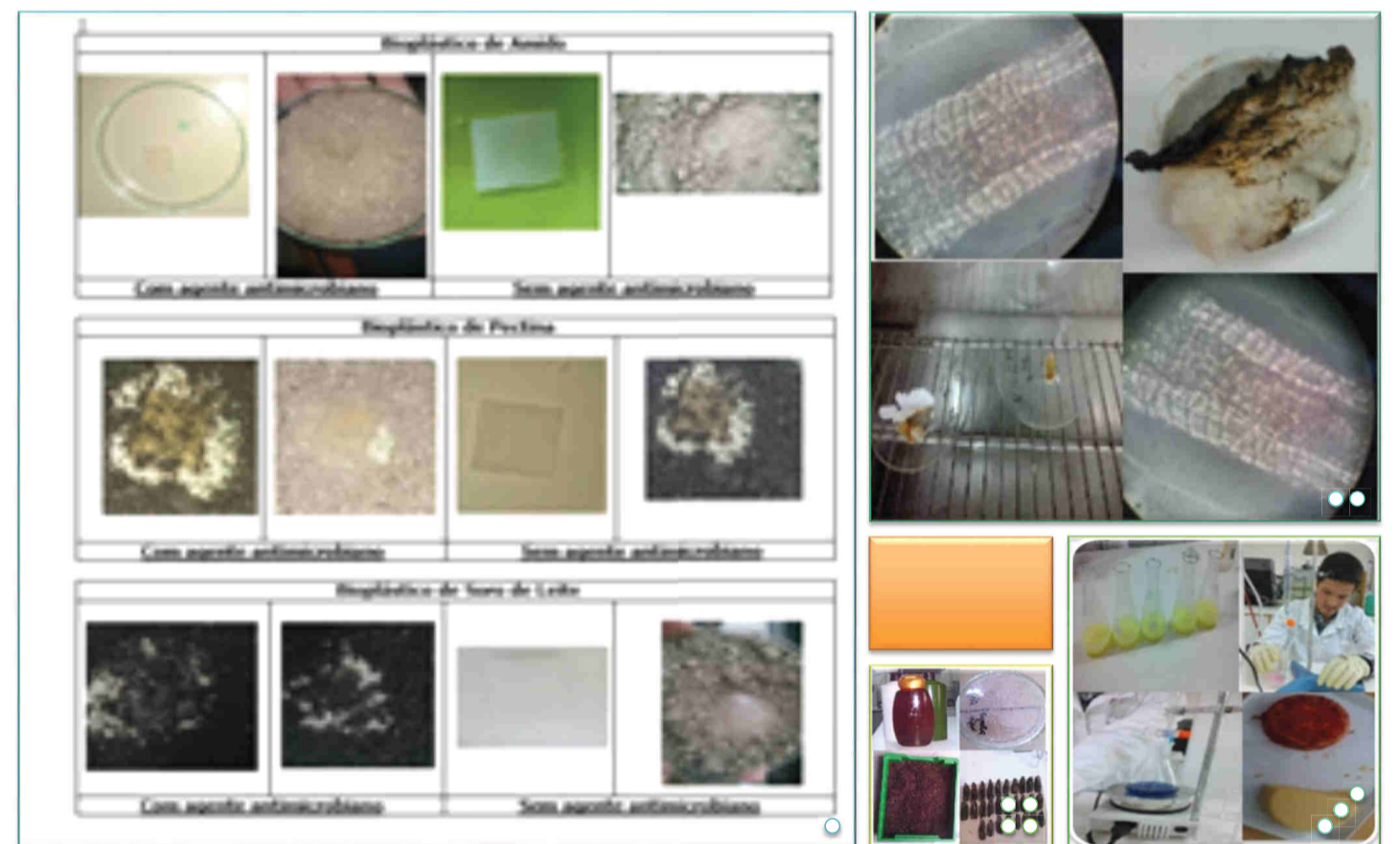
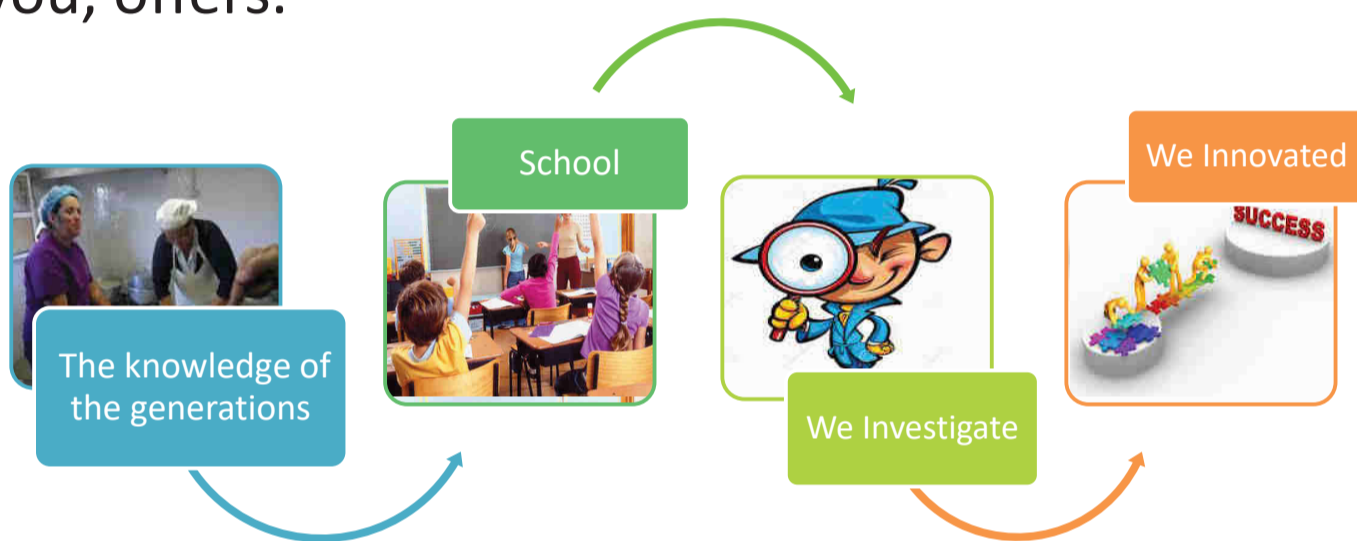
HONORATA PEREIRA | EPTOLIVA | OLIVEIRA DO HOSPITAL | PORTUGAL

RETURN HOME

LEARNING BY PROJECT



Imagine you have the opportunity to make the place where you live your classroom. Suppose your region is the scene of a crime and you are a Sherlock Holmes in the ability to relate and recover ancestral knowledge, perceive the mysteries and solve the problems that the natural world around you, offers.



Plantifica-te Genes da Serra Meat no Meat Bioquente

RETURN HOME

WATER	FAUNA	FLORA
Eletróbio	Genes da Serra	Meat no Meat
Plantifica-te	Fertiliza-te	Bioquente
Antocianinas	Oleico	Compósito



CONCLUSION

The students have built their future:
Some have registered patents and become entrepreneurs;
Others continued their studies and are now in university.



Cofinanciado por:

