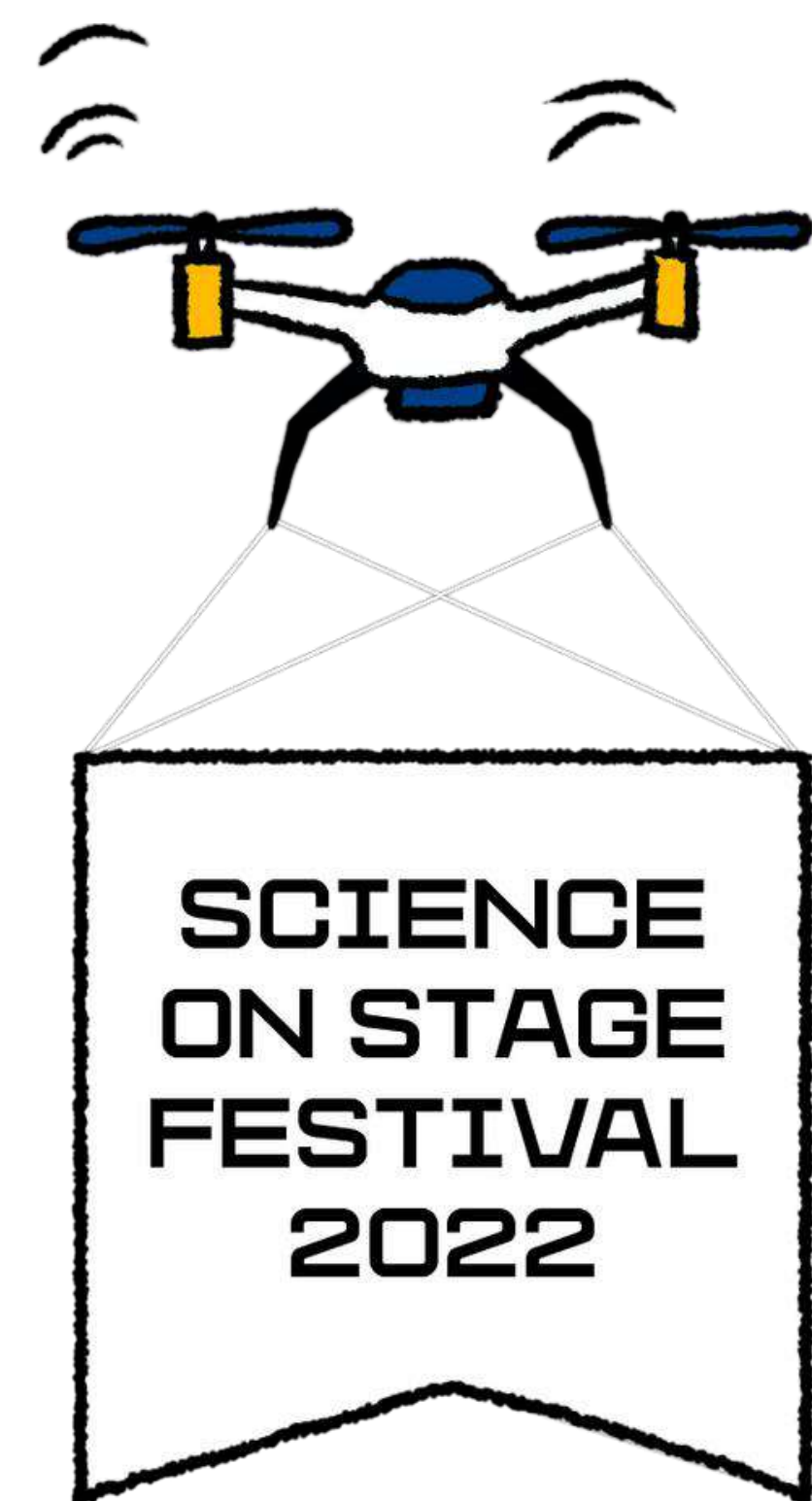
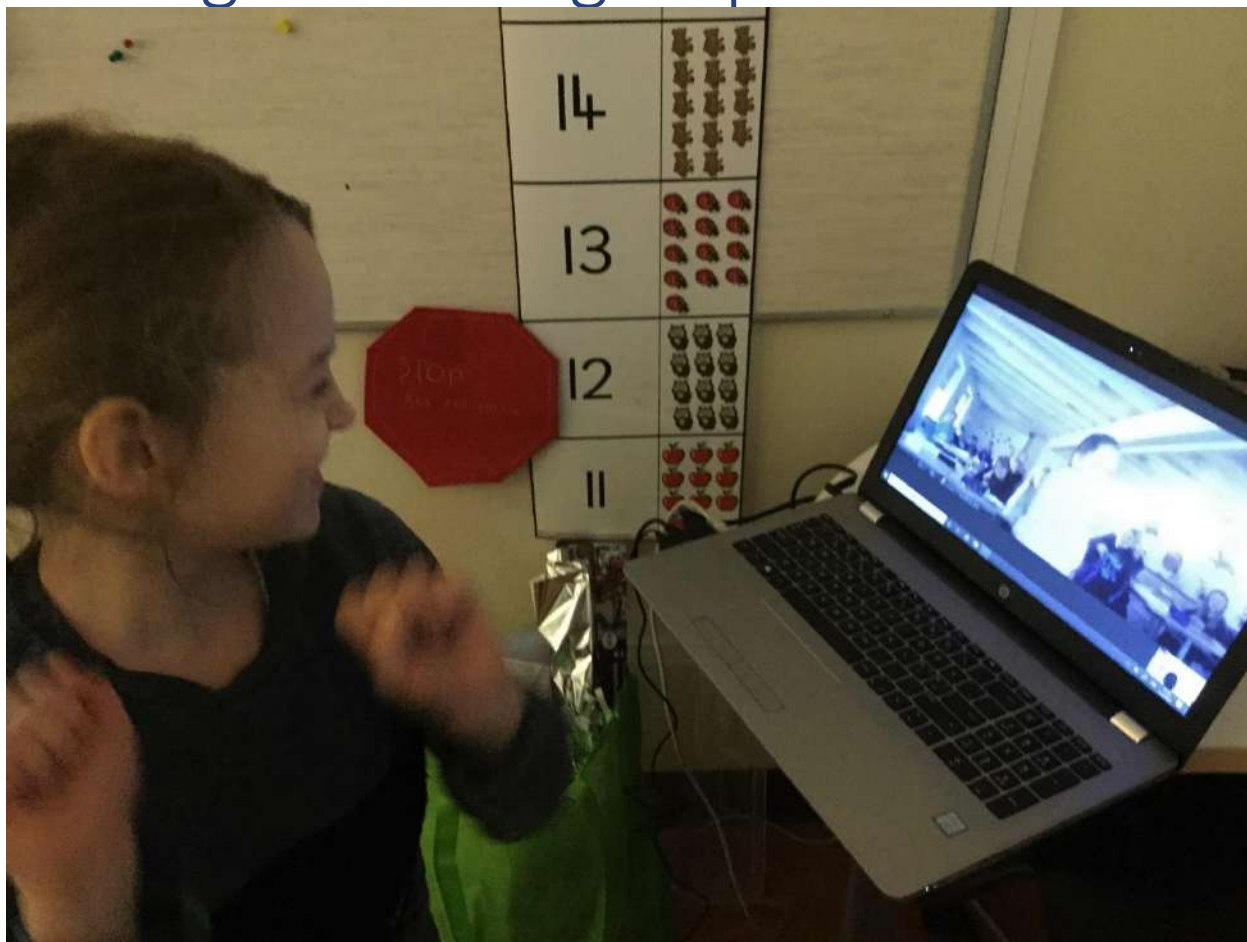


# SCIENCE FOR THE YOUNGEST

Pre primary Taipalsaari Kirkonkylä school | Taipalsaari Finland

## Mirror Experiments and Co-operation

The project starts with collecting the questions of mirrors. The pupils discuss about their answers and findings in small groups at school.

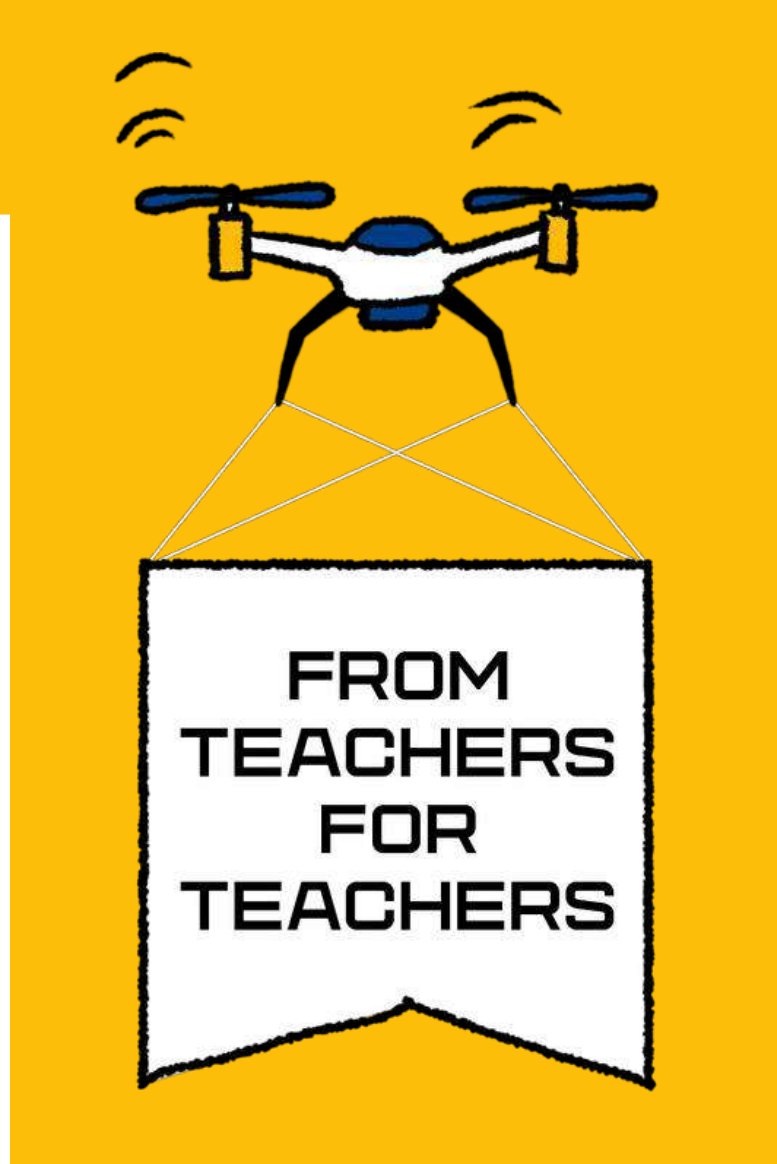


The same tasks are made via Teams/Meet/Zoom with the partner school of Denmark and the pupils can compare their answers. The pupils play a game Be my mirror and show their mirror artwork and periscopes via video so that ideas are shared. When pupils have learnt a lot, they plan an escape room with a story where they can survive with mirror knowledge, problemsolving and teamwork.



Co-operation, problem-solving, creating, science, engineering, art, mathematics, Learn and show what you know inside the Escape-room.





# SCIENCE FOR THE YOUNGEST

Rute Carmo Oliveira; Isabel Poço; Teresa Reis | Nobel Algarve British International School |  
Lagoa | Portugal

## Nature Answers

### Why?

Since children are the ones that will have to solve some of the global challenges we are facing, water shortage, resources saving, etc, we need to invest on them.

As Science teachers, we feel that older students present many difficulties when it comes to knowing how to observe.

Because observation is essential for Science and we believe that we can only evolve with collaborative work.

### How?

We introduced the project to our school teachers and extended the invitation to the Council of Lagoa by sharing our resources in a Good Practices event.

We researched and created a [website](#) to share all the necessary information about each challenge and [tutorials](#) of the proposed STEAM activities, we also provided support in activity preparation and clarified doubts in a team, on [Teams platform](#).



We observed the playground trees and with its shape, we built a support structure.



We learned how to save resources with the bees and soap bubbles.



We were looking for snails.



We used wax to make waterproof paper and do our works of art.

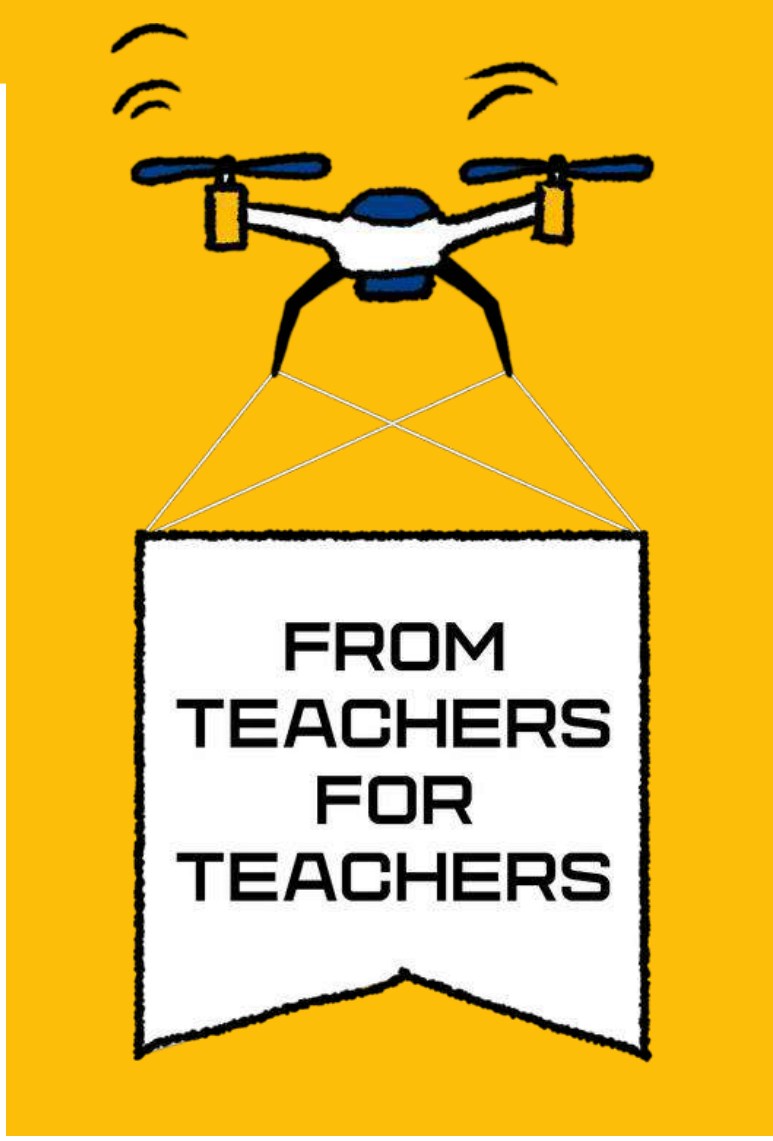
### What?

With nature and in nature our pre-school and primary children went outside to observe, listen, touch and search for the answer to challenges such as saving resources, protecting ourselves, saving space, keeping ourselves dry and clean and building things in a safe way just like nature does.

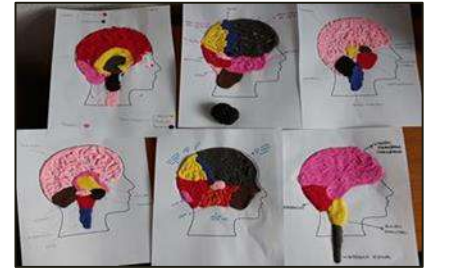
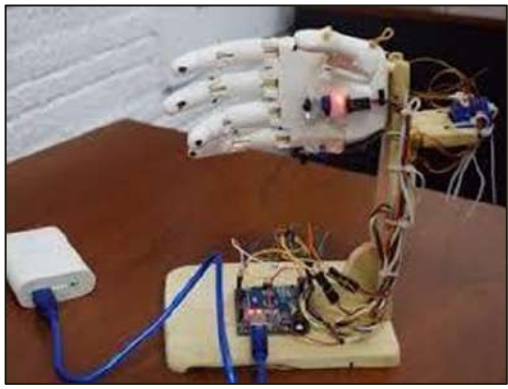
STEAM activities were performed with very simple, low cost and easily achievable materials. These materials can be found in any school, such as paper, water and soap.

**Conclusion:** Outside the classroom, in nature, we learn how nature is able to solve problems that we also face. We learn how important it is to observe what surrounds us.





# SCIENCE FOR THE YOUNGEST



Bárbara de Aymerich | Escuela de Pequeñ@s Científic@s Espiciencia | Espinosa de los Monteros | Spain

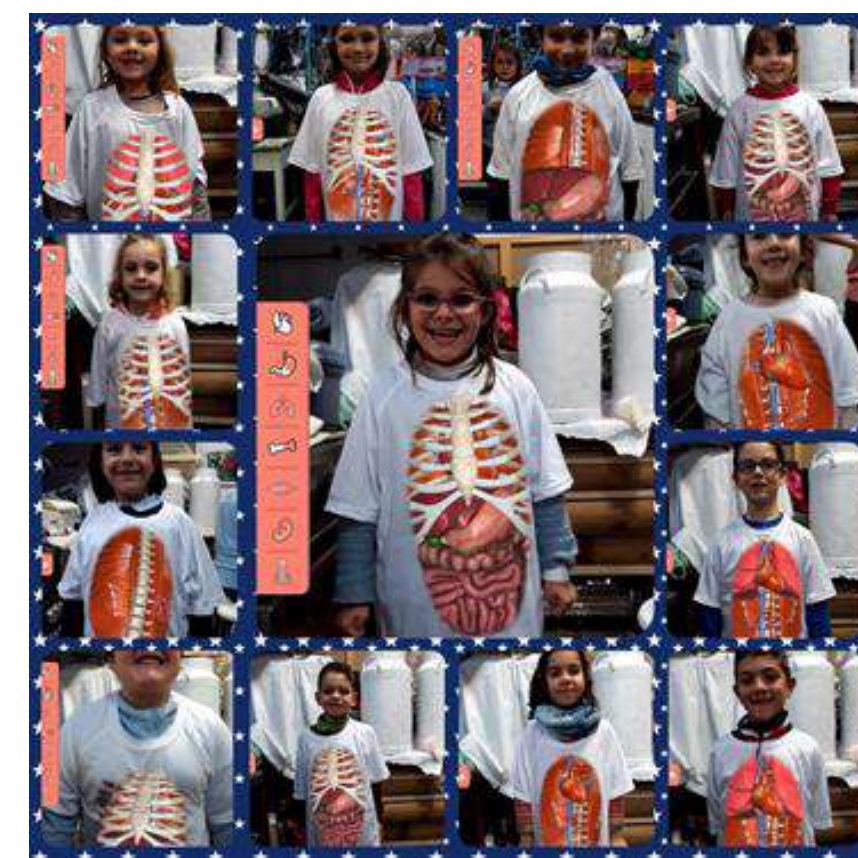
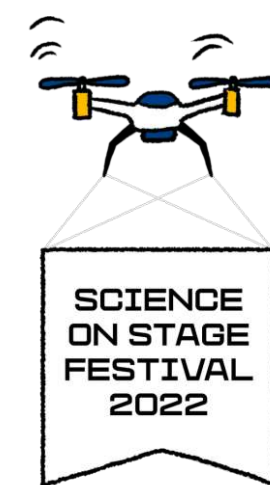
## OUR BODY, THE BEST PLACE TO LIVE

VR, AR, inquiry and modeling for the study of the human body in early childhood education

### METHODOLOGY

Carrying out different experiences using active methodologies to improve knowledge and care of the human body:

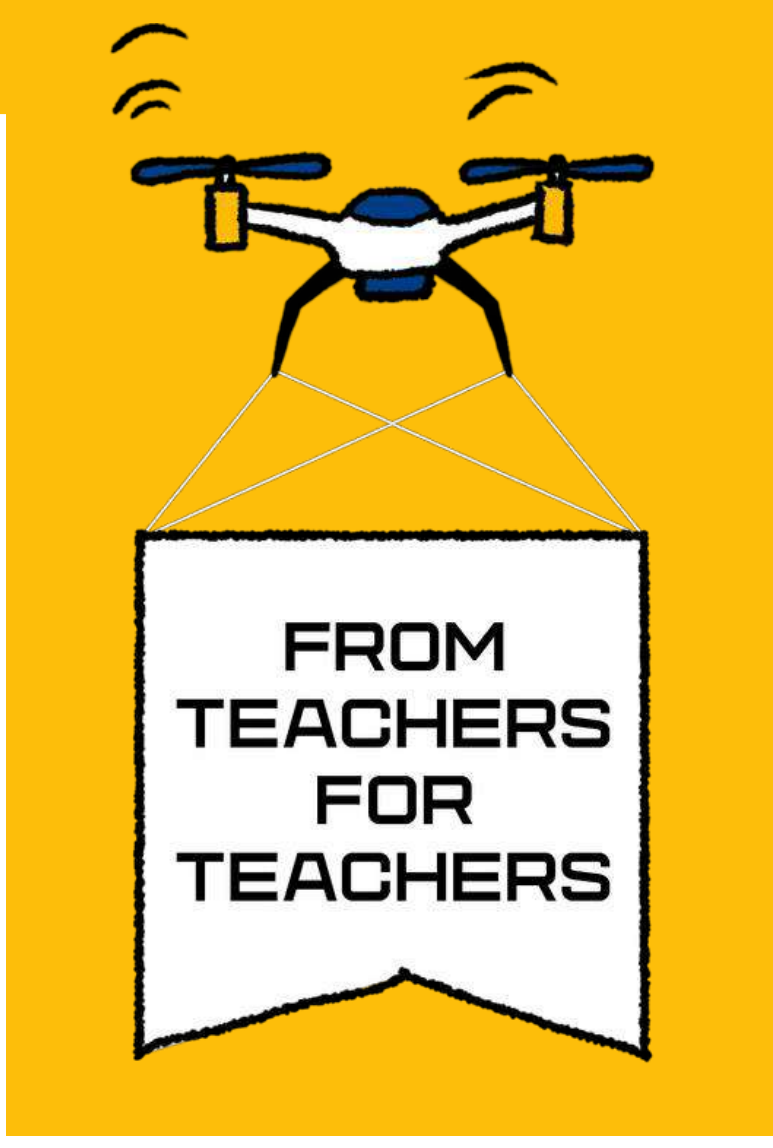
- 1.- **MODELS.** - Representations of many parts of the body joined with simple physico-chemical concepts, using cheap and attractive materials.
- 2.- **NEW TECHNOLOGIES.** - Use of VR and AR as a source of information for the knowledge of the real appearance and functioning of the human body.
- 3.- **INQUIRY.**- Research experiences to improve the knowledge and care of the human body:
  - **RESEARCH ON SKIN CARE.** - We are involved in the importance of protecting our skin to avoid the action of the sun's rays, using photochromic beads and different sun creams.
  - **RESEARCH ON THE EFFECT OF CARBONATED DRINKS ON OUR TEETH.** - We know that these drinks have acids and sugars that damage enamel and favor the appearance of spots and cavities. Using eggs like tooth enamel (similar composition), different carbonated soft drinks and pH meters, we were able to observe interesting results.
  - **BIOMETRIC RESEARCH.** - To know the biometric data and compare them with the standardized tables of the WHO, we calculate our BMI, to compare them with 50th pct. To visually check our results, we made tables and graphs with building blocks. We also conducted surveys on eating habits to appreciate the deficiencies or excesses of some foods.
  - **RESEARCH IN NEUROSCIENCE: SPEED OF RESPONSE TO DIFFERENT STIMULES.** - We evaluate the speed of response to tactile, visual and auditory stimuli, using 30 cm plastic rulers in a pair game. We check the variation with respect to the age and sex of the students.
  - **And so on...**



### CONCLUSION

The experiences based on models, technological resources and IBL, improved their scientific and mathematical skills, brought them closer to scientific methodology and made them aware of the importance of science in knowing their own body and in achieving and maintaining health.





# SCIENCE FOR THE YOUNGEST

Rukiye Akyol | Denizciler Mustafa Kemal Primary School | Hatay | Turkey

## DISCOVERING STEM IN NATURE

Children in Nature, Stem in Nature



**Project Goal:** Our students both learn STEM and spend time in nature in early childhood.

**Project Purpose:** Children's discovery of STEM in nature. Studies were carried out on 4 main themes. Stem's 5E rule was applied to each tema separately.

### 1-Learning Stem from Waste

Our problem situation was determined as the pollution of wastes to the environment. Recycle bins were built to collect waste. A robot was designed to clean the environment. Our criteria are that the robot is made of waste materials, that at least 1 natural material is used, that it has a container where it can put the wastes and that it can stand.



Design Product



Design Product

### 2-We Learn Stem From Plants

The problem was determined as the harm of chemical dyes to people. A color chart was created from plants, vegetables and fruits. Natural dye was created from plants as a design product. Paintings were made by children with natural dyes. Our criteria is to form paint by squeezing and crushing without boiling.



Design Product

### 3-Learn Stem in Water

The decrease in clean water was determined as the problem situation. The water cycle experiment was carried out. As a design product, a device was designed to clean dirty water. Our criteria is that this instrument is designed with natural materials.



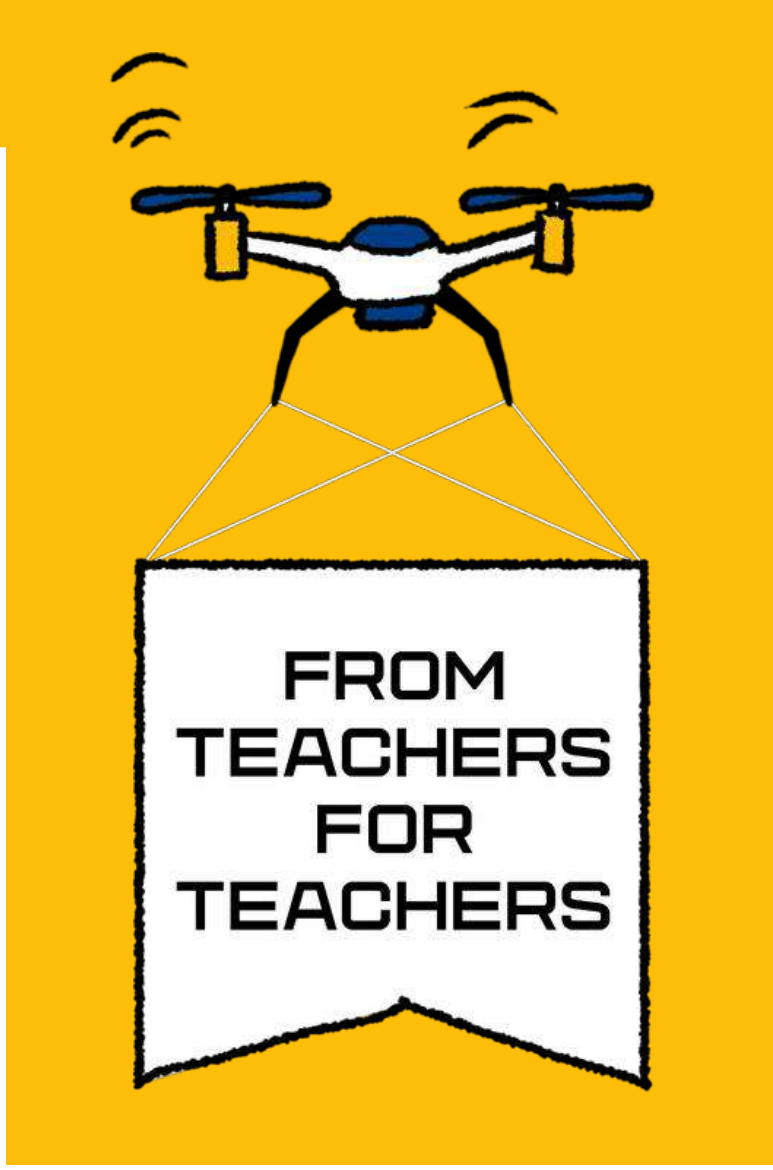
Design Product

### 4-We Learn Stem from Animals

The extinction of some animals has been identified as a problem situation. It was investigated what can be done to prevent the extinction of animals. A conservation area was created for the endangered stag beetle. Our criteria is that it is a protected area that will be suitable for the living conditions and diet of the stag beetle.

In the Animals section, we noticed that there are a lot of different endangered animals. We have determined that this section is open to development. We should reach more students with projects on environmental pollution and protecting nature.





# SCIENCE FOR THE YOUNGEST

Olha Doskochynska | Lyceum named after Puliui | Lviv | Ukraine

## Our Trip on Mars

The project integrates STEM subjects and demonstrates innovative approach to the elaboration of creativity and competitive skills by means of hands-on experiments with lego.

During the project teachers engage pupils in STEM-based activities, they are provided with better information and support them with knowledge useful for their future education.

Considering the mechanism and the motion of the rocket model, pupils can get inquiring to the momentum conservation law in an original and entertaining way. They can also create and design their own rover robots.

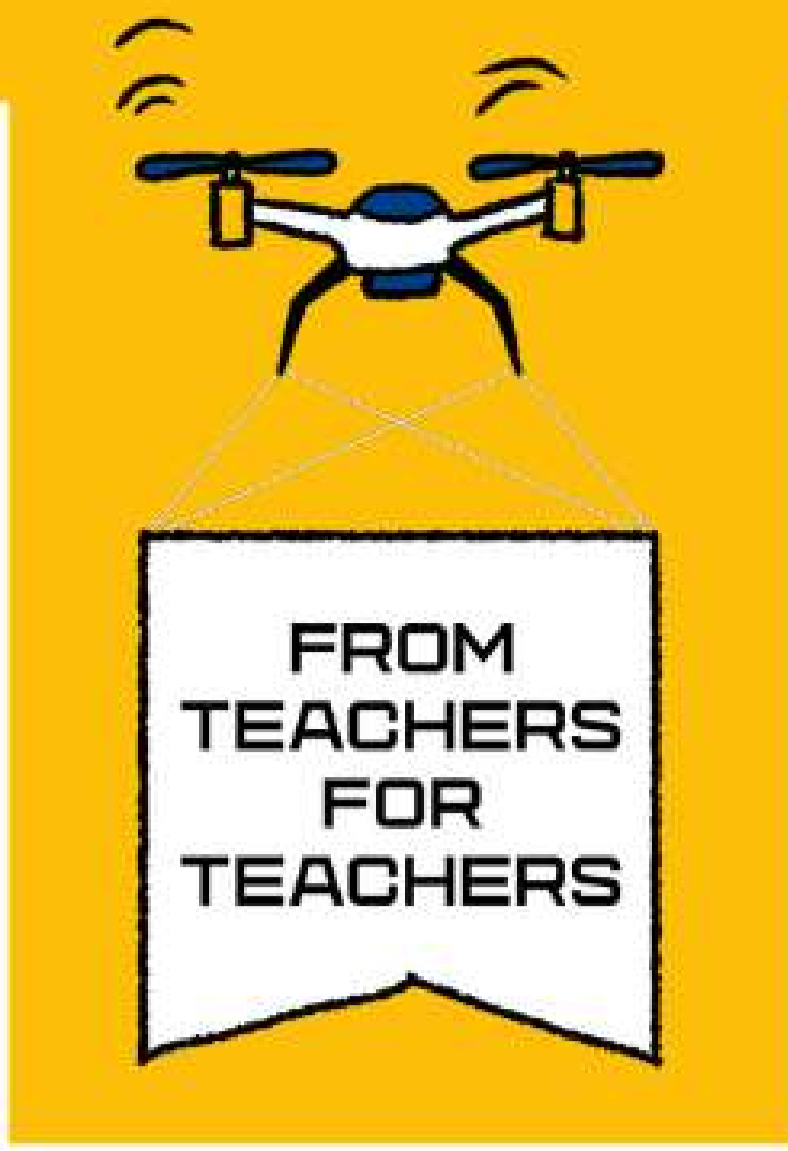


This project has integrated STEM subjects, supporting the development of pupils' hands-on activity and constructivism. We have provided our students with more information and their future learning skills would be deeply social, student-oriented, personalized and technological.

This teaching technique was successfully used at physics lessons. Considering the structure and motion of the rocket has helped to deepen students' knowledge about conservation of momentum law and to reveal the idea of Ukrainian scientists about space flights. Models of rockets and rover robots have been designed by pupils.

This Project helps Generation Z develop their hands-on skills, 3-D imagination and creativity.





# SCIENCE FOR THE YOUNGEST

projects for preschool and primary school

BISOGNI ANNA RITA CONVITTO NAZIONALE G.FILANGIERI VIBO VALENTIA ITALY



## Leonardo amava le SteAm

Leonardo loved the SteAm is an interdisciplinary and transdisciplinary project whose purpose is to provide schools with an introduction of the basic concepts of STEAM subjects in game formats.

By studying Leonardo, students communicate with each other, identifying themselves with his action and interpreting drawing lessons, from his ability, to persist in the face of difficulties, not to give up, to seek beauty and perfection with which to discover their potential, their unique characteristics, and their specialty and originality. It is a path of knowledge aimed at stimulating both scientific thinking, observation, resilience, and the artistic skills of everyone, in an environment and a game itinerary that respect individualities, and enhance talents.. Steam activities are therefore proposed starting from Leonardo's passions for code, science, flight, architecture, art, engineering, mathematics, and music., Children are encouraged to reflect on the proposed activities, to look for scientific reasons and engage in learning in curricular subjects such as mathematics, science, technology and art.



The project combines a digital presentation with artifacts and elaborate materials:

The first is a "from teacher for teachers" gift, open and editable by anyone who wishes, and in any educational institution using a QR code.

The second part, which utilizes making and tinkering, is created almost entirely with readily-available materials. manually cut and manipulated by the students. They start with the construction of a notebook where they insert and store projects and observations





FROM  
TEACHERS  
FOR  
TEACHERS

# SCIENCE FOR THE YOUNGEST

projects for preschool and primary school

Dovilė Grininė/ Kaunas A.Stulginskis school/ Kaunas/ Lithuania  
Daiva Gerdzevičienė/ Vilnius preschool "Vaikystės takas" /Vilnius/ Lithuania

STEAM

## "STEAM education and technology – from smart robots to virtual expeditions"

Pupils virtually traveled around the Curonian Spit, created smart robots, participated in the interactive tasks, explored QR codes, were encouraged to make and test hypotheses, experiment, create constructions, compare, measure, model. In creative activities, using already used items (i.e. a toothbrush, a toy car with remote control, etc.) recreated objects, raised hypothetical questions about how to enable robotic helpers: a robot broom/painter/toy. In this way, we encouraged the children to develop attitudes towards sustainability, ecology.

The project material includes attractive interdisciplinary integration worksheets for students, related to real-world issues, and guidelines for teachers.



WOW

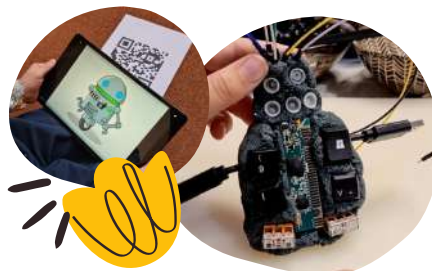


### Project Goal:

1. To **expand children's horizons** by using smart technologies and exploring **the Curonian Split in Lithuania**.
2. To enable the innovative use of secondary raw, **recycled materials** in the creative process.

Stay tuned

Robot!



Scan me



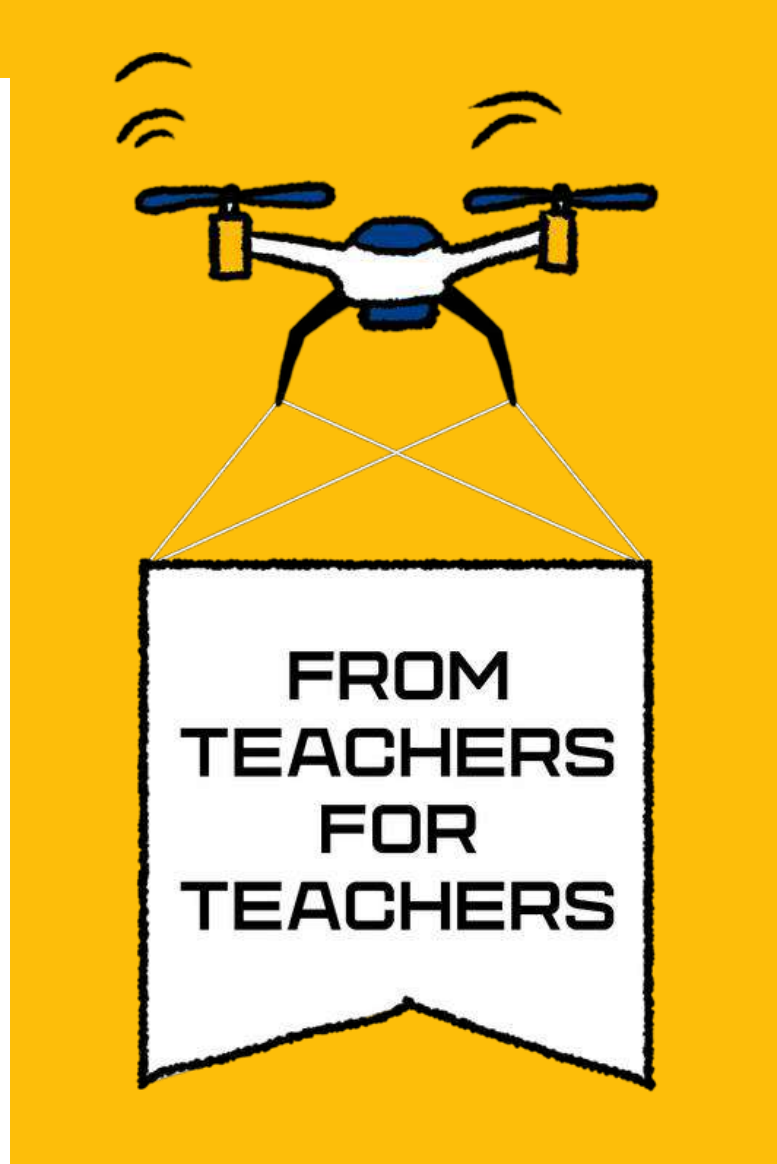
Scan me



### Conclusion:

We believe that this interactive exploration of robotic objects has allowed the children not only to discover new secondary toys and tools. Also this project broadened their horizons to the planning, development and monitoring of world improvement, progress, sustainability and ecology. The children also had a chance to explore the landscape of Curonian Split in Lithuania.





# SCIENCE FOR THE YOUNGEST

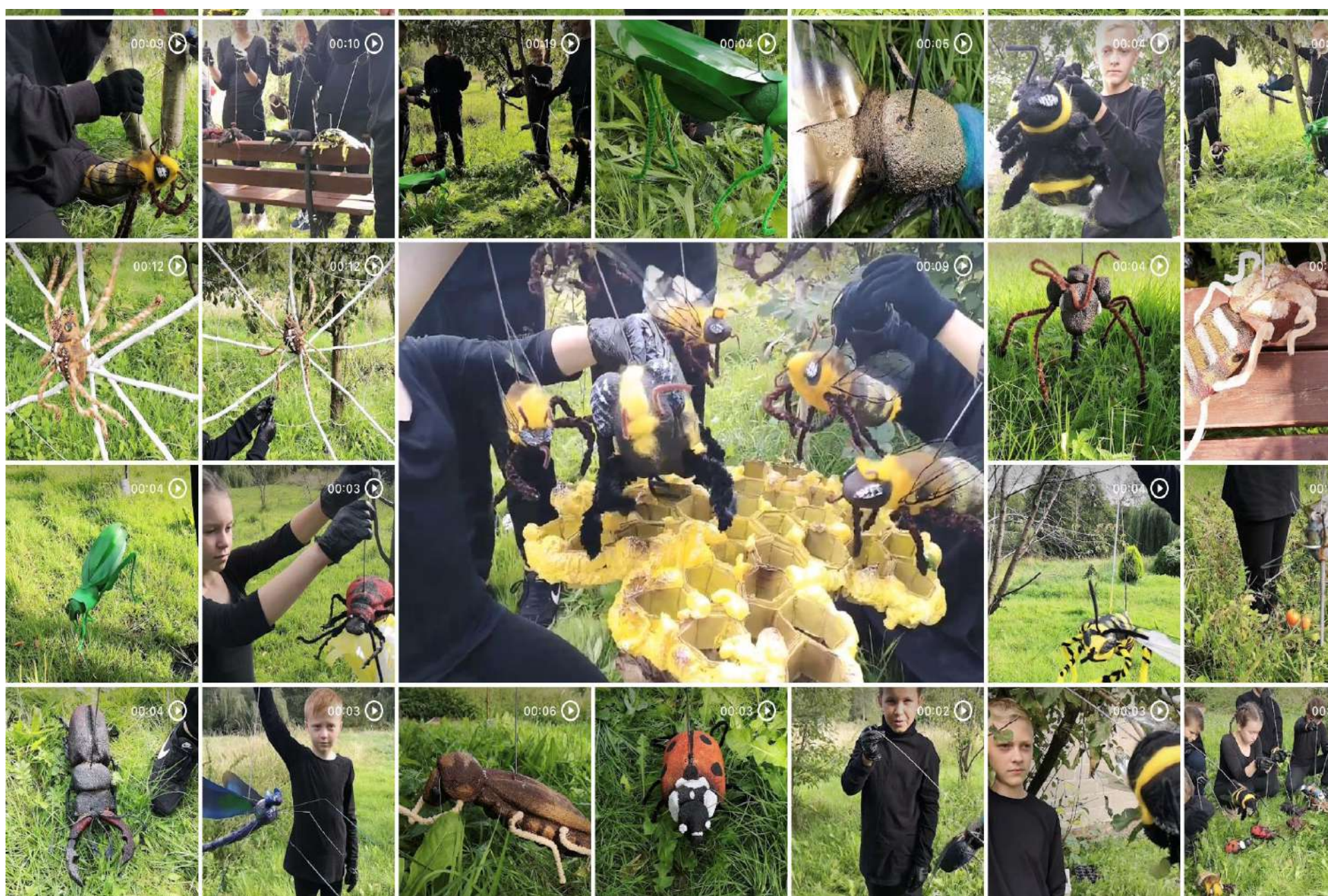
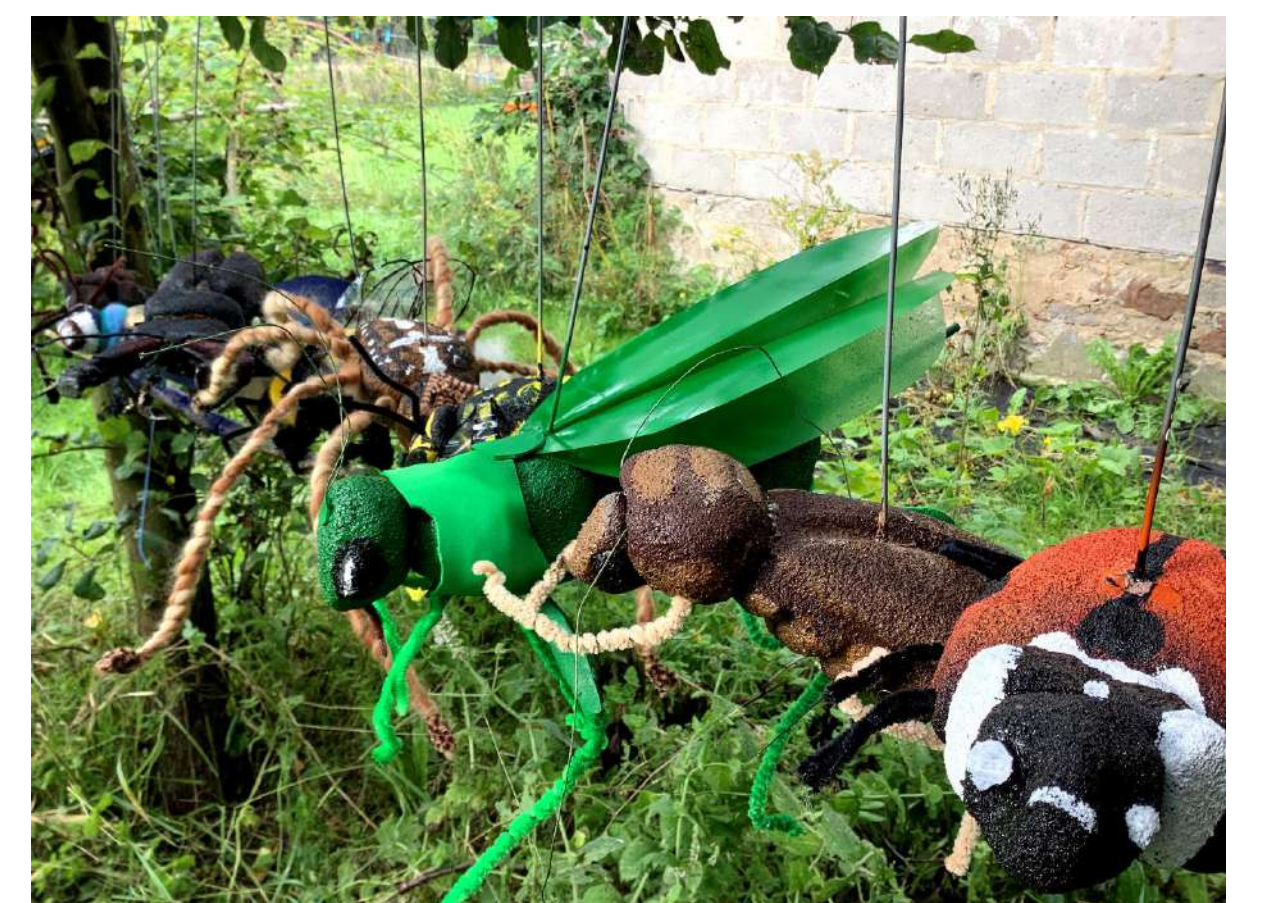
Izabela Kaleta | Primary School | Wola Jachowa | Poland

## Holiday Bees' Symphony

Nature and Art Project

The inspiration for the project was a photo of Angelina Jolie with living bees covering her body.

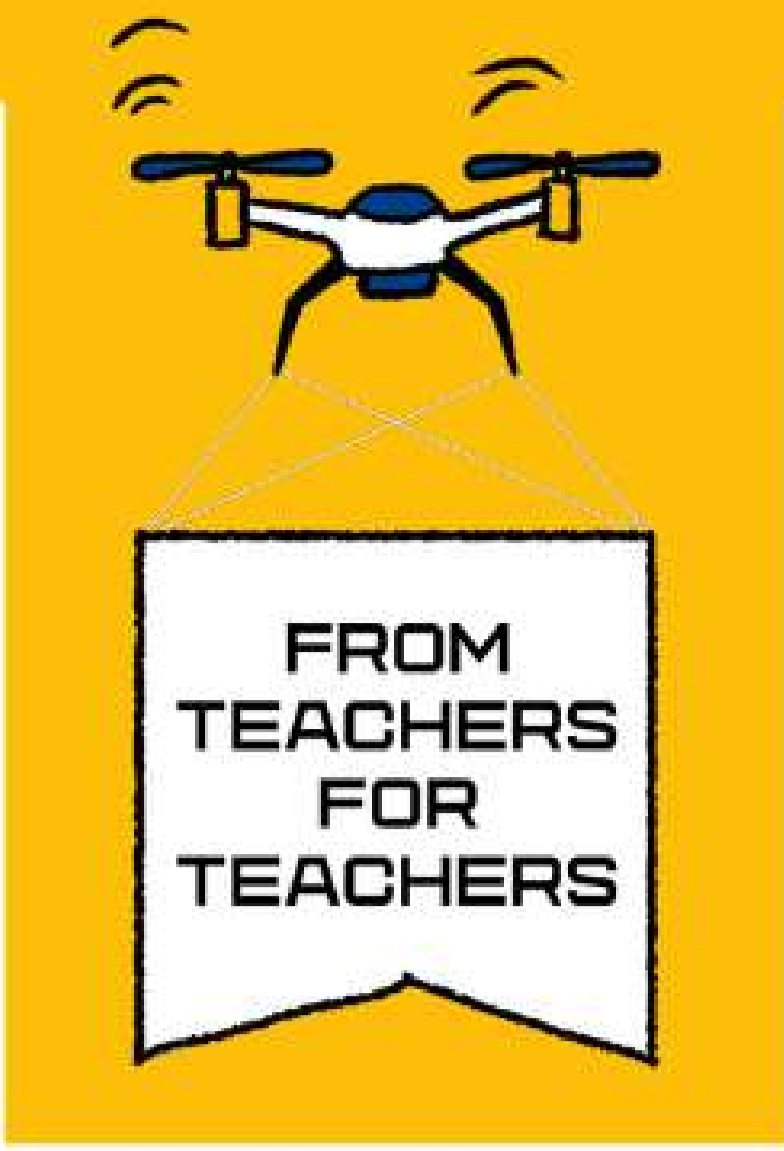
The project was carried out during last summer holidays. Its aim was to encourage the children to learn about the life and importance of bees in the ecosystem, to shape ecological attitudes, and to make them aware of the beauty of the surrounding world. For two months the children watched the bees in the apiary and in the natural environment.



The children got to know the physiology of insects and bees, observed their life cycle, planted melliferous plants. Then, they presented the acquired knowledge in the form of a puppet show, for which they created the scenario, designed and made the puppets. Both the holiday activities and the performance had a symphonic character.

**Let's take care of bees, because... "If the bee disappeared off the surface of the globe then man would only have four years of life left. No more bees, no more pollination, no more plants, no more animals, no more man."- Albert Einstein**





# SCIENCE FOR THE YOUNGEST

projects for preschool and primary school  
Zlatina Dimitrova | Izzi Science for Kids | Sofia | Bulgaria

A familiar topic – **density of sugar solutions.**



In a flipped classroom, students research **new topics at home** and try to apply this to **problems and experiments in the classroom.** They are free to choose their sources, as long as they are reliable and the information is **scientifically accurate.**



## Upside умоп

a story about 20 sugar crystals



Students are **free to choose** the hypothesis and all the necessary steps to prove it.

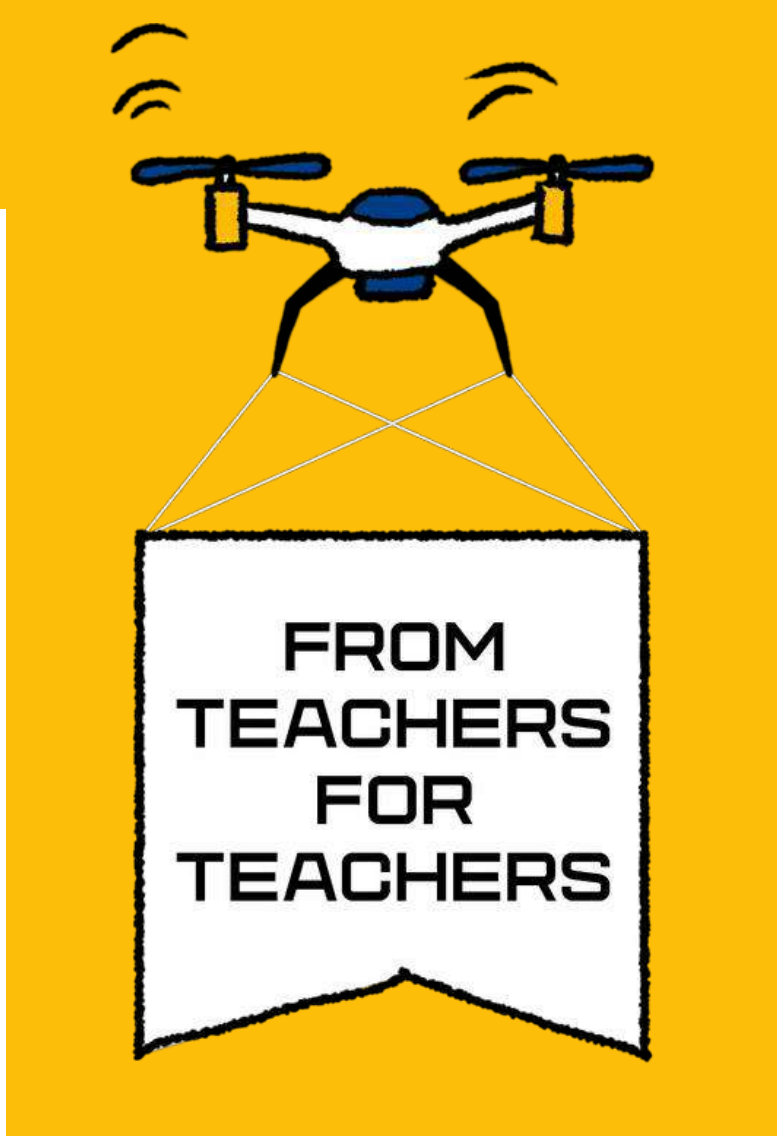
In this case, they had to do their **own research** and **design an experiment** for the teacher to perform. Their task was to research the properties of sugar solutions.



Some students take it to the next level with **high-tech equipment.** Others mischievously make the teacher **count sugar crystals...**

**Curiosity is the only prerequisite!**





# SCIENCE FOR THE YOUNGEST



Véronique Corbeil and Geneviève Lapointe | St-Joseph | Ste-Adèle | Canada

## ENERGY + STRENGTH = BIRDIE !

Learn science and become a better golf player !

How can we encourage boys to like school?  
How can we make learning fun?  
How can we support teachers in a skills-based approach?

Introducing **biomimicry** in a golf course: **NATURE = FUTURE!**

Motivation is optimized to its fullest potential!

**DESIGN** and **BUILD** your own *Mini Golf*

**ENTREPRENEURIAL COMPETENCIES**

- Innovating to reach educational targets
- Initiating a project
- Creating a prototype
- Engaging students in their community
- Optimizing the student's potential

**SOCIAL AND CIVIC COMPETENCIES**

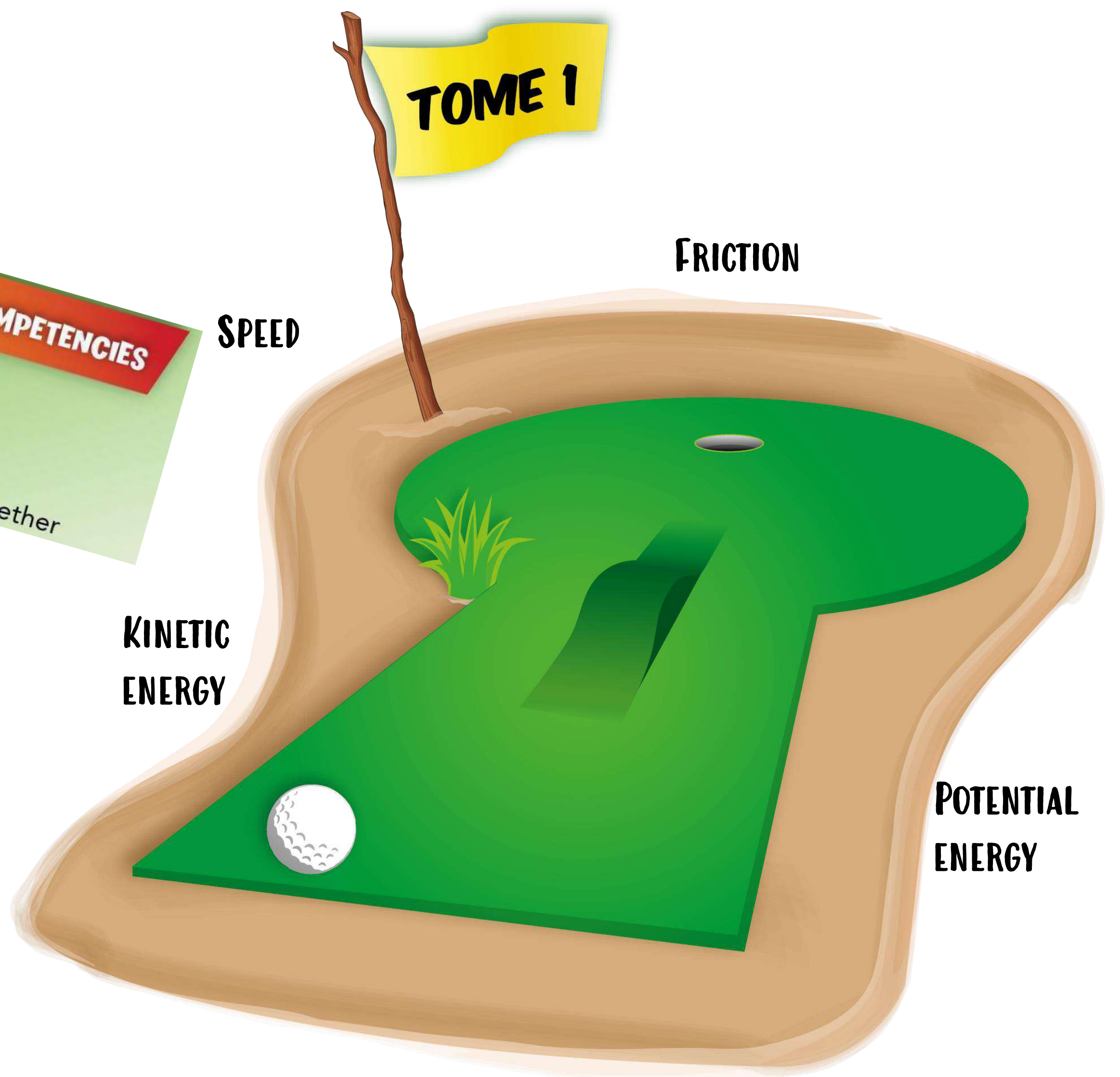
- Learning to be
- Learning to do
- Learning to know
- Learning to live together

**CROSS-CURRICULAR COMPETENCIES**

- Integrating technologies
- Collaborating
- Structuring identity

**SUBJECT-SPECIFIC COMPETENCIES**

- Reading, writing, and communicating
- Solving problems and applying concepts
- Proposing scientific explanations
- Appreciating art



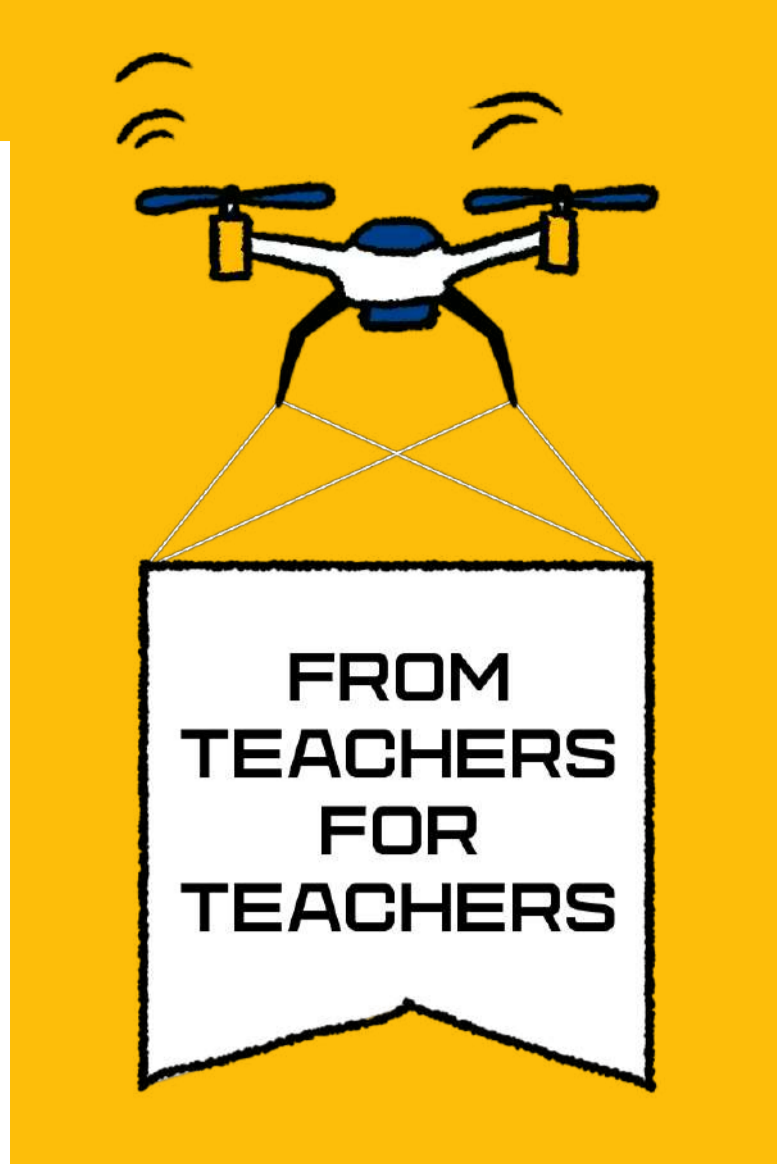
Cross-curricular project 100% adapted to 21st-century learners!



Maison d'édition à compte d'auteur





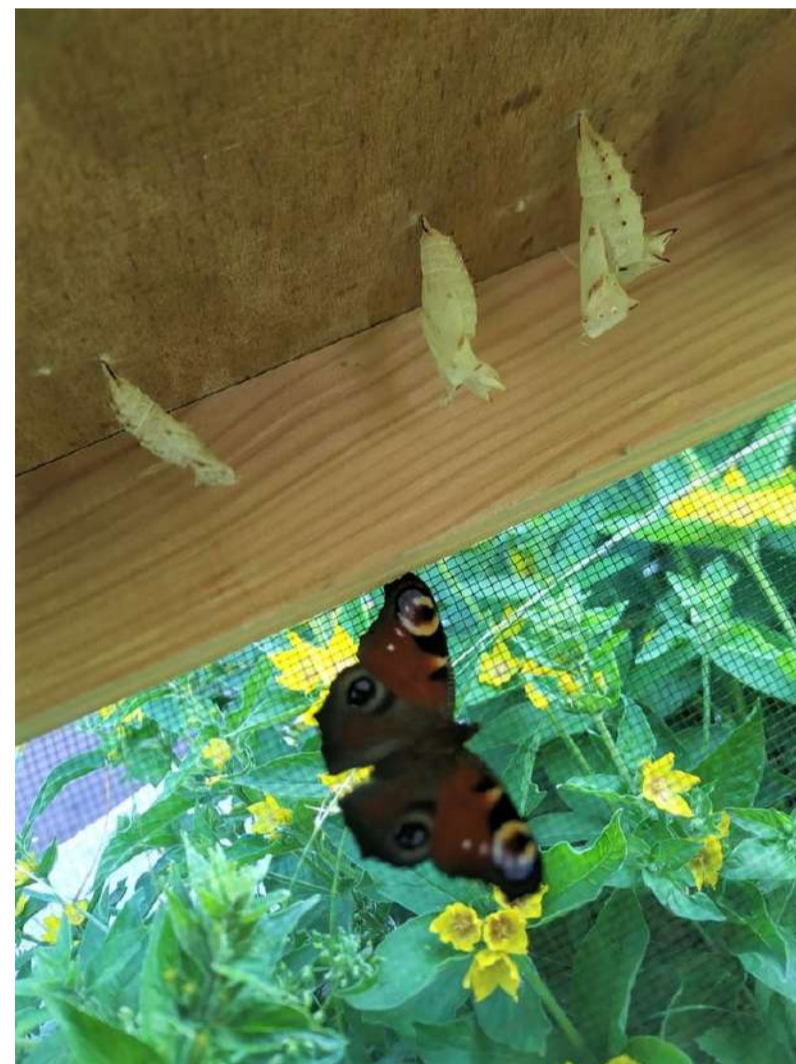


# SCIENCE FOR THE YOUNGEST

Andrea Tláskalová | Základní škola | Zbiroh | Česká republika  
Kateřina Tláskalová | Základní škola | Zbiroh | Česká republika

## Butterfly's journey

This project promotes outside learning. It takes place in the school garden, park or the forest. The observation of butterflies takes place inside – insectarium or classroom.



In this project, pupils get familiar with the evolution of butterflies and the way of their life. This theme is integrated into basic educational areas and aims at explorer approach, problem-solving and experimenting which increase natural curiosity. The children with different interests and ages cooperate with each one and another.

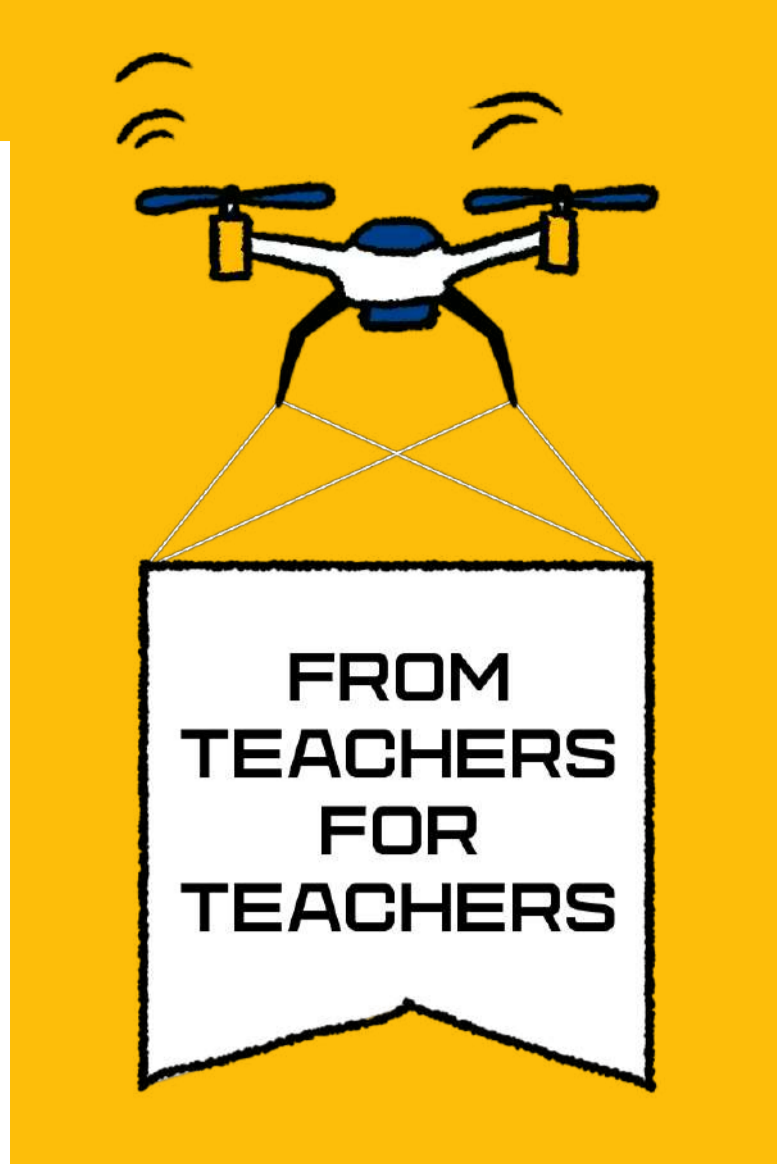
### A PATHWAY IN THE SCHOOL GARDEN

The pathway consists of stations where there are prepared few tasks for students from 4th to 5th grade:

1. LANGUAGE AND LANGUAGE COMMUNICATION
2. A HUMAN AND HIS WORLD
3. MATHS APPLICATION
4. A HUMAN AND CULTURE
5. A HUMAN AND HEALTH
6. A HUMAN AND WORLD OF WORK
7. INFORMATICS







# SCIENCE FOR THE YOUNGEST

Andrea Tláskalová | Základní škola | Zbiroh | Česká republika  
Kateřina Tláskalová | Základní škola | Zbiroh | Česká republika

## Butterfly's journey

This project promotes outside learning. It takes place in the school garden, park or the forest. The observation of butterflies takes place inside – insectarium or classroom.

The Project – A butterfly pathway in the school garden may be used as a whole for teaching about butterflies.



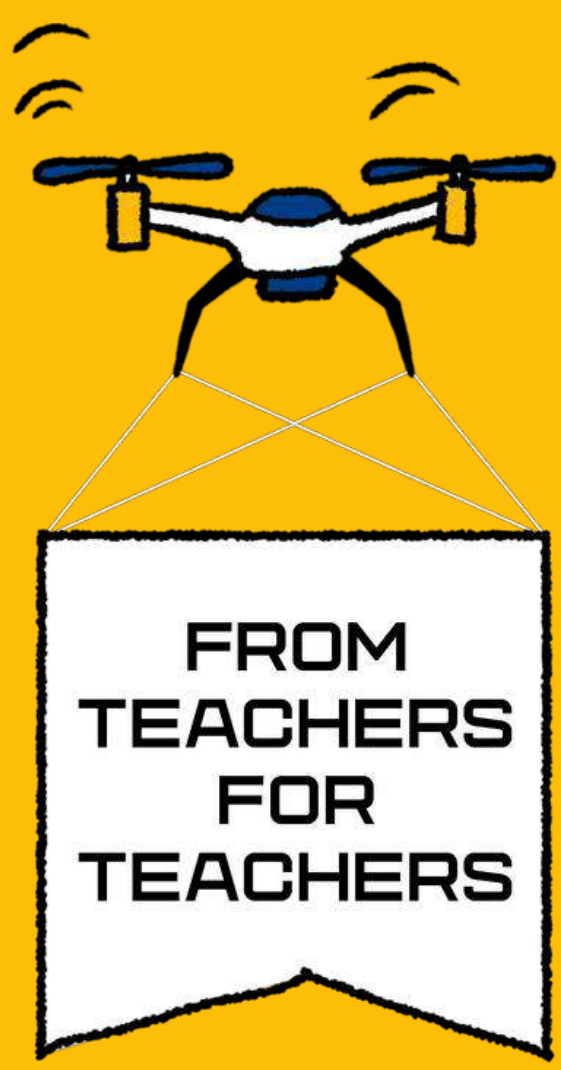
The manual for observing the development of butterflies from caterpillars to adults you can use in exploring directly in the classroom or around the school.

Find a few caterpillars on nettles, pick them up and put it in caterpillarium. Afterward change nettles regularly and observe caterpillars evolving. Pupils should record temperature which should be compared with butterfly evolving.

- Pupils can practise word classes with this theme (the development of butterflies). They make sentences using codes. They can also practise vocabulary relate to butterflies in english lessons.
- Pupils can order phases of the development of butterflies in the field called a human and his world.
- Butterflies can be used to practise axial symmetry, logical contemplation and combinatorics in maths.
- We can use chromatography to make colourful butterflies with our upils. It is a part of a human and culture field.
- Pupils can also practise their movement skills together by recognizing butterflies and flowers in field a human and health.
- Some physical experiments (for example – making simple kaleidoscope, butterfly paper weight or flying butterfly) are a part of field called a human and world of work.
- We can enrich the curriculum of computer science with preparing a butterfly's pathway for ozobots. This pathway can be also cut in grass in the school garden.





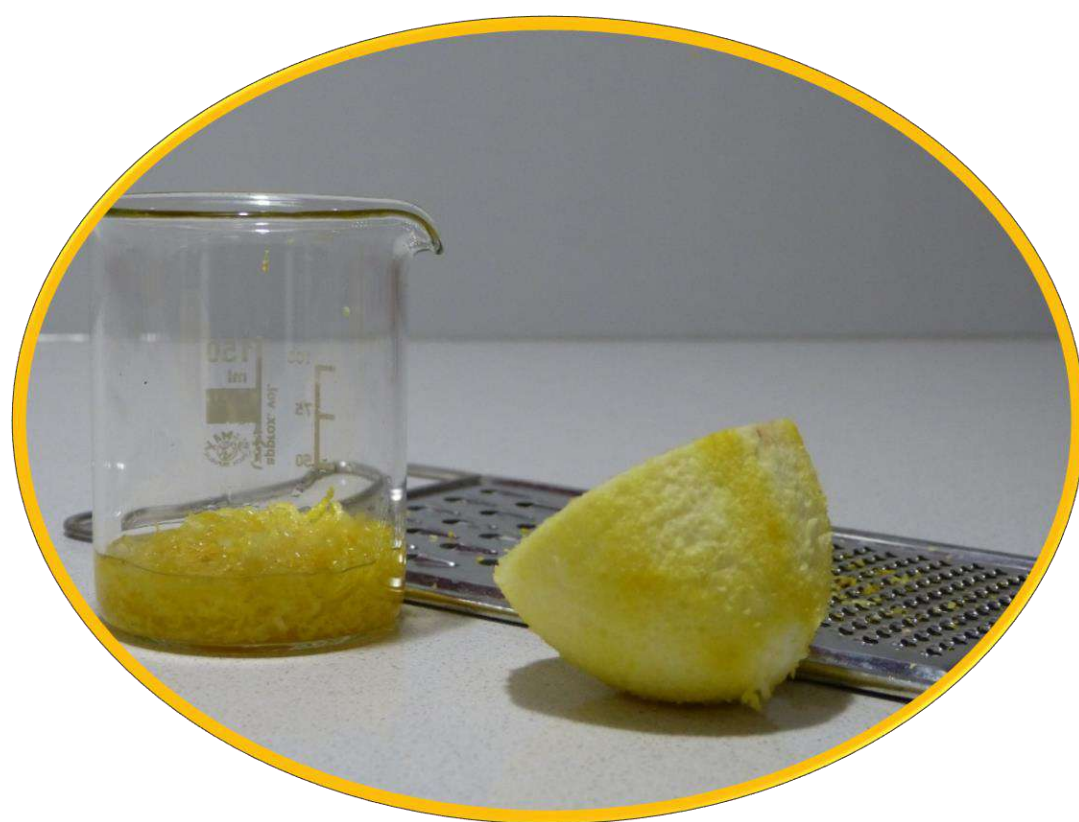


# SCIENCE FOR THE YOUNGEST

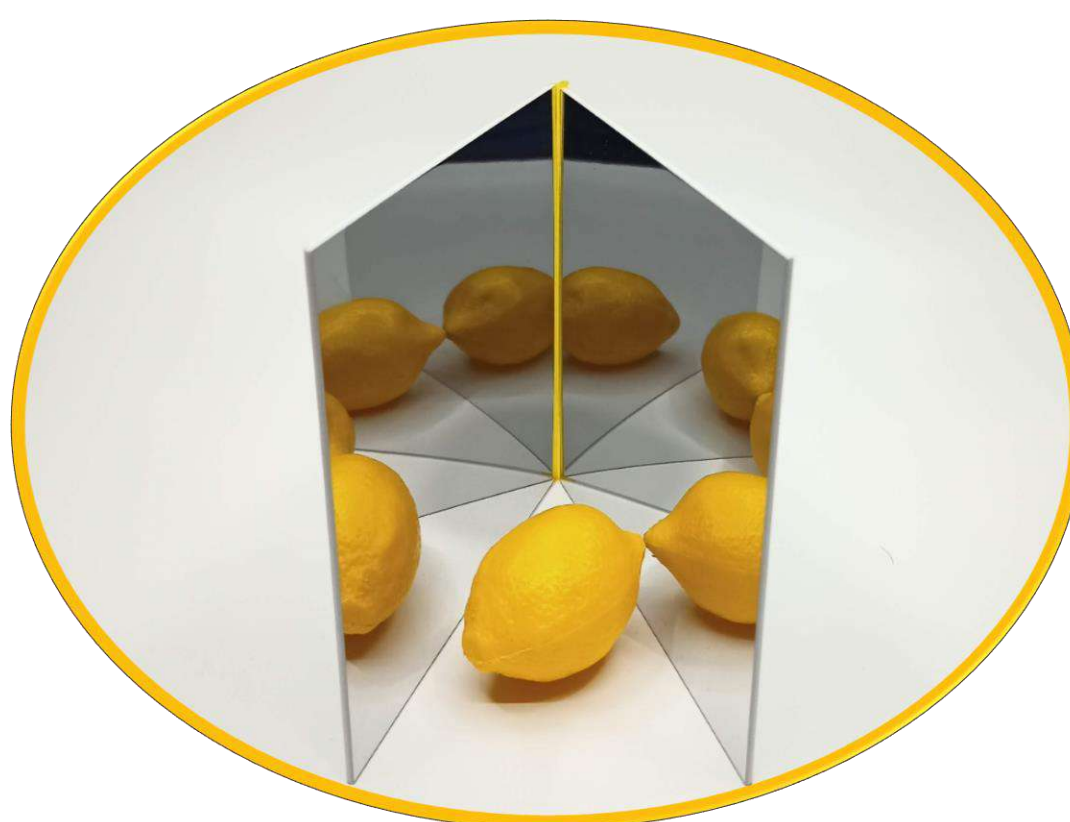
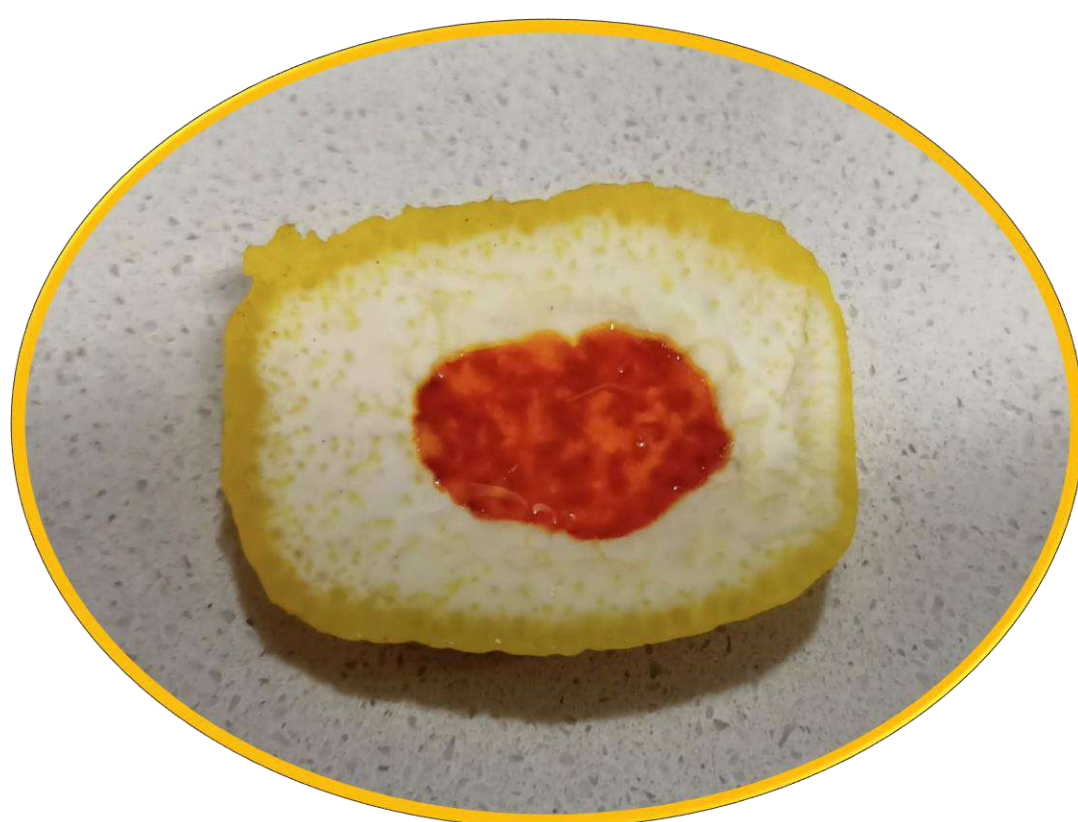
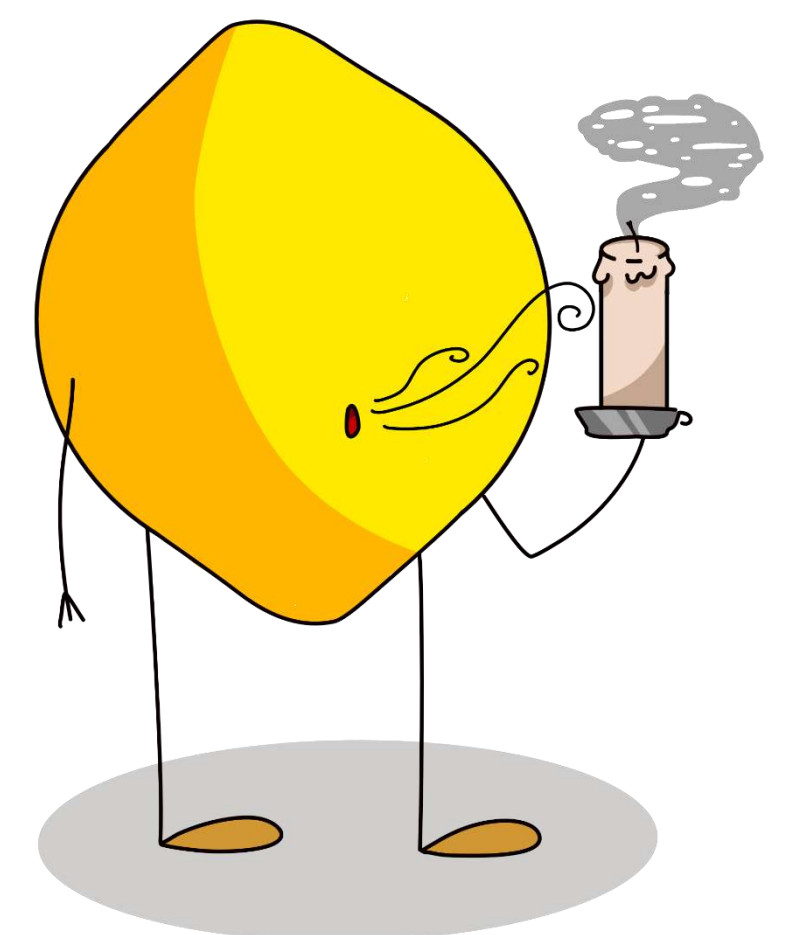
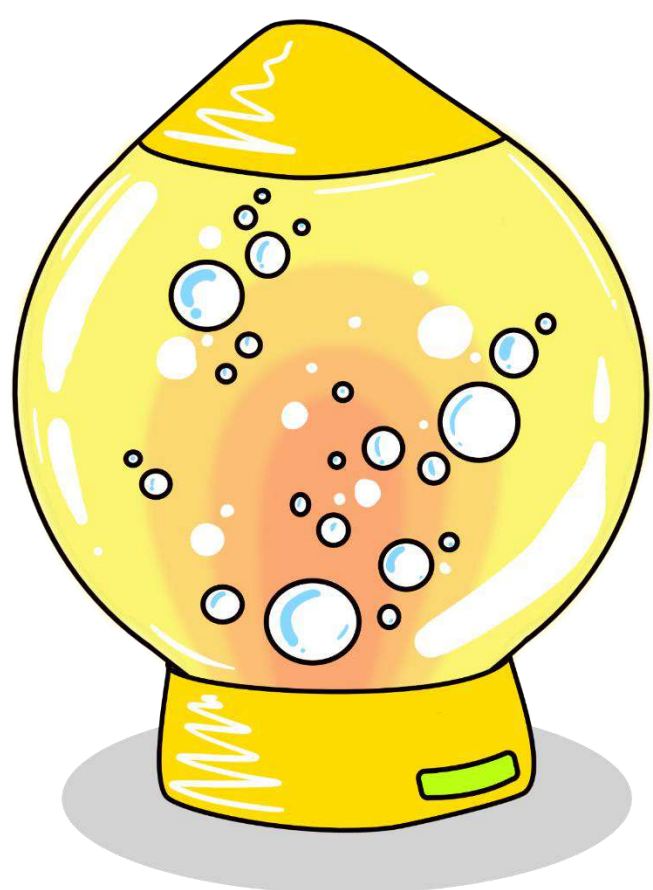
Pavla Machová | Gymnázium | Česká Lípa | Czech Republic

## Tricks with lemons

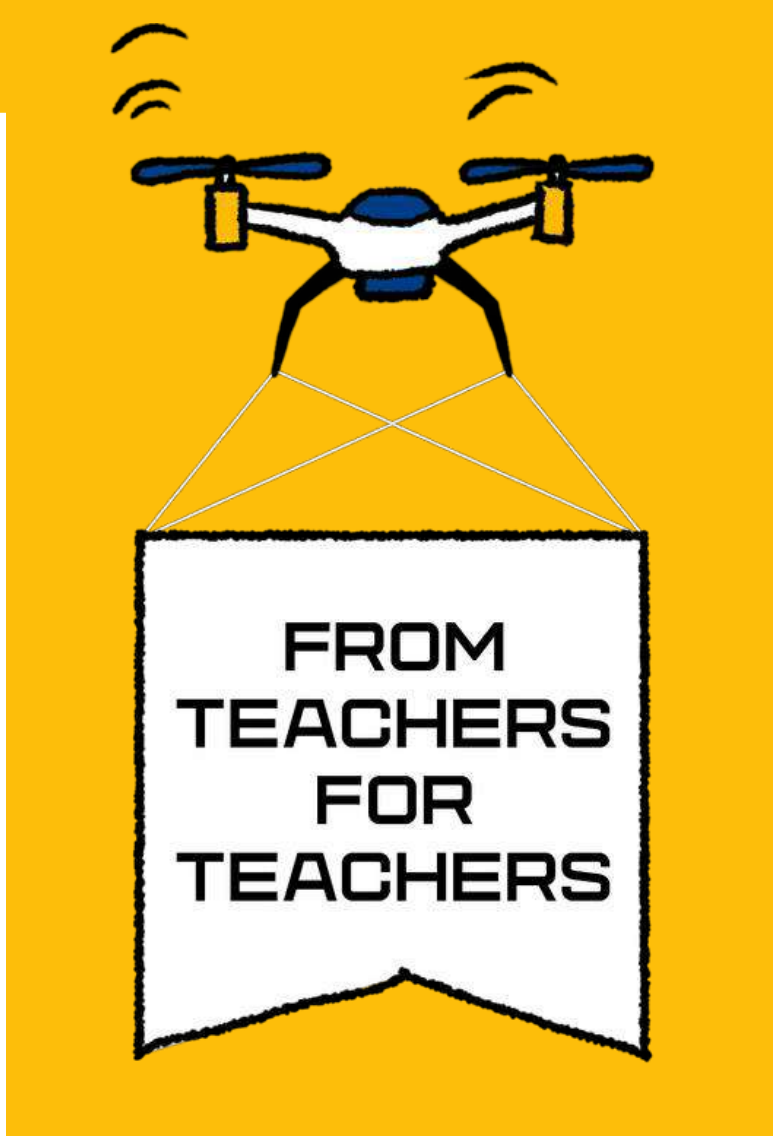
Science experiments using lemons and substances contained in lemons



- 30 experiments using lemons and substances contained in lemons,
- 6 cards information regarding all of the compounds and their chemical and physical properties,
- 30 cards with instructions for the realisation of the experiments and explaining the principle,
- 30 original illustrations with a lemon motif indicating the course of the experiment
- 30 expanding information with an overlap into other scientific fields and school subjects (biology and ecology, geography, food industry, art class, history, technology)





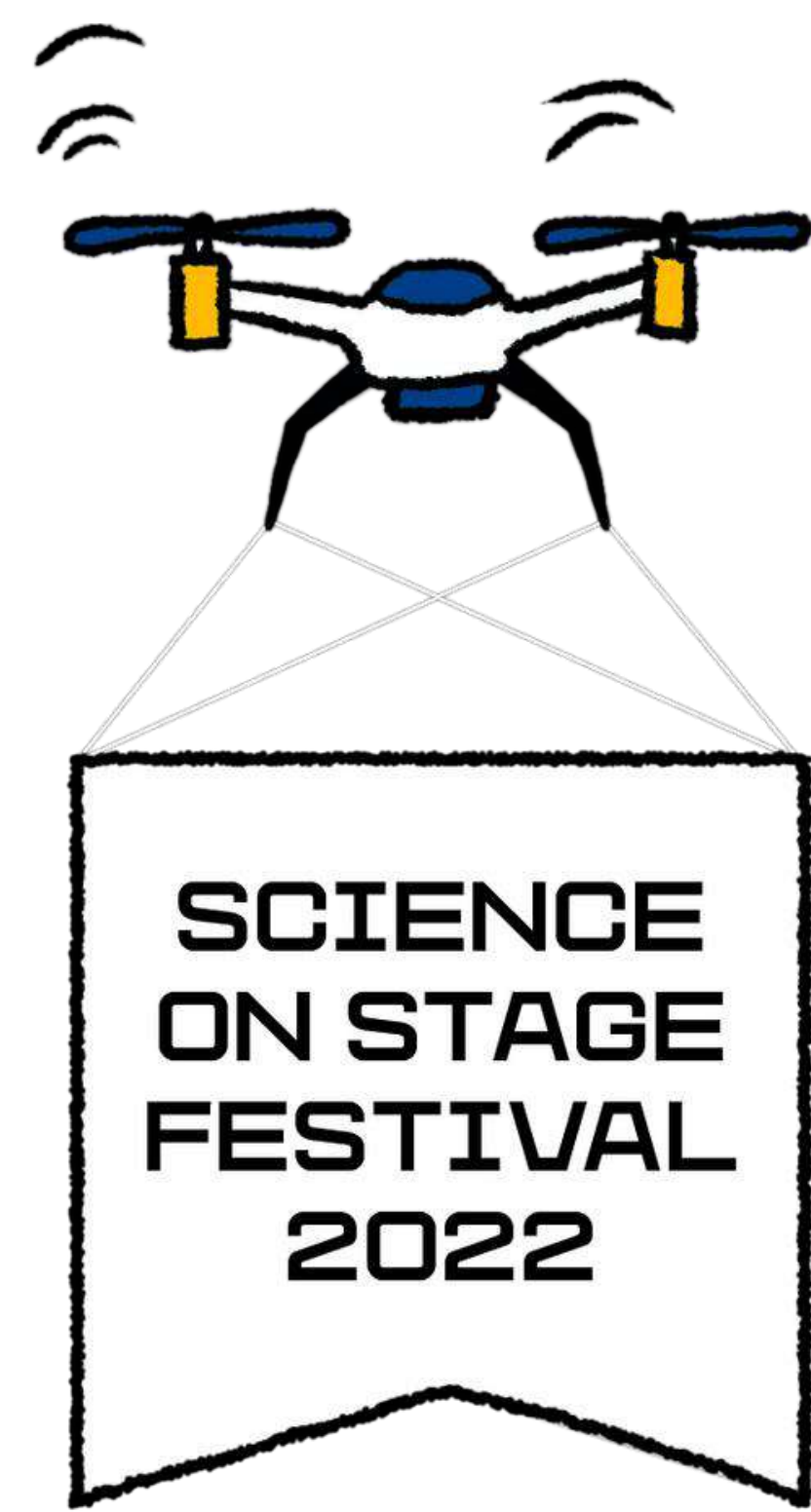
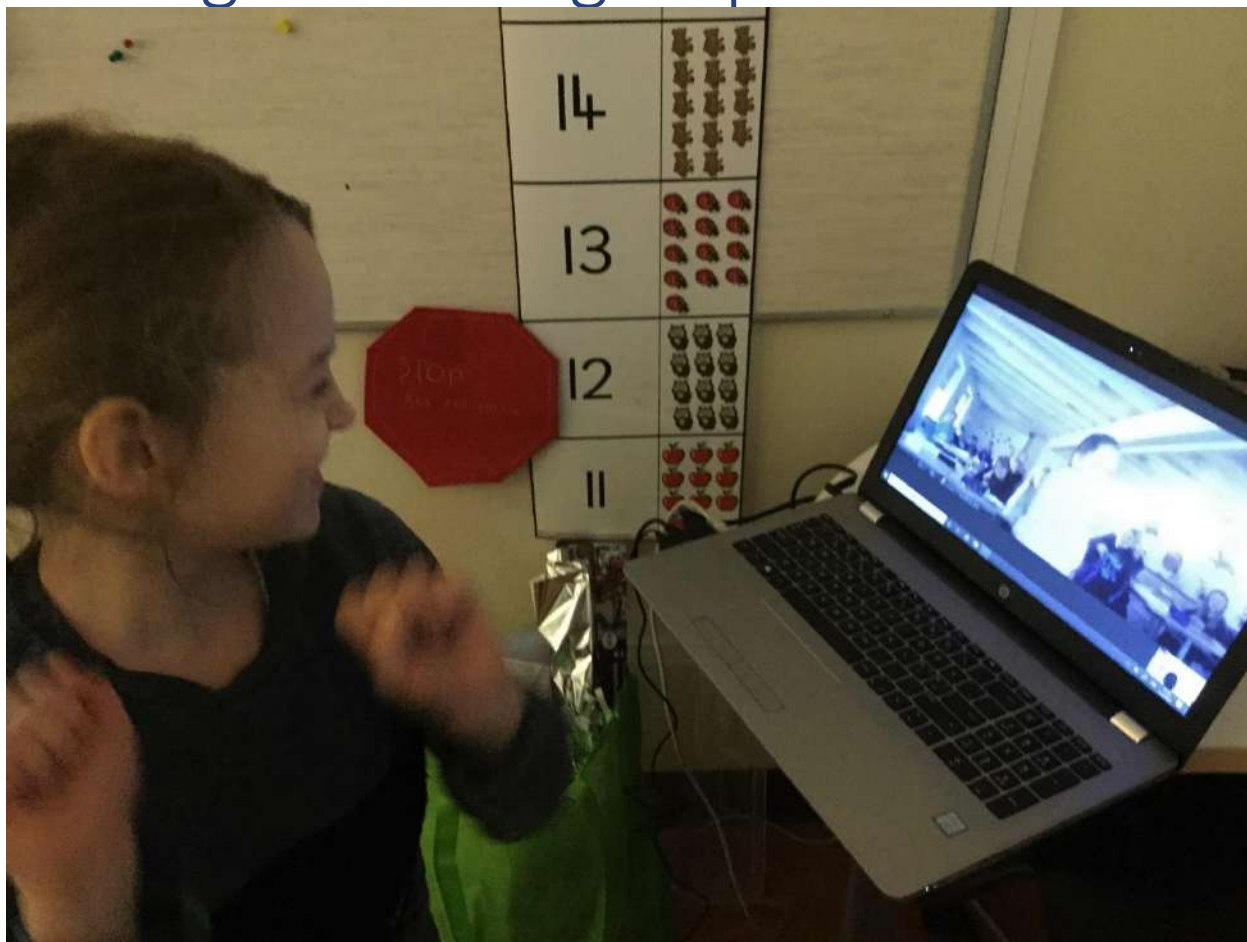


# SCIENCE FOR THE YOUNGEST

Pre primary Taipalsaari Kirkonkylä school | Taipalsaari Finland

## Mirror Experiments and Co-operation

The project starts with collecting the questions of mirrors. The pupils discuss about their answers and findings in small groups at school.

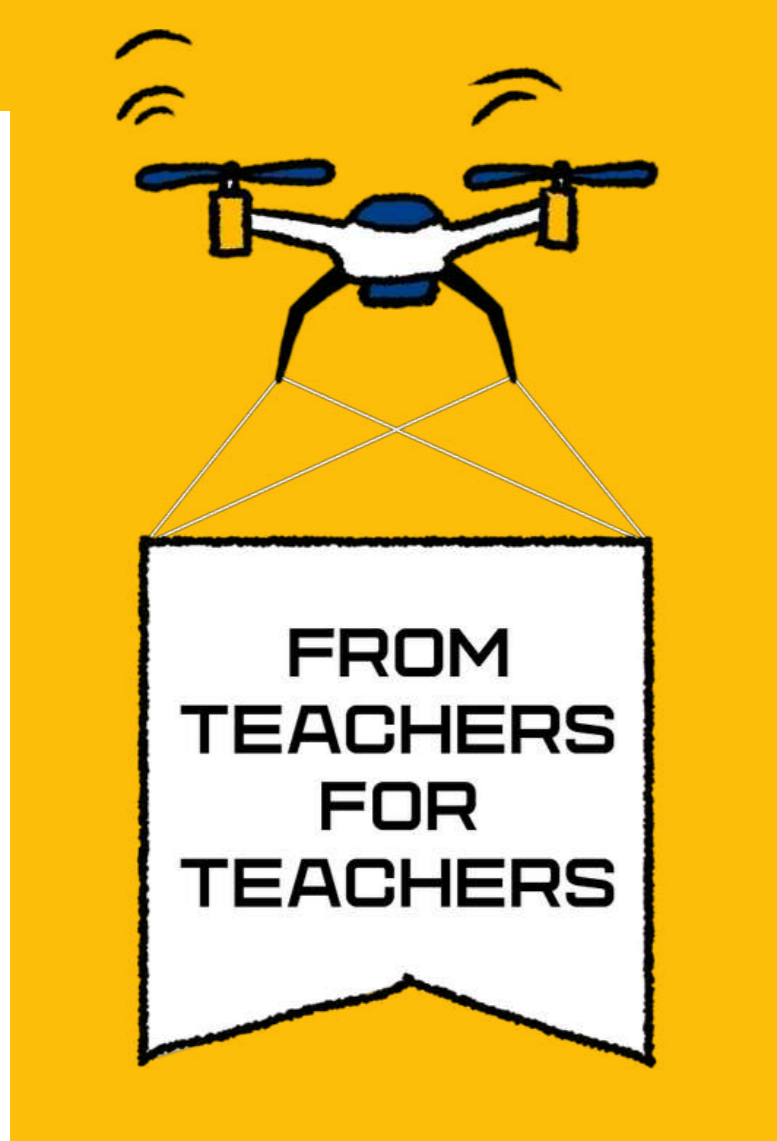


The same tasks are made via Teams/Meet/Zoom with the partner school of Denmark and the pupils can compare their answers. The pupils play a game Be my mirror and show their mirror artwork and periscopes via video so that ideas are shared. When pupils have learnt a lot, they plan an escape room with a story where they can survive with mirror knowledge, problemsolving and teamwork.



Co-operation, problem-solving, creating, science, engineering, art, mathematics, Learn and show what you know inside the Escape-room.





# SCIENCE FOR THE YOUNGEST

ENS de Lyon Biology Department / Ecole d'application Aveyron, Lyon, France

## In the lab coat of a biologist

a science-discovery activity aimed at elementary school children.

**Kids are introduced to the scientific method and tackle gender bias in science.**

This involves visits at the elementary schools, an excursion to the university to perform small experiments and an exhibition at school for the families. **The strong connection between elementary school teachers and researchers allows the development of targeted workshops that are easy to reproduce and discuss in class.**

Last year we had to adapt. We started from a simple question "How do birds survive the winter?" and by studying true (and somewhat crazy) answers that have been proposed throughout history we led the kids to think about the difference between belief and proof.

**All experiments are designed to be safely and cheaply reproduced in class.**

We propose experiments that are doable with cheap everyday material (clay, leaves/twigs, glue, etc), and with insects easy to collect in the countryside (water striders).

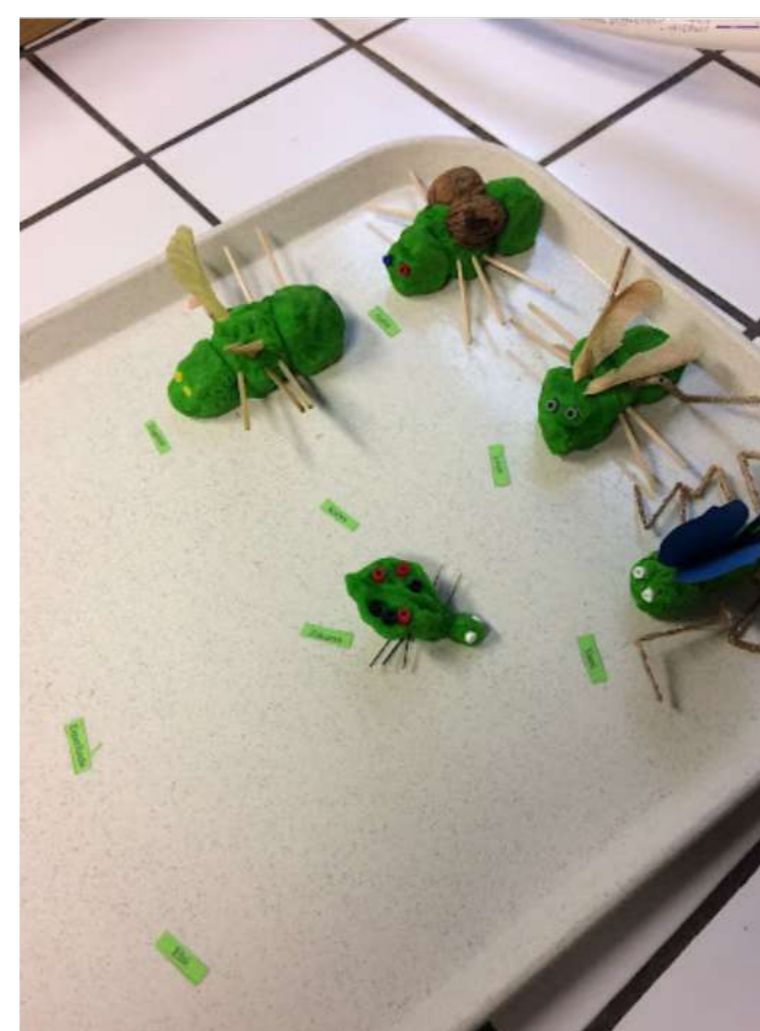
Conclusion: Developing such scientific, poetic and fun workshops for primary school pupils is a useful way to fight the alternative facts epidemic.



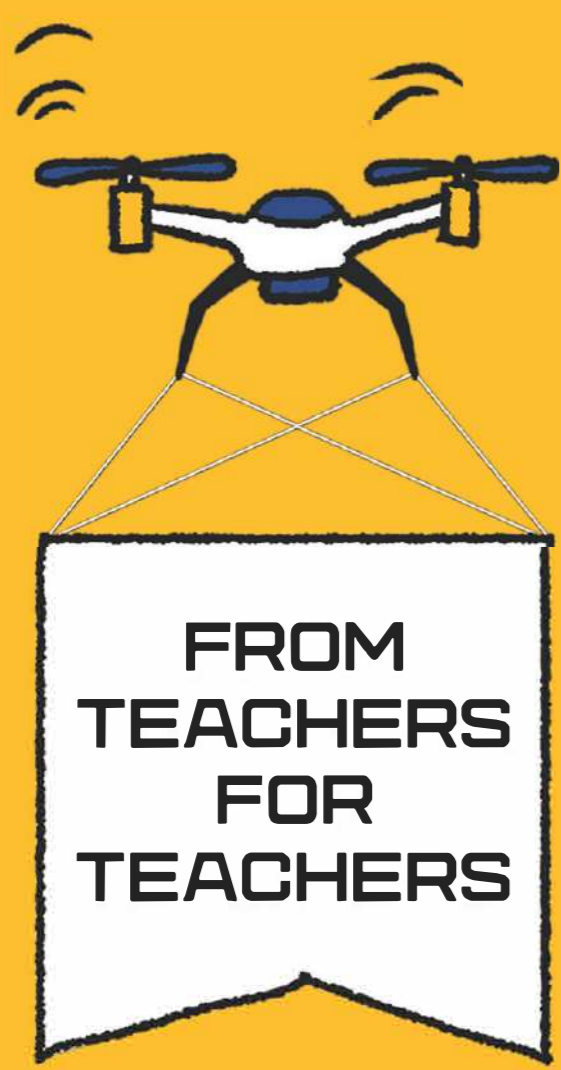
"a scientist in a book"



"a scientist in real life"







# SCIENCE FOR THE YOUNGEST

Inesa Bezhanova | "QarTuli saswavlebeli" | Tbilisi | Georgia

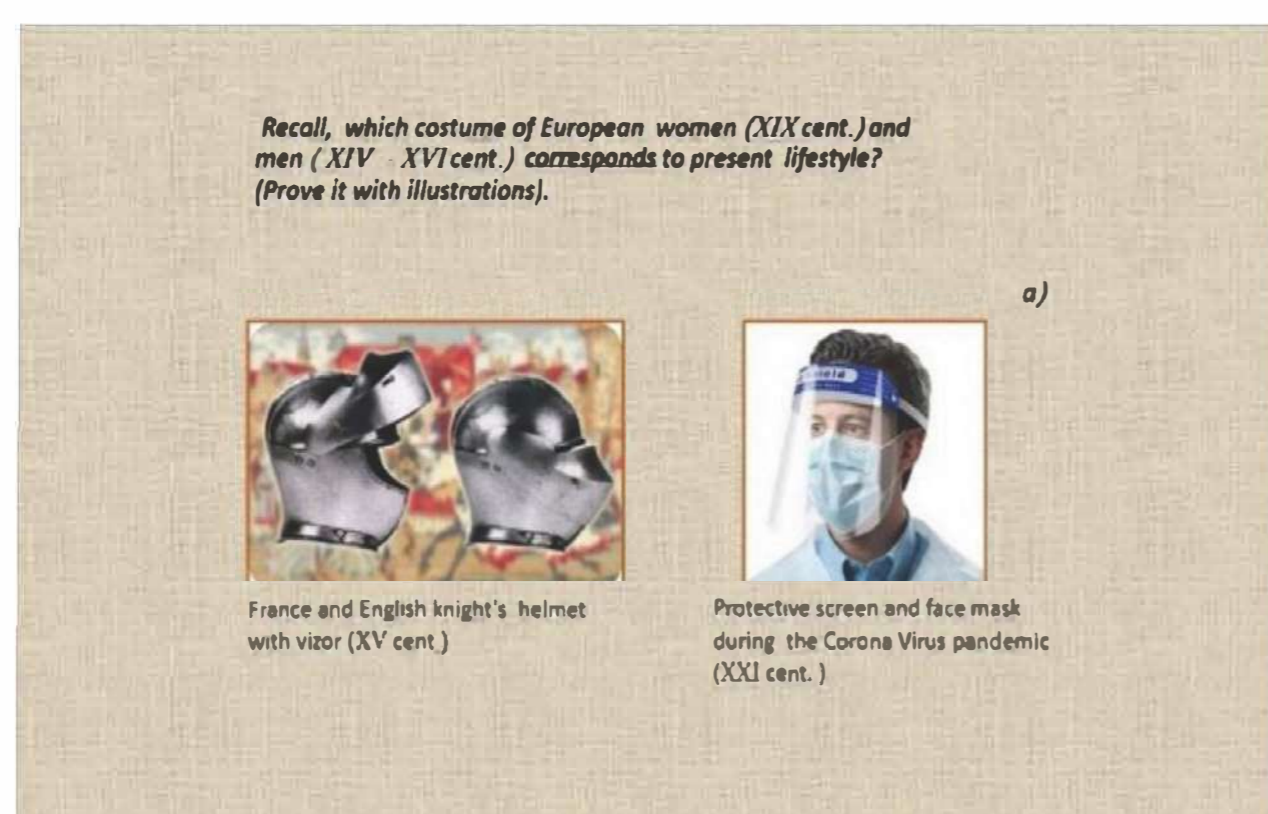
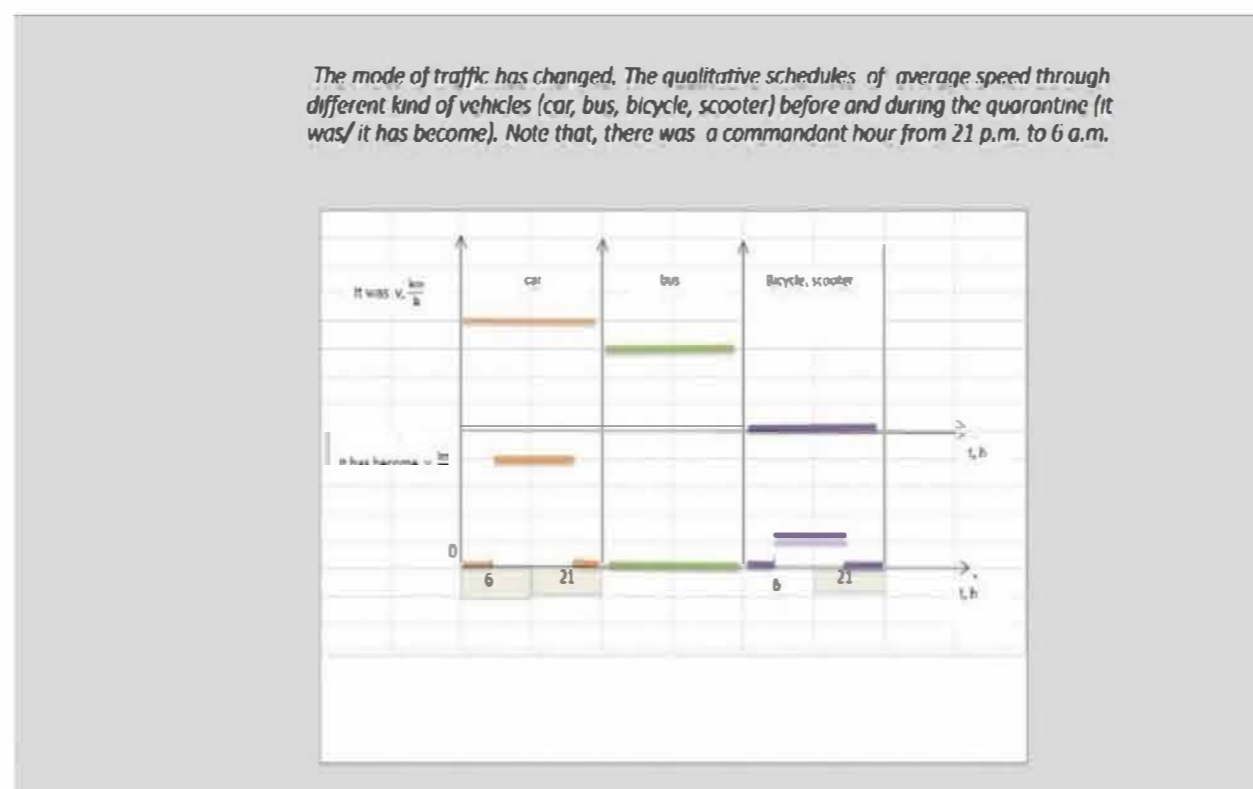
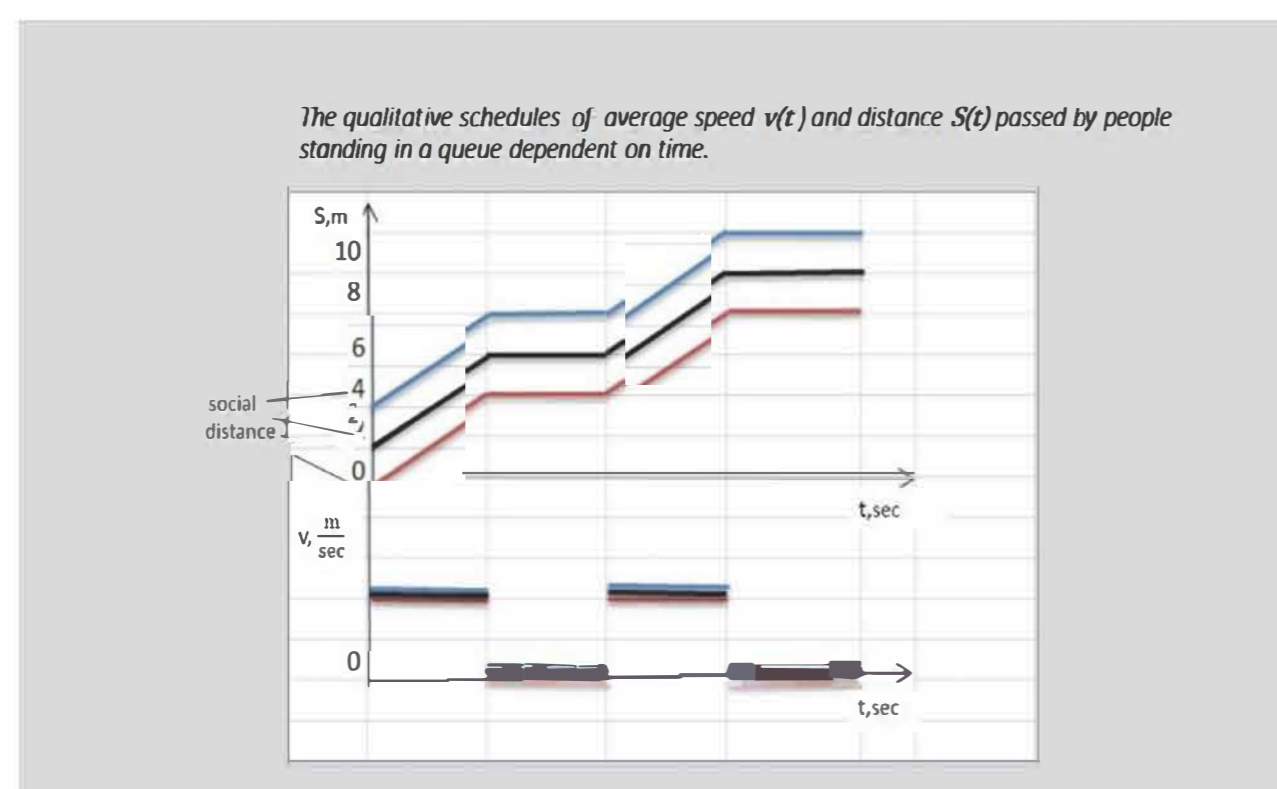
## The city presence during the Covid-19 pandemic, seen through eyes of a 6th grader

Our online project is a clear example of a complex approach. The object of our investigation has become the Covid-19 pandemic itself. We consider pandemic in terms of natural sciences as well as in historical, technical and linguistic aspects. While completing the tasks, we used different approaches, starting with graphic interpretation ending with measurements, through mobile apps. For implementing the project we formed a questionnaire with 20 tasks. Most of the tasks correspond to the competence of the 6th grade (11-13 years-old) student. The best student solutions were included in the final version of the project. The teacher can use any task in practice and as additional material in future projects.



During the pandemic the air has become significantly fresher. Does it mean, that amount of oxygen in the atmosphere has increased?

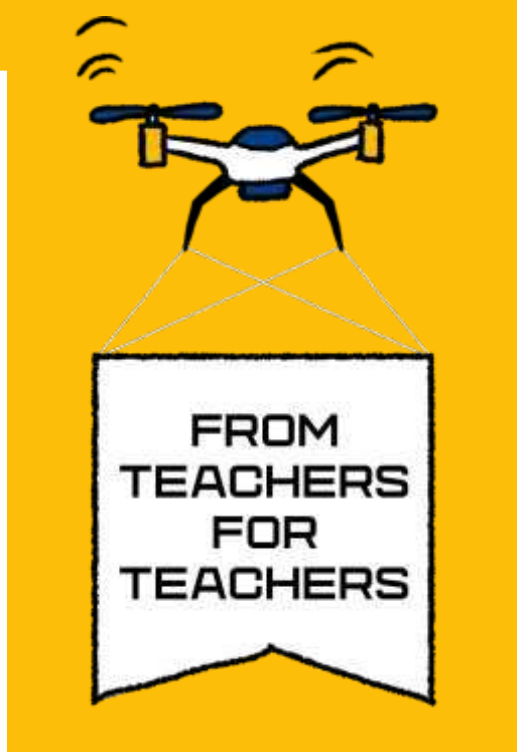
Select the material and create an air composition model (it was/it has become).



“Let’s record the sound “. To do this, use the mobile attachment “Sound meter”. Record the observation results daily 3-4 times a day (one measurement definitely after 21 hours ). Observation period - (17.05.20 – 06.06.20) during the active traffic on the street.

(monitoring results without spectral analysis).





# SCIENCE FOR THE YOUNGEST

Inga Shavadze | Public School no 23 | Tbilisi | Georgia

## Electricity in our lives

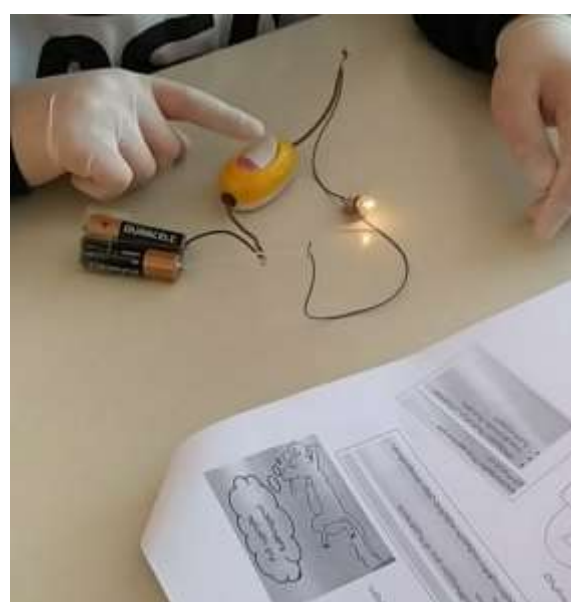
The aim of the project - to arise the student's interest and share the basic principles of electricity.

The project requires:

- Materials:** batteries, lamps, switches, etc and
- Learning guide** - based on the principles of self-learning and learning by doing.



At the end of the project students have created a model of house with simple electric lights.

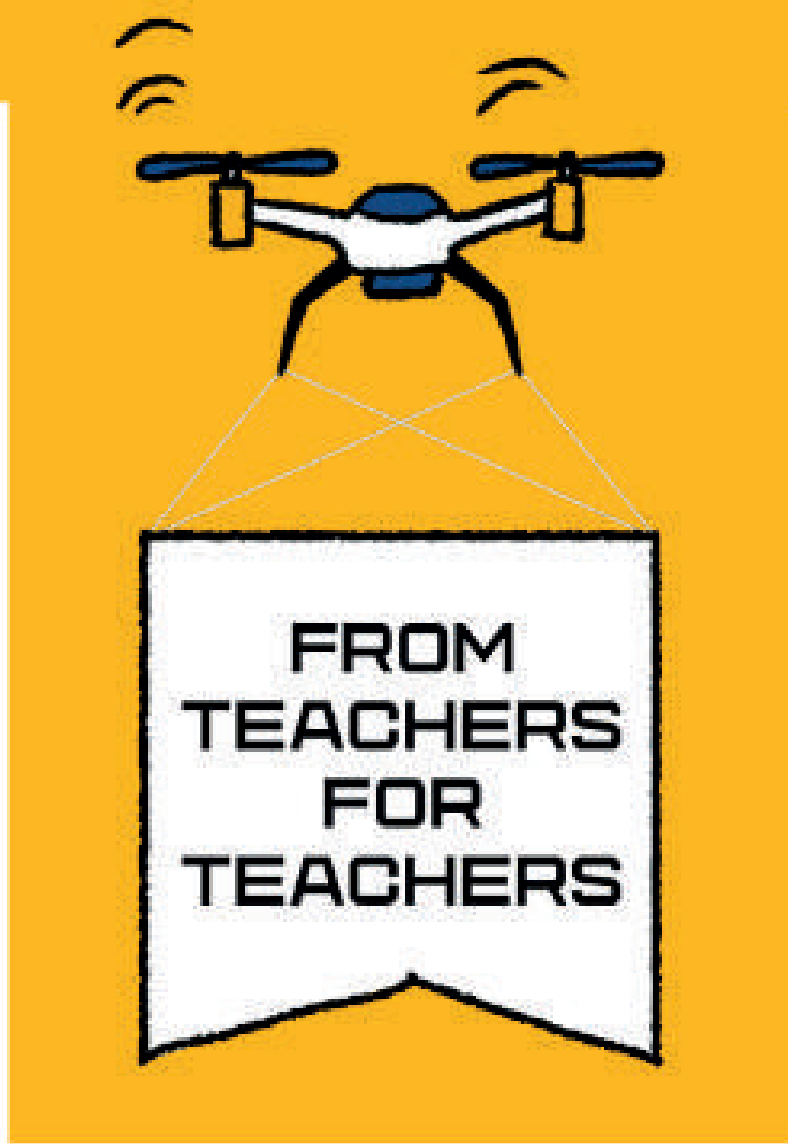


Students develop problem solving, communication and creative skills.



*“Tell me and I forget. Teach me and I remember. Involve me and I will learn”. Benjamin Franklin*





# SCIENCE FOR THE YOUNGEST

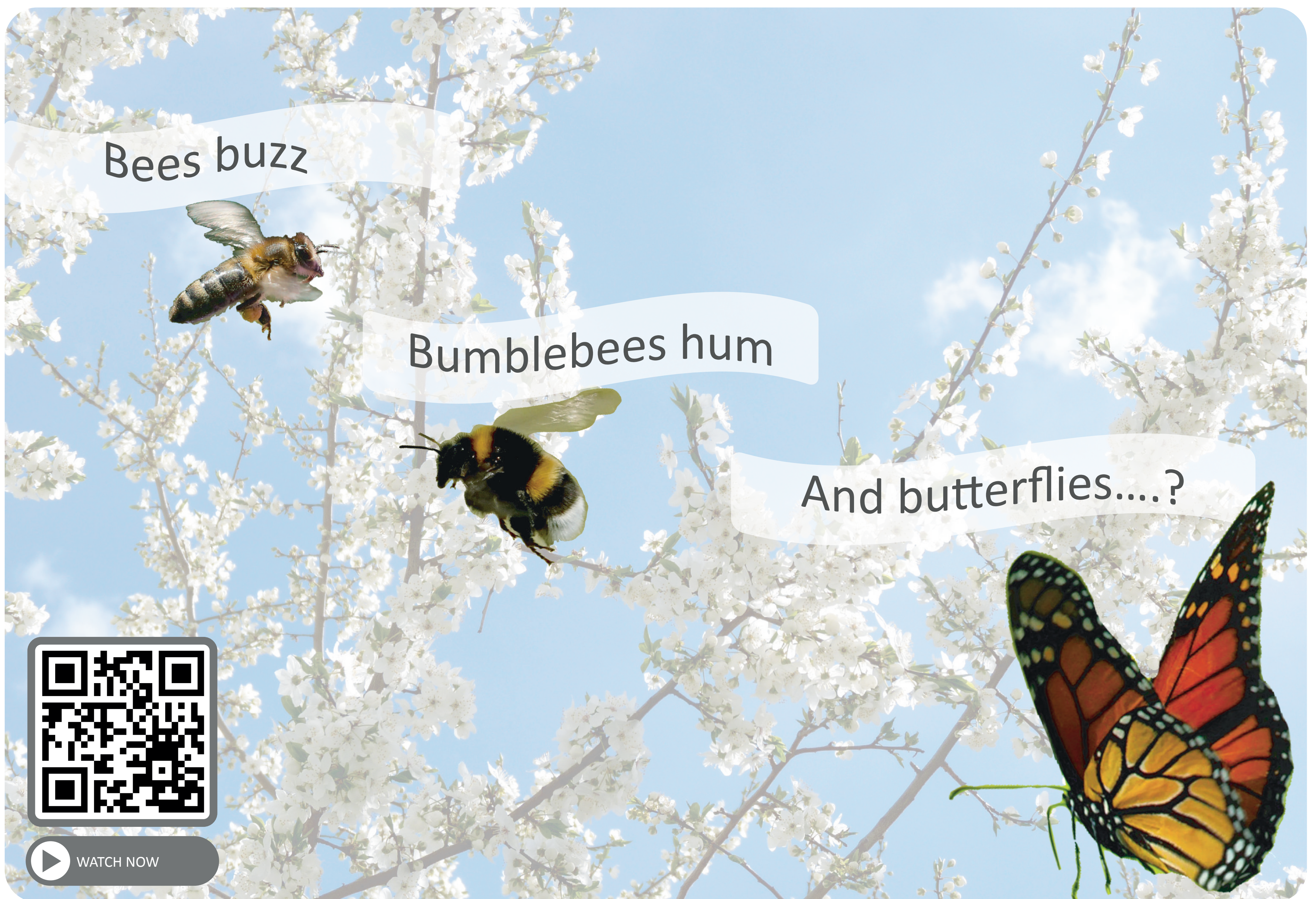
projects for preschool and primary school

Sonja Vochezer | Berger-Höhe Grundschule | Wangen im Allgäu | Germany

Astrid Pösl | Birkendorf Grundschule | Biberach an der Riss | Germany

Project developed by Schülerforschungszentrum Südwürttemberg e.V. | [www.sfz-bw.de](http://www.sfz-bw.de) | Germany

## Children explore acoustic phenomena



### PERCEIVING SOUND

Everything I can hear is sound.



### GENERATING SOUND

For a sound to occur something has to vibrate.

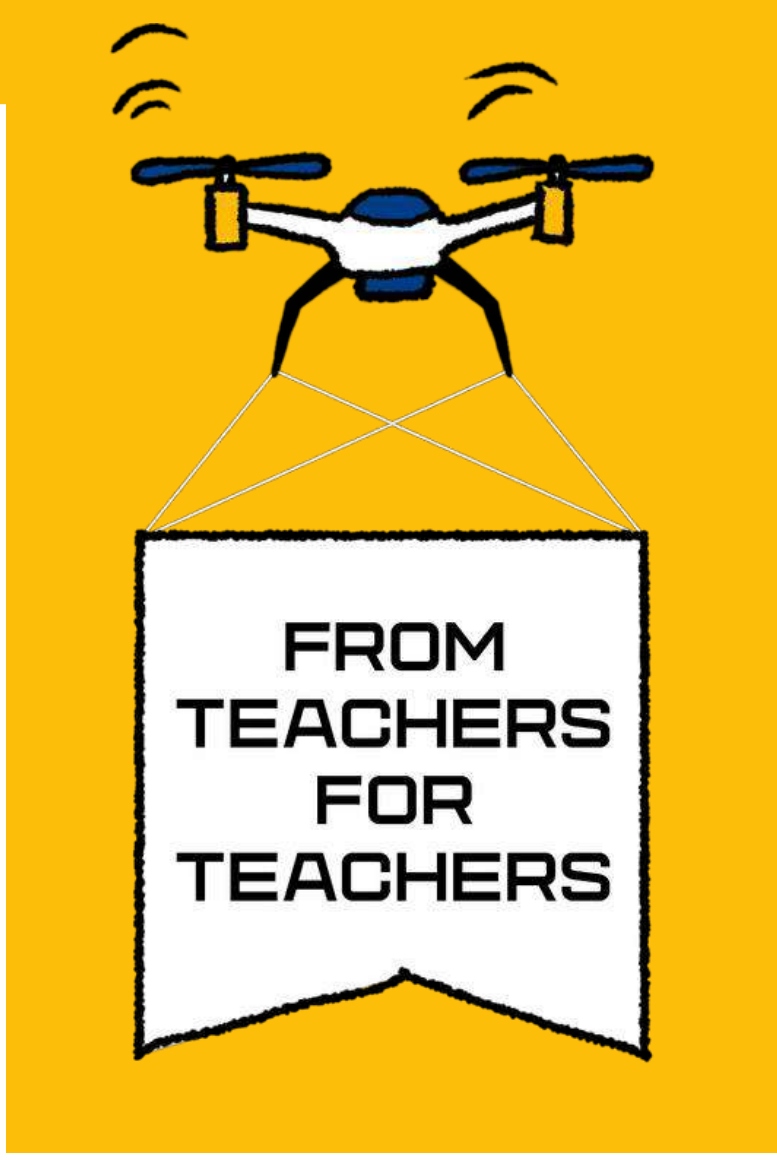


### EXPLORING SOUND

Air, water and solid materials can transmit the sound.



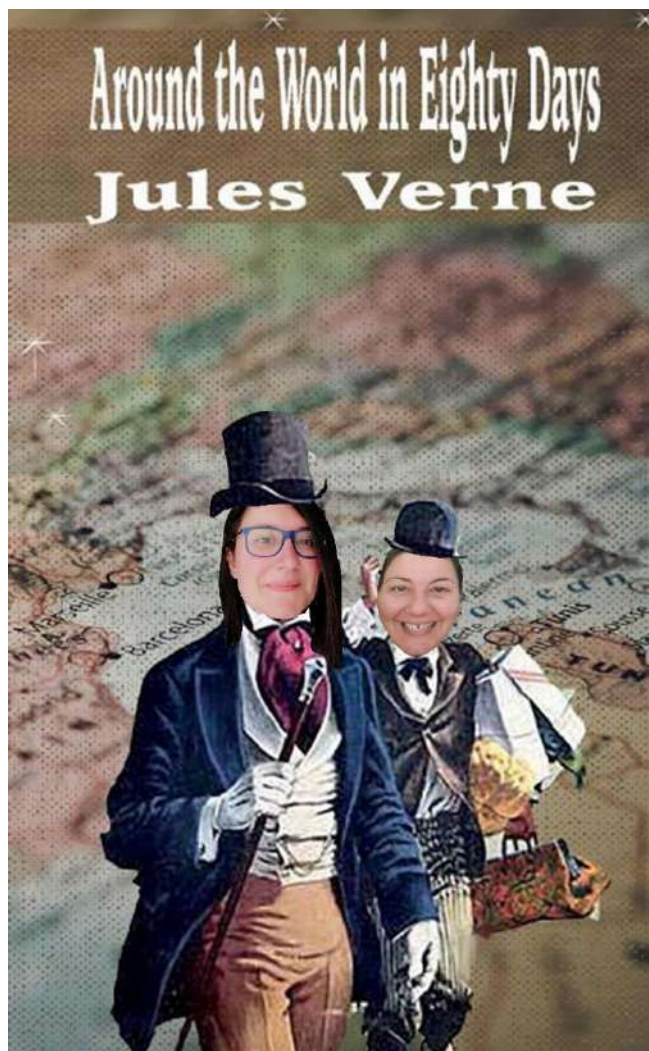




# SCIENCE FOR THE YOUNGEST

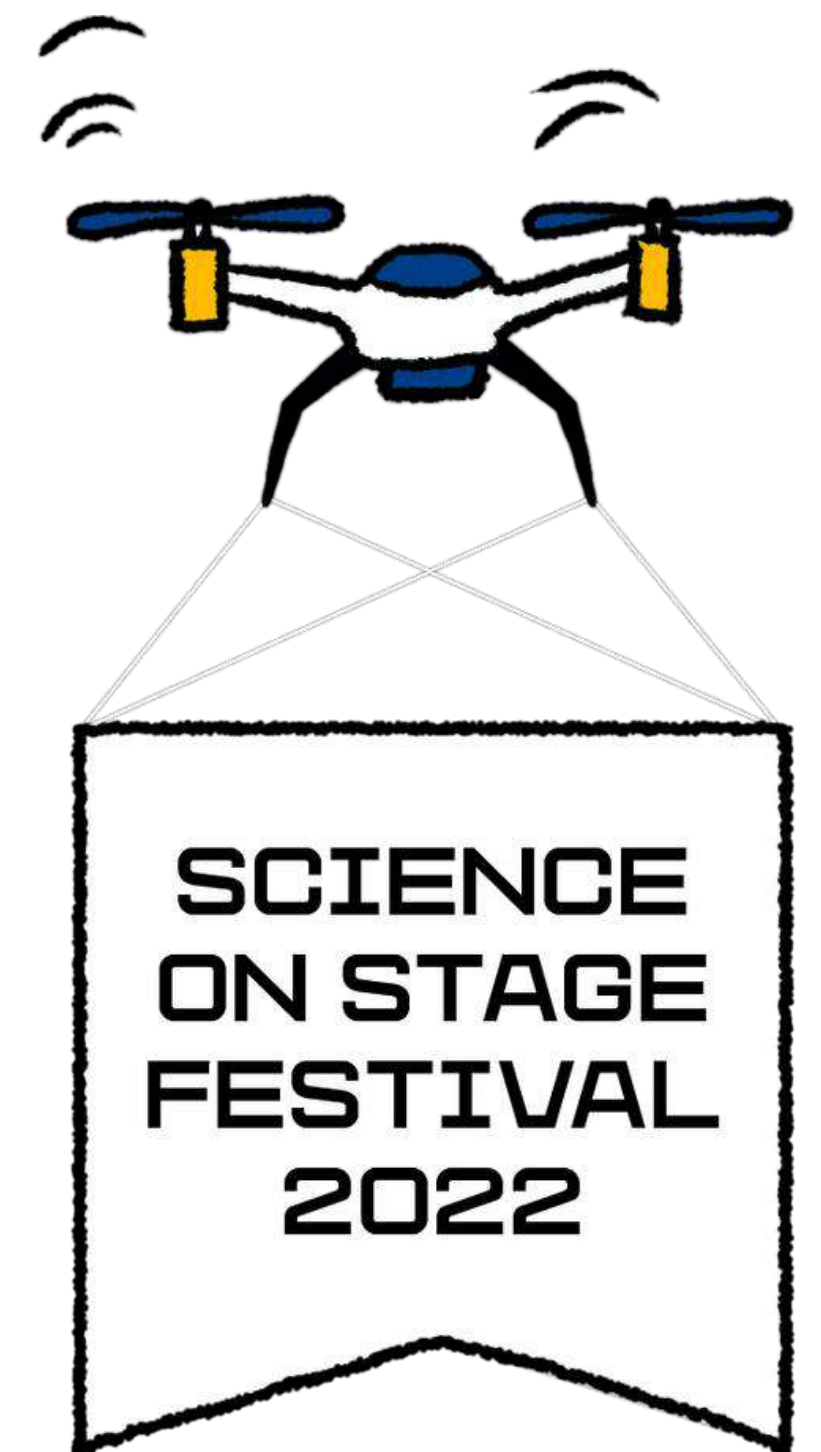
Angeliki Samanta | 48<sup>th</sup> Primary School of Athens | Athens | Greece  
Evangelia Samanta | 3<sup>rd</sup> Gymnasium of Langada | Thessaloniki | Greece

## Phileas Fogg in the 21<sup>st</sup> century



“Phileas Fogg in the 21<sup>st</sup> century” is a **STEAM**, multidisciplinary (Physics, Geography, Math, Literature, Art) educational suggestion.

Based on the classic book of Jules Verne “**Around the world in 80 days**”, it was attempted, using inquiry-based activities to deal with the *rotation of the earth*, the *day & night cycle*, the *time zones* and the *technology evolution* over the years.



This project included the following activities:

- ✓ **Studying** Jules Verne’s book “Around the world in 80 days”, noting **locations and dates**.
- ✓ **Making a list** of things needed for a trip around the world **now and then**.



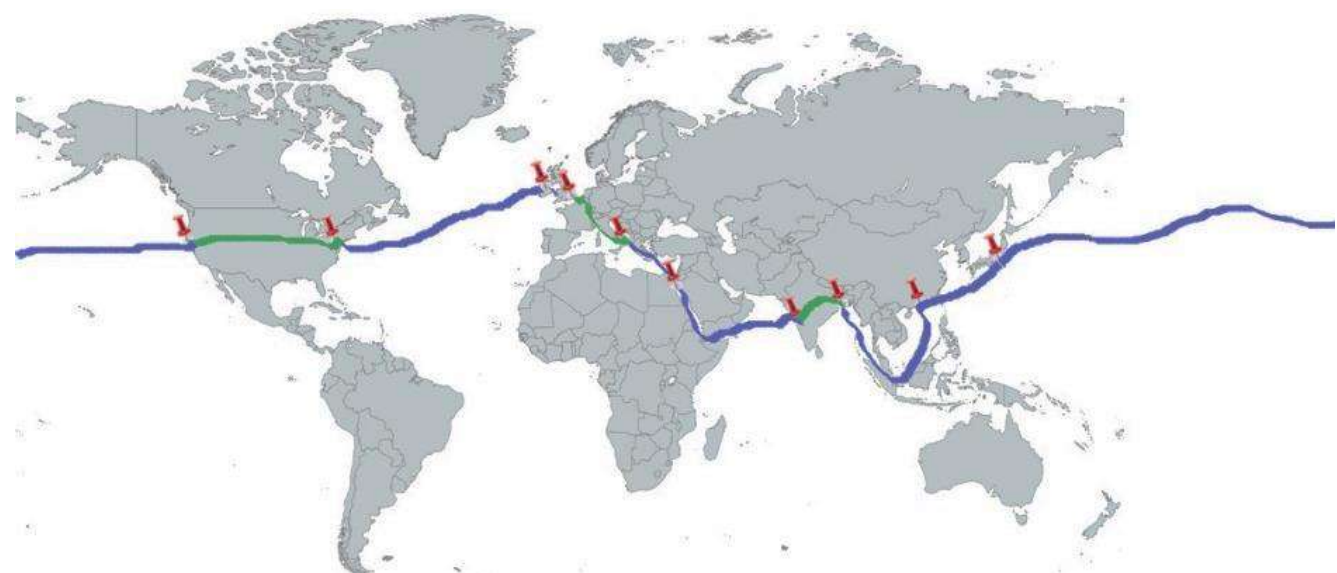
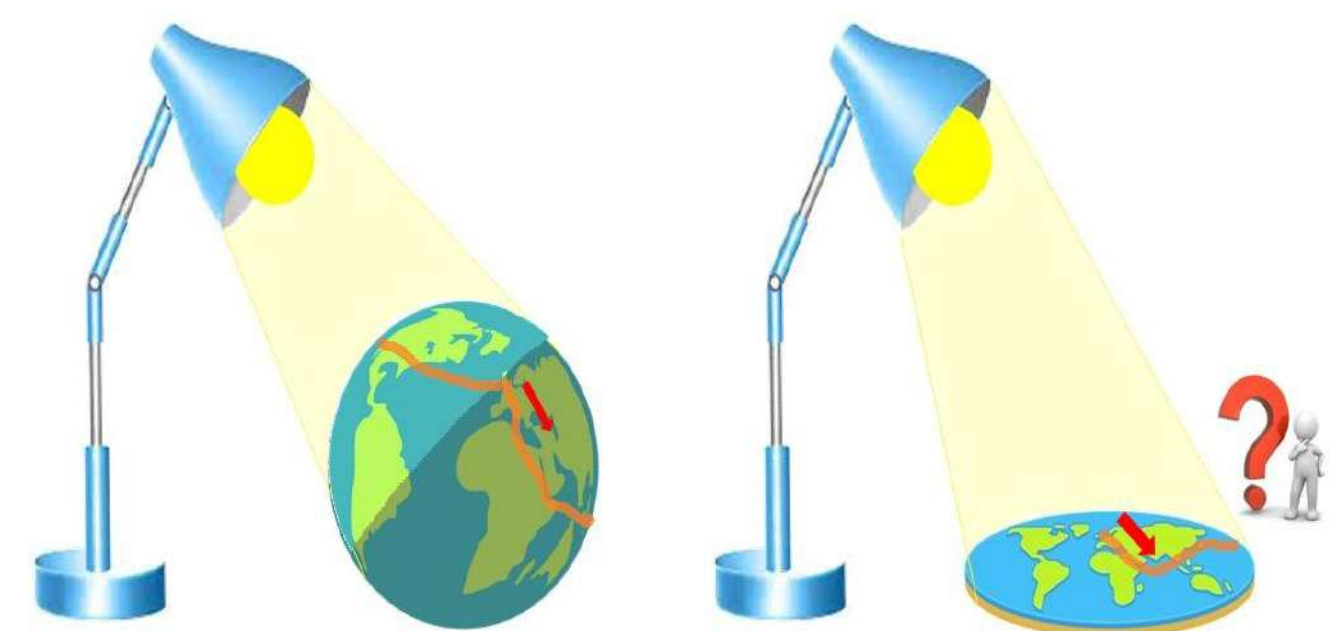
- ✓ **Construction** of a 24hour analog clock



- ✓ **Finding** Phileas Fogg’s **place** on the globe and map



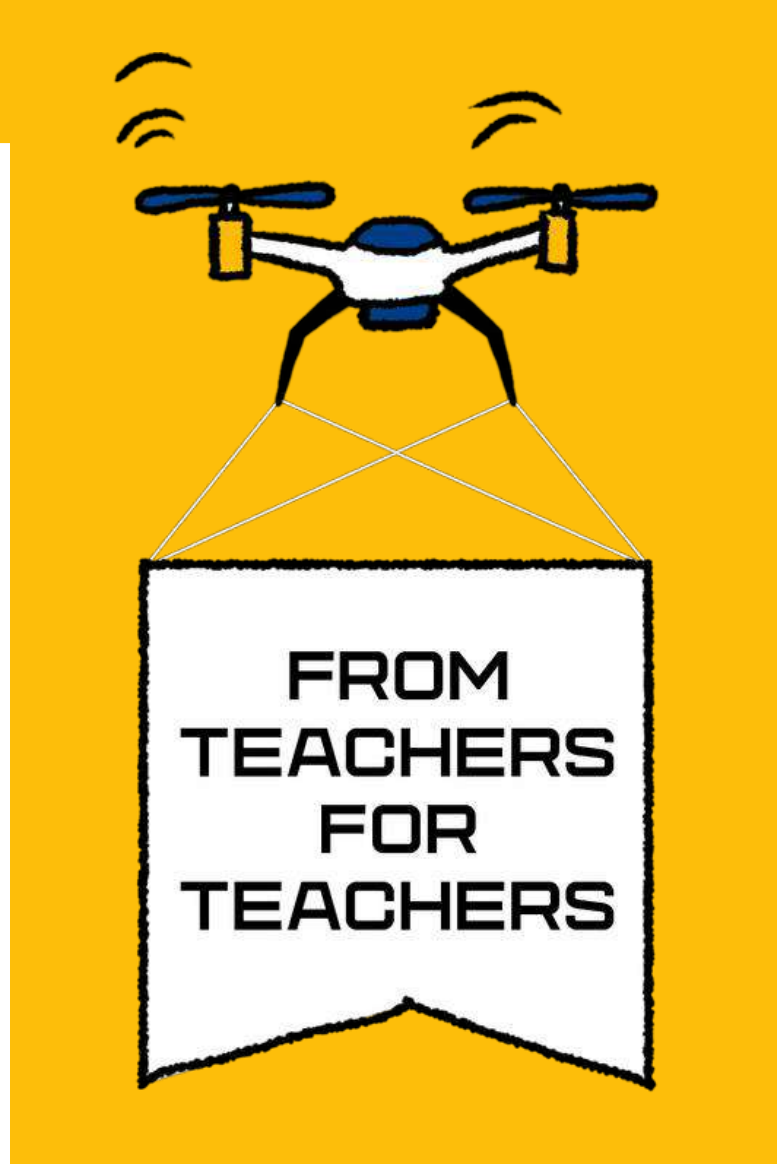
- ✓ **Experiment** in order to show that Phileas Fogg was not a flatearther.



*Note: This project started occasioned by the European Union’s decision to stop the change of summer and winter hour on October of 2021. Due to the covid pandemic, it was decided to consider this change after its ending.*

Using literature in order to teach and clarify scientific terms may be very interesting and exciting!





## SCIENCE FOR THE YOUNGEST

Rukiye Akyol | Denizciler Mustafa Kemal Primary School | Hatay | Turkey

# DISCOVERING STEM IN NATURE

Children in Nature, Stem in Nature



**Project Goal:** Our students both learn STEM and spend time in nature in early childhood.

**Project Purpose:** Children's discovery of STEM in nature. Studies were carried out on 4 main themes. Stem's 5E rule was applied to each tema separately.

### 1-Learning Stem from Waste

Our problem situation was determined as the pollution of wastes to the environment. Recycle bins were built to collect waste. A robot was designed to clean the environment. Our criteria are that the robot is made of waste materials, that at least 1 natural material is used, that it has a container where it can put the wastes and that it can stand.



Design Product



Design Product

### 2-We Learn Stem From Plants

The problem was determined as the harm of chemical dyes to people. A color chart was created from plants, vegetables and fruits. Natural dye was created from plants as a design product. Paintings were made by children with natural dyes. Our criteria is to form paint by squeezing and crushing without boiling.



Design Product

### 3-Learn Stem in Water

The decrease in clean water was determined as the problem situation. The water cycle experiment was carried out. As a design product, a device was designed to clean dirty water. Our criteria is that this instrument is designed with natural materials.



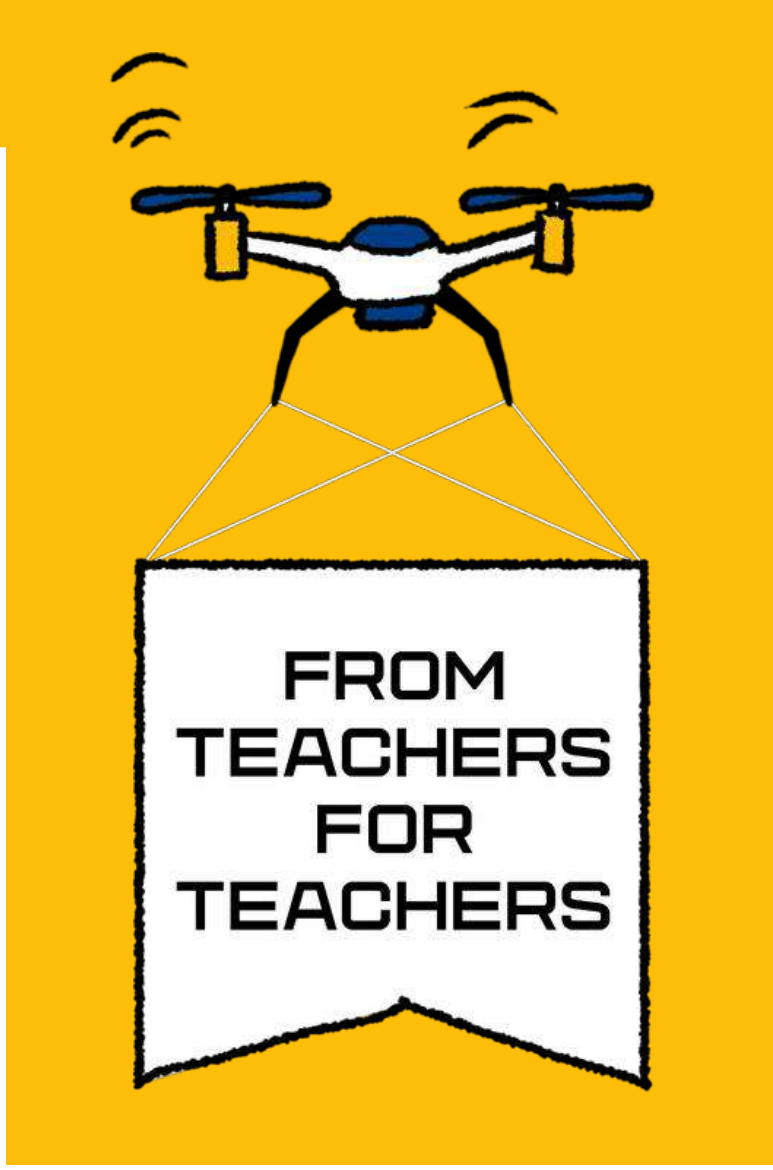
Design Product

### 4-We Learn Stem from Animals

The extinction of some animals has been identified as a problem situation. It was investigated what can be done to prevent the extinction of animals. A conservation area was created for the endangered stag beetle. Our criteria is that it is a protected area that will be suitable for the living conditions and diet of the stag beetle.

In the Animals section, we noticed that there are a lot of different endangered animals. We have determined that this section is open to development. We should reach more students with projects on environmental pollution and protecting nature.





# SCIENCE FOR THE YOUNGEST

Olha Doskochynska | Lyceum named after Puliui | Lviv | Ukraine

## Our Trip on Mars

The project integrates STEM subjects and demonstrates innovative approach to the elaboration of creativity and competitive skills by means of hands-on experiments with lego.

During the project teachers engage pupils in STEM-based activities, they are provided with better information and support them with knowledge useful for their future education.

Considering the mechanism and the motion of the rocket model, pupils can get inquiring to the momentum conservation law in an original and entertaining way. They can also create and design their own rover robots.

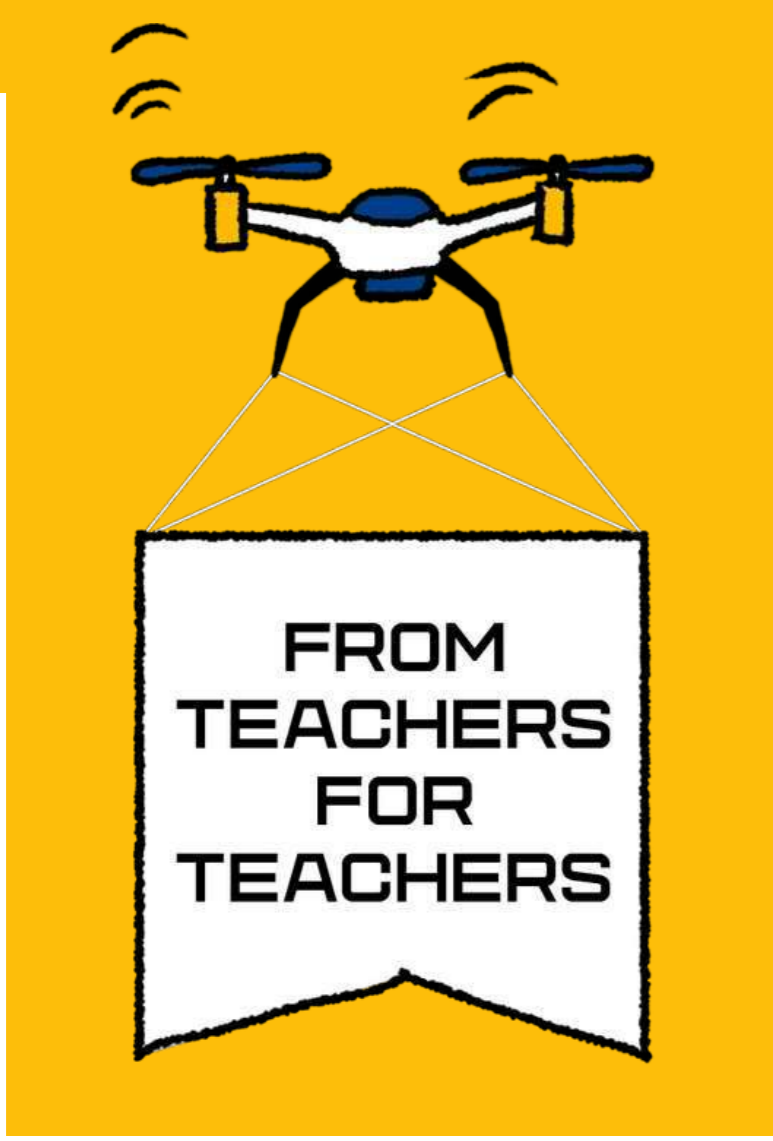


This project has integrated STEM subjects, supporting the development of pupils' hands-on activity and constructivism. We have provided our students with more information and their future learning skills would be deeply social, student-oriented, personalized and technological.

This teaching technique was successfully used at physics lessons. Considering the structure and motion of the rocket has helped to deepen students' knowledge about conservation of momentum law and to reveal the idea of Ukrainian scientists about space flights. Models of rockets and rover robots have been designed by pupils.

This Project helps Generation Z develop their hands-on skills, 3-D imagination and creativity.





# SCIENCE FOR THE YOUNGEST

Oksana Okulova | Ivano-Frankove secondary school | Lviv | Ukraine

## Developing Students Motivation by Means on Entertaining Temperature and Heat experiments.

Increasing students interest to learn science has always been a challenging task for most secondary school teachers. It is wellknown that lots of STEM teachers haven't got enough experimental skills and knowledge for that. And another barrier is difficulties connected with remoted teaching and learning. The project demonstrates some entertaining Chemistry and Physics hands-on experiments with detailed descriptions of how they can be used at the lessons. Some of them such as experiments with a medical mask, Global Warming Experiment, concerning heat and temperature: reefs, volcanoes, crystals - can be easily repeated and have been done with the accessible and low-cost materials.



Endothermic, Exothermic Reactions



Experiments with a medical mask



Plastic snow



Winter experiment with ice



The convention current experiment



Crystals

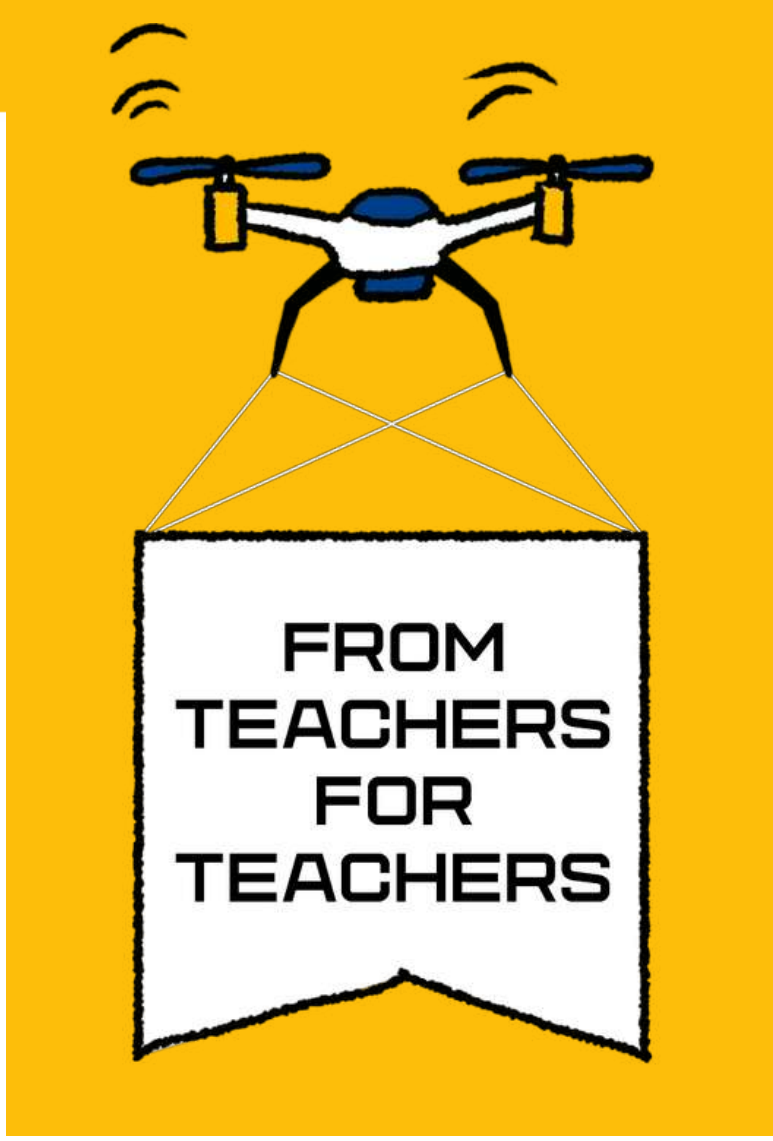


Booklet

Using experimental demonstrations at the lessons can seriously increase the students motivation to learn a really difficult subjects like Physics and Chemistry, the experiments, elaborated in the project are visual and wonderful and demonstrate the real beauty of STEM disciplines.

Conclusion: The project includes STEM activities that combine different subjects (chemistry, physics). The work resulted in the mastering of new knowledge and abilities at the basis of the certain research problem realization. Experiments can be used as at the STEM lessons and also after them. They give possibility for the teacher to explain the science laws easilier.





# SCIENCE FOR THE YOUNGEST

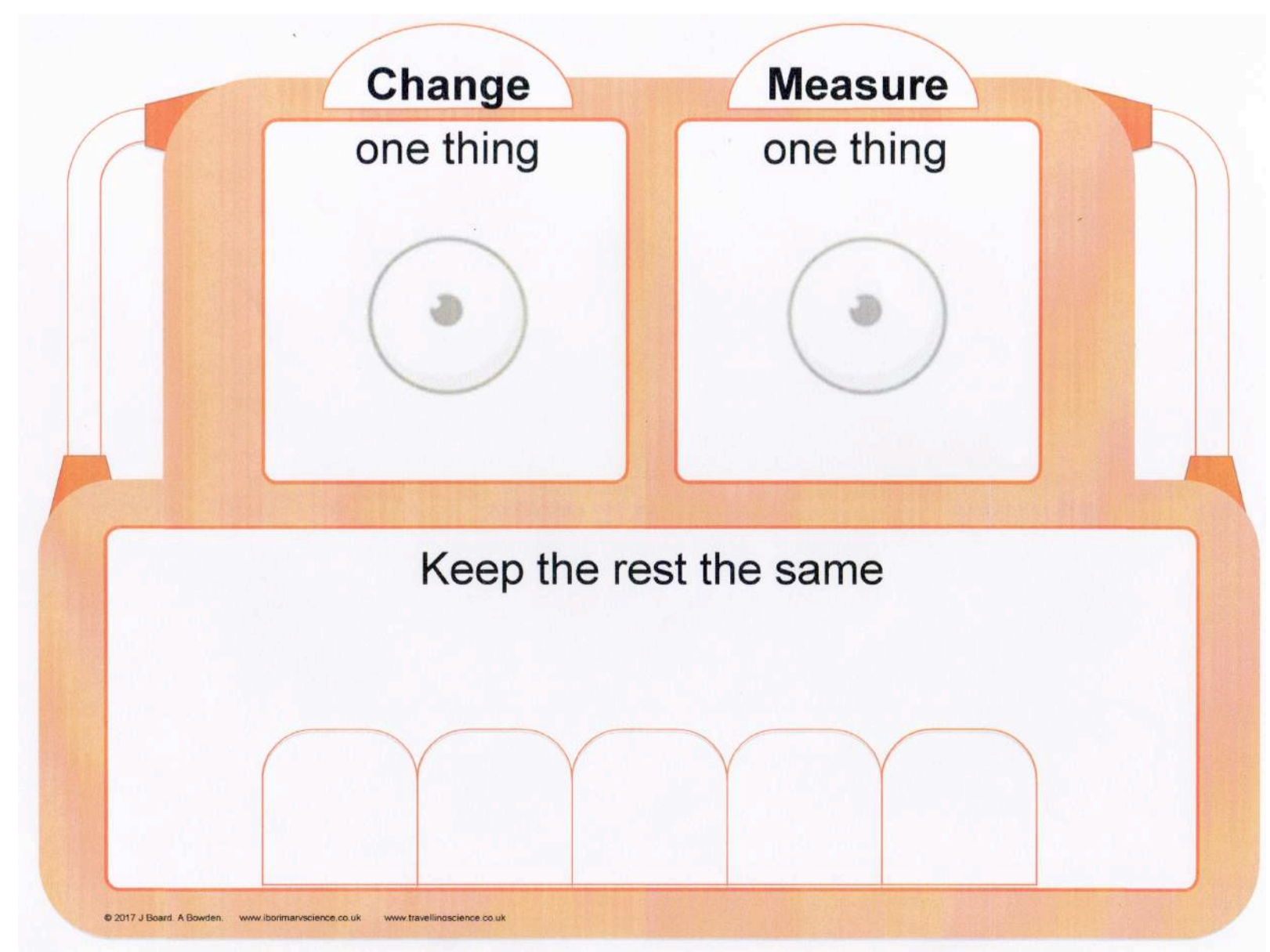
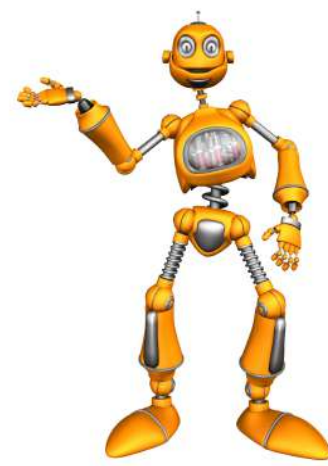
Mr J Board | Mauldeth Road Primary School | Manchester | UK

## Fair Test Fatima

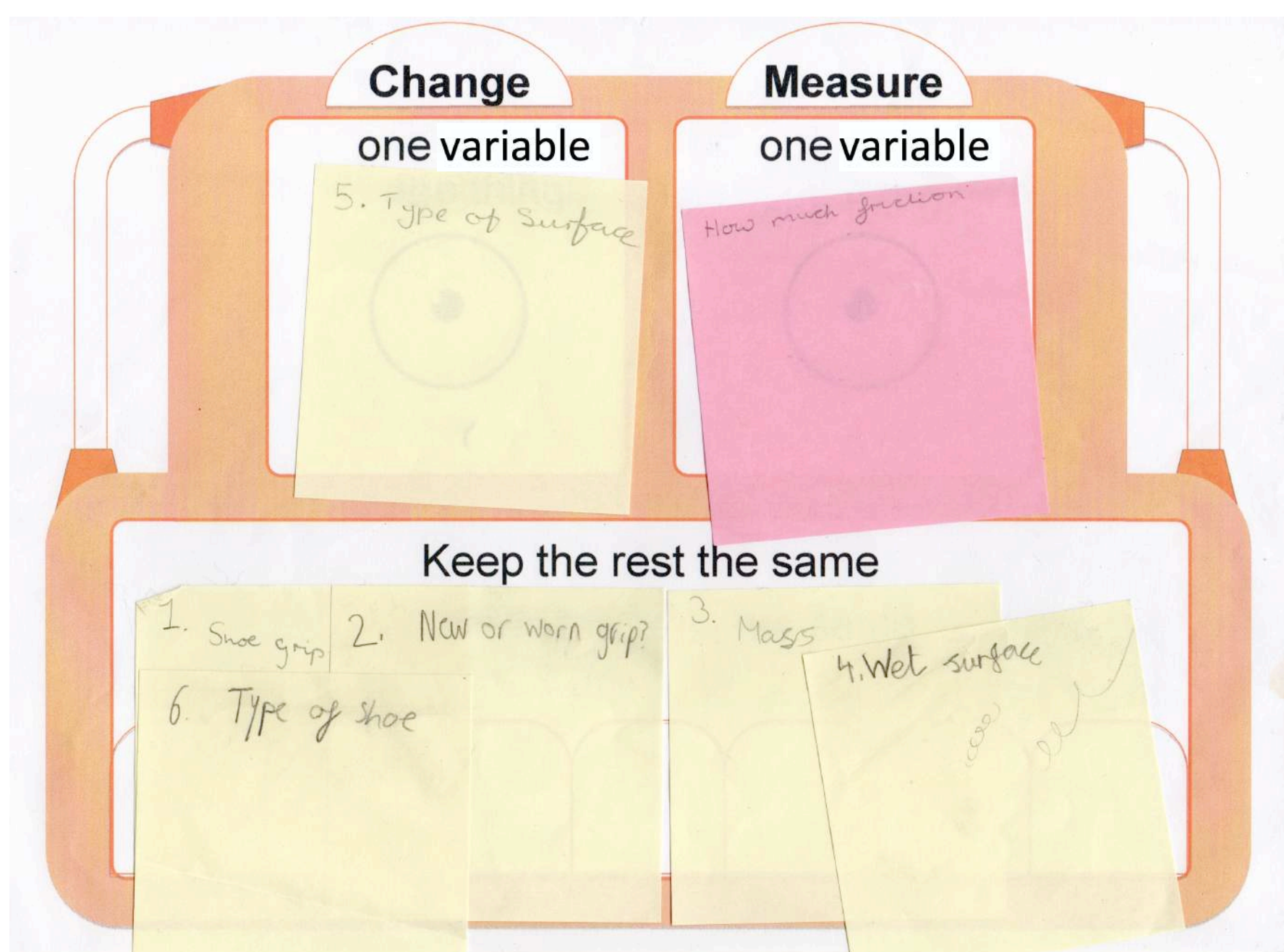
A simple algorithm to develop primary child-led science

At Mauldeth Road Primary School we use a super-simple algorithm to help children plan their own fair test investigations. It works with even the youngest children.

Change one thing  
Measure one thing  
Keep the rest the same



At our school, the algorithm is introduced by an orange robot called Fair Test Fatima. Children enjoy repeating the algorithm in a robot voice.



Children can plan their own investigation by choosing which variable to change.

We have developed the idea into animated slideshows, sticky-note planning sheets and investigation worksheets that ensure a child-led approach to investigations. In the 7 to 11 age range, we introduce the word 'variable' to replace 'thing'.

### Could this work in your school?

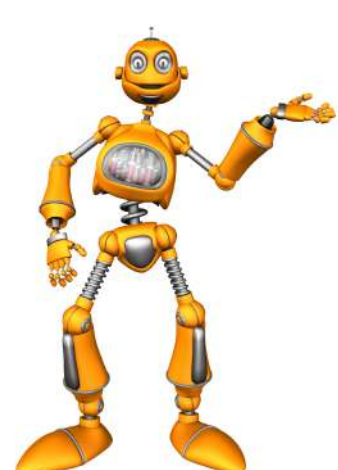
The algorithm is easy to translate if you want to use it in a different language. Here it is in Czech.

Změňte jednu věc

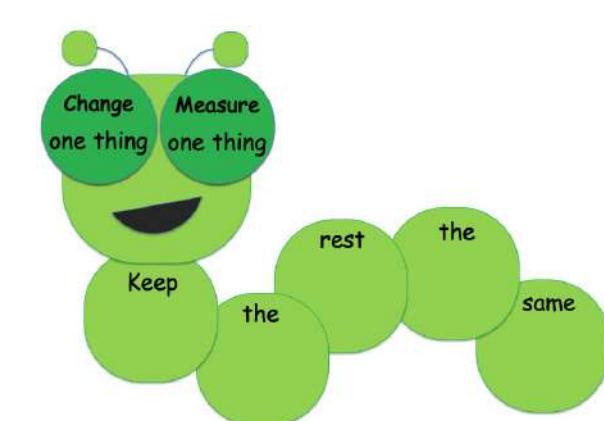
Změřte jednu věc

Zbytek zachovat stejný

You could even change the robot for a different character to suit your own school. For example, some UK schools are using a 'curious caterpillar'.



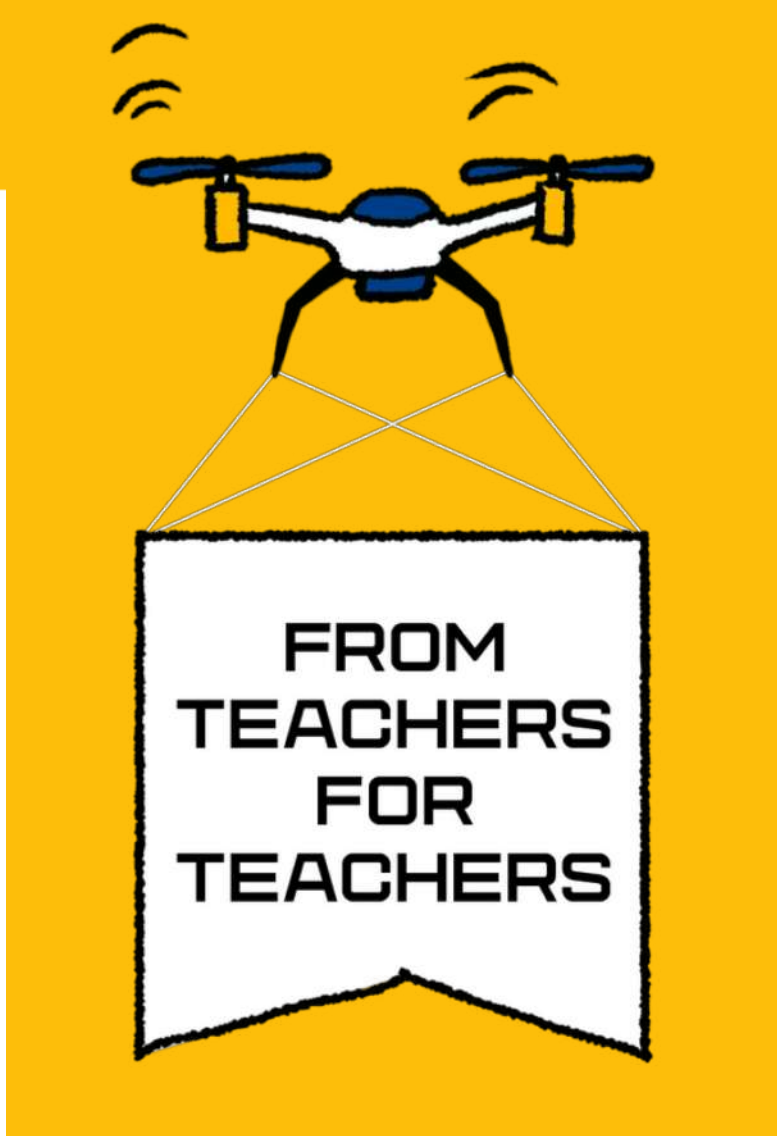
You can download Fair Test Fatima resources for free from [www.jbprimaryscience.co.uk/working-scientifically](http://www.jbprimaryscience.co.uk/working-scientifically)



Fair Test Fatima was developed by Mauldeth Road Primary School in collaboration with The University of Manchester.







# SCIENCE FOR THE YOUNGEST

Rebecca Riley | Horbury Bridge (CE) Academy | Wakefield | United Kingdom

## Scientist's Storytime

Children step in to stories and become REAL scientists!

Children's stories are exciting and creative, just like science! This project allows children to enter imaginary worlds and complete STEM challenges alongside their favourite book characters. By becoming STEM professionals, they can use their science learning and practical skills in context and find out about the different careers available to them.

Using drama method 'Mantle of the Expert' allows children to become part of stories instead of standing on the outside looking in. It can be adapted to suit any age, setting or curriculum.

Pick an age appropriate novel

Devise STEM challenge(s)

Children become STEM professionals (Experts)

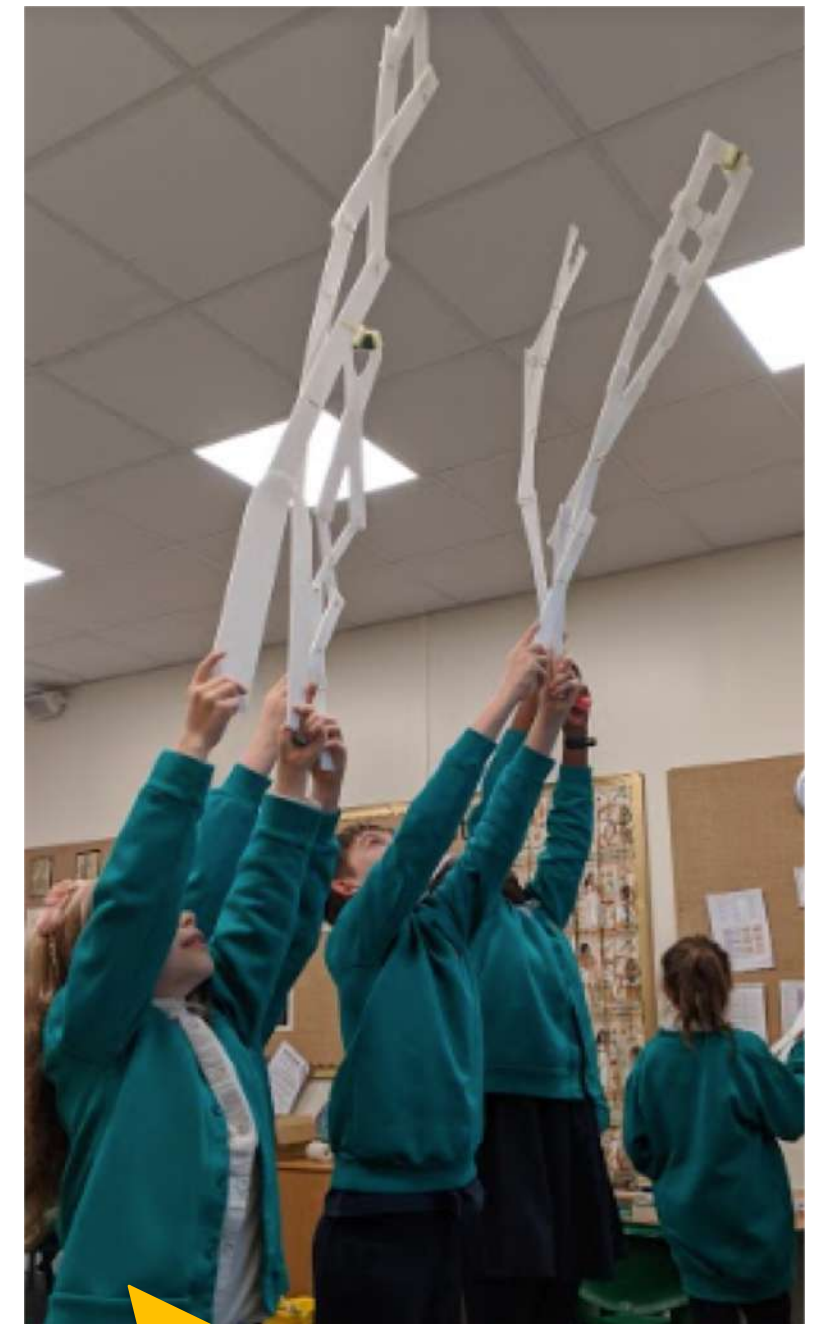
Children as experts complete the challenge(s)

This project has impacted our children in many ways:

- Removed the 'mad scientist' stereotype
- Improved resilience – Does it matter if you fail in a fantasy world?
- Increased enjoyment, motivation, and a real purpose for learning.
- Greater awareness of STEM Careers.



We are astronomers moving to a new planet and mapping a course through our solar system!



We are archeologists helping Howard Carter uncover Tutankhamun's tomb!



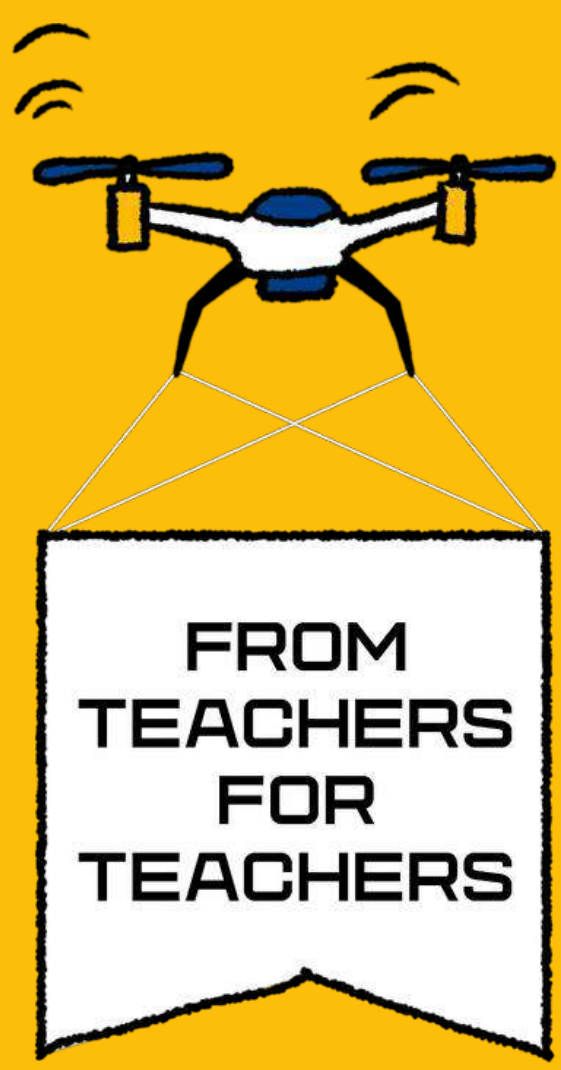
A doctor is a type of scientist. I would like to be a doctor too!



We are going to The Arctic Circle and must check our safety glasses protect our eyes from UV light!

What does a scientist look like? Me!



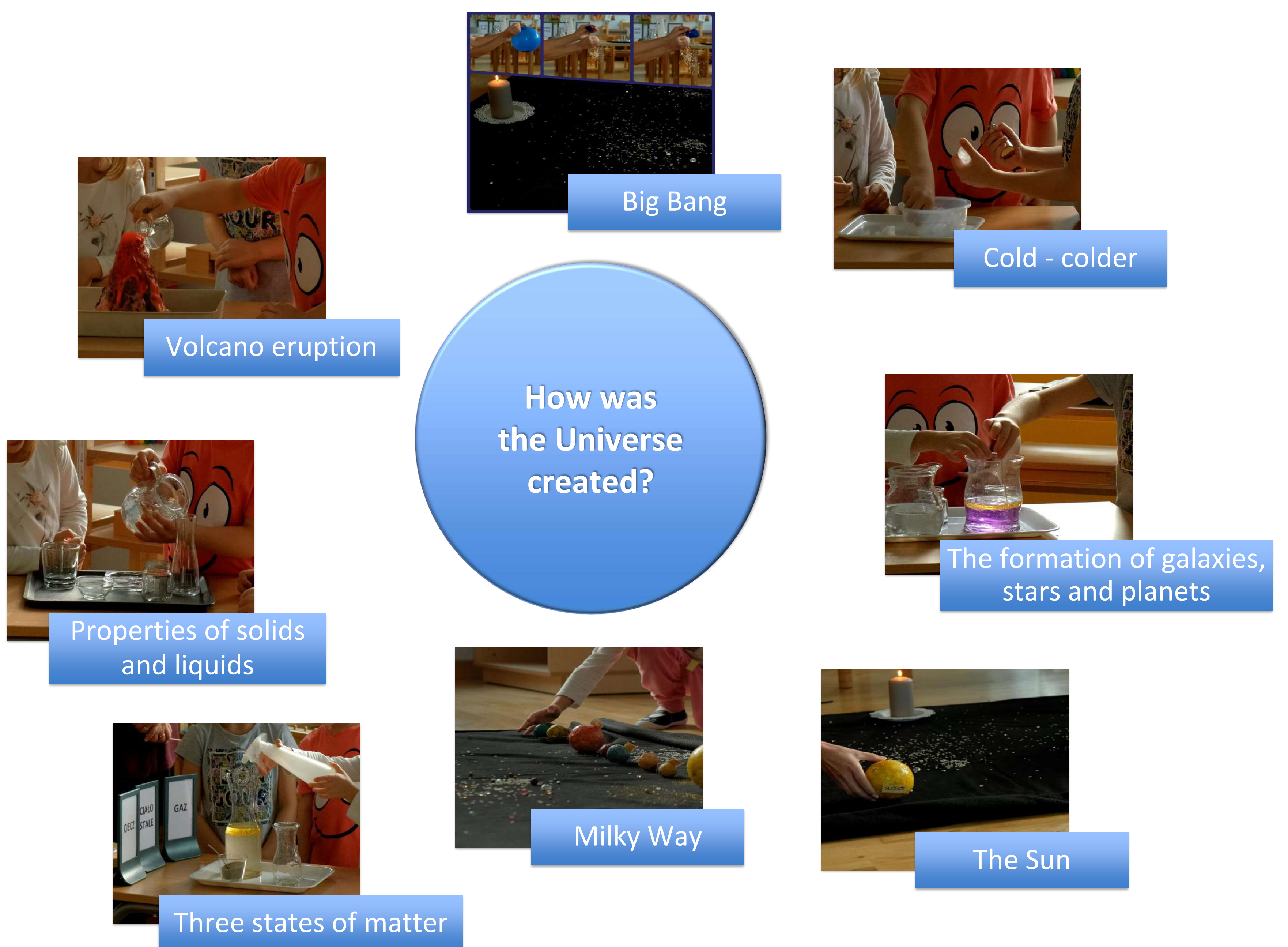


# SCIENCE FOR THE YOUNGEST

Małgorzata Głuch | Primary School No. 5 | Świdnik | Poland

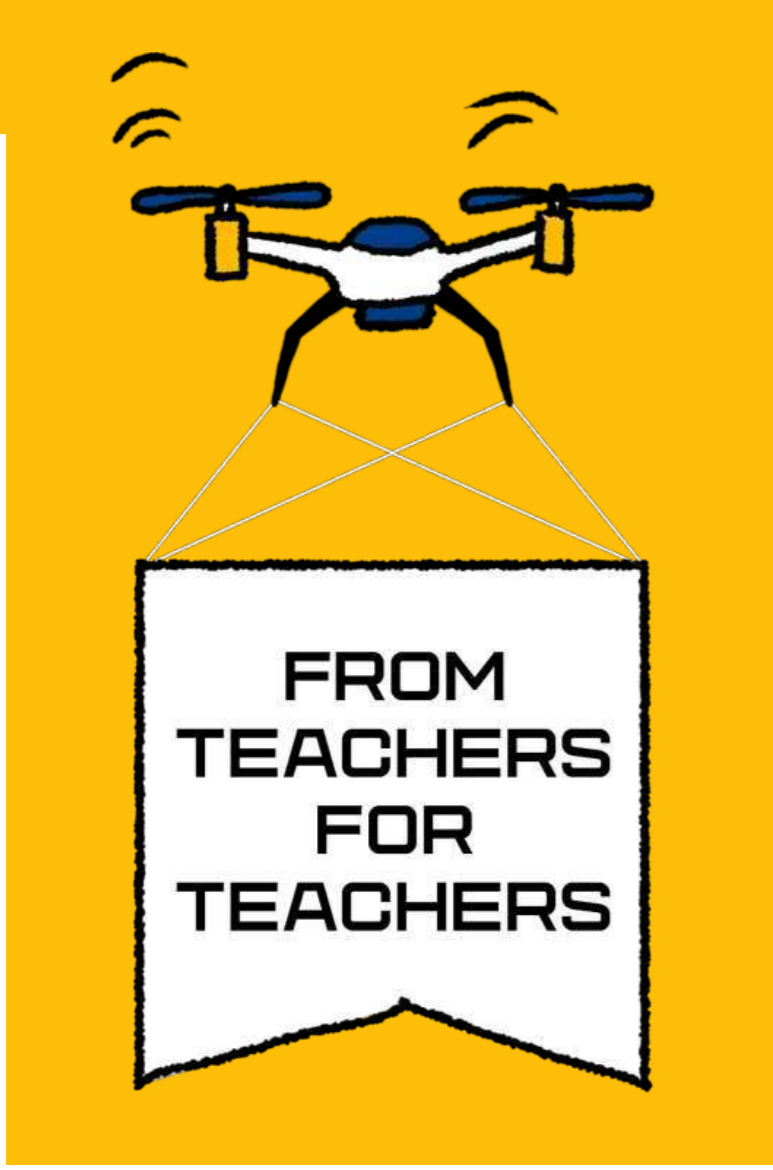
## The First Great Montessori Lesson THE BEGINNING OF THE UNIVERSE

The project **THE BEGINNING OF THE UNIVERSE** brings preschool children closer to the beginnings of the world around us and includes the story of how the universe was created as a result of the Big Bang. It talks about the changes taking place in space, the formation of galaxies, stars and planets, including our planet – Earth, until the moment when the Earth is no longer hot and consists of soil, air and water.



*„Help me do it on my own” Maria Montessori*





# SCIENCE FOR THE YOUNGEST

Monika Gniatkowska | Kindergarten No. 185 "Fairy-tale corner" | Poznań | Poland

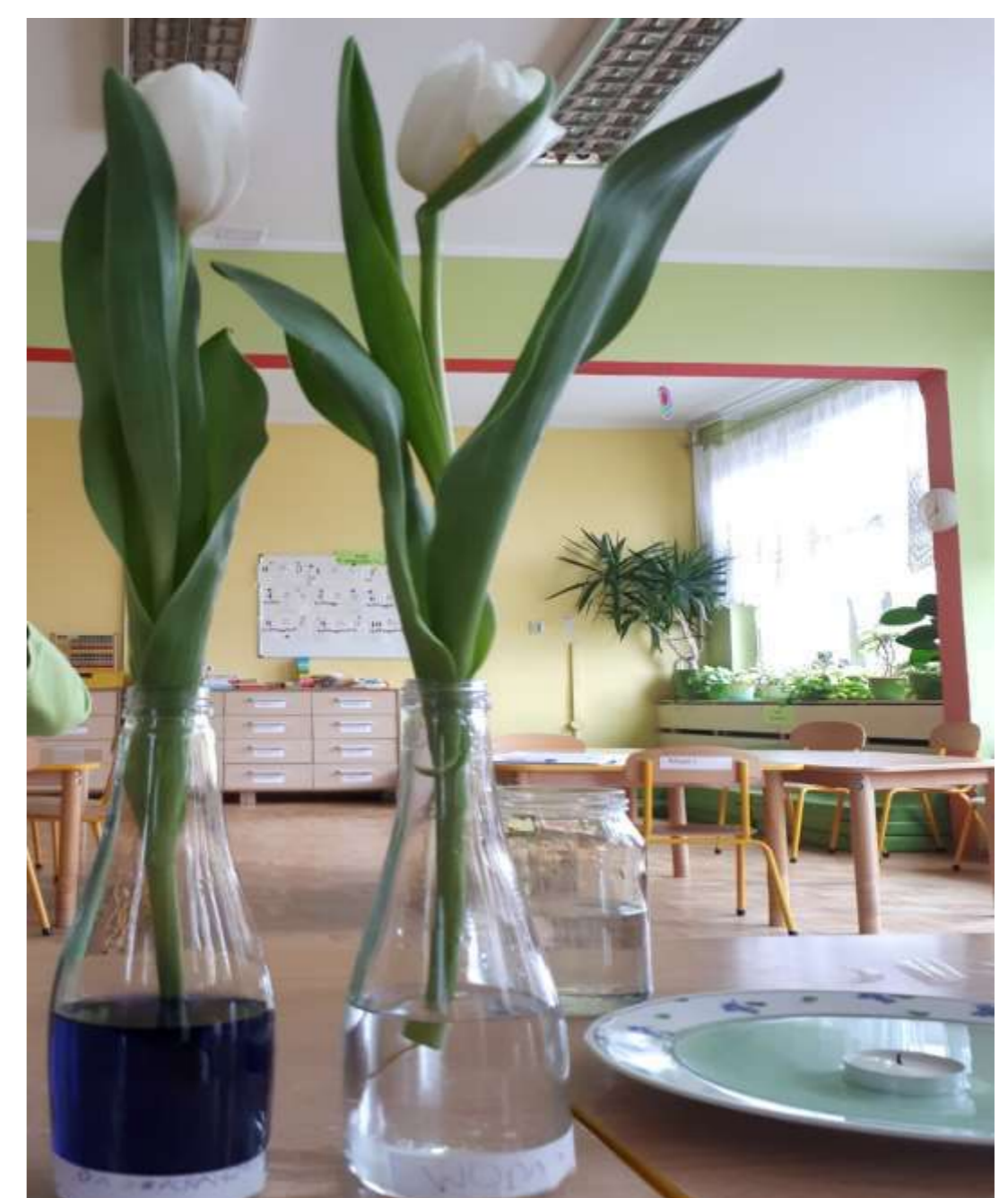
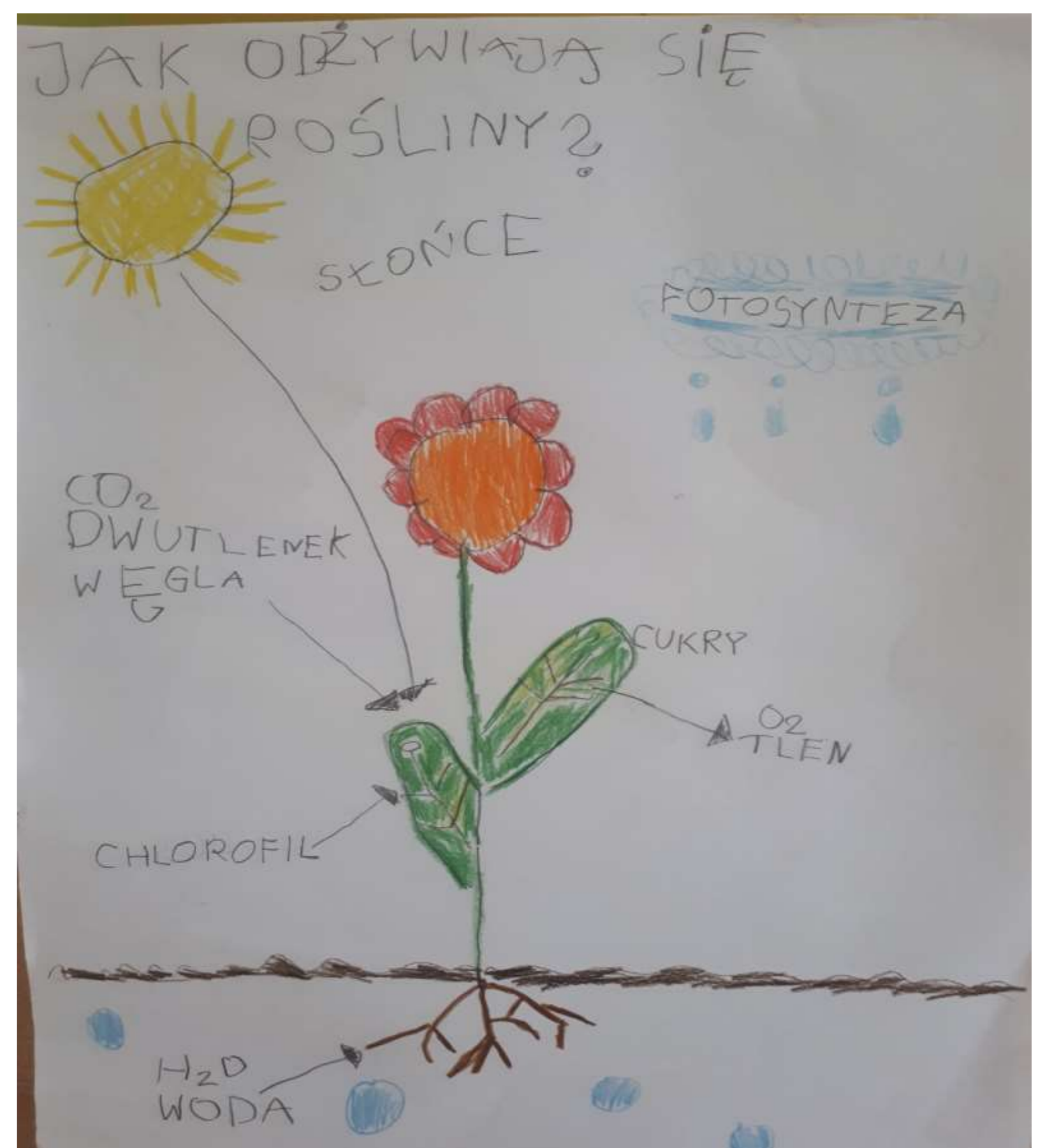
## How do plants nourish themselves?

Method: Experimental method

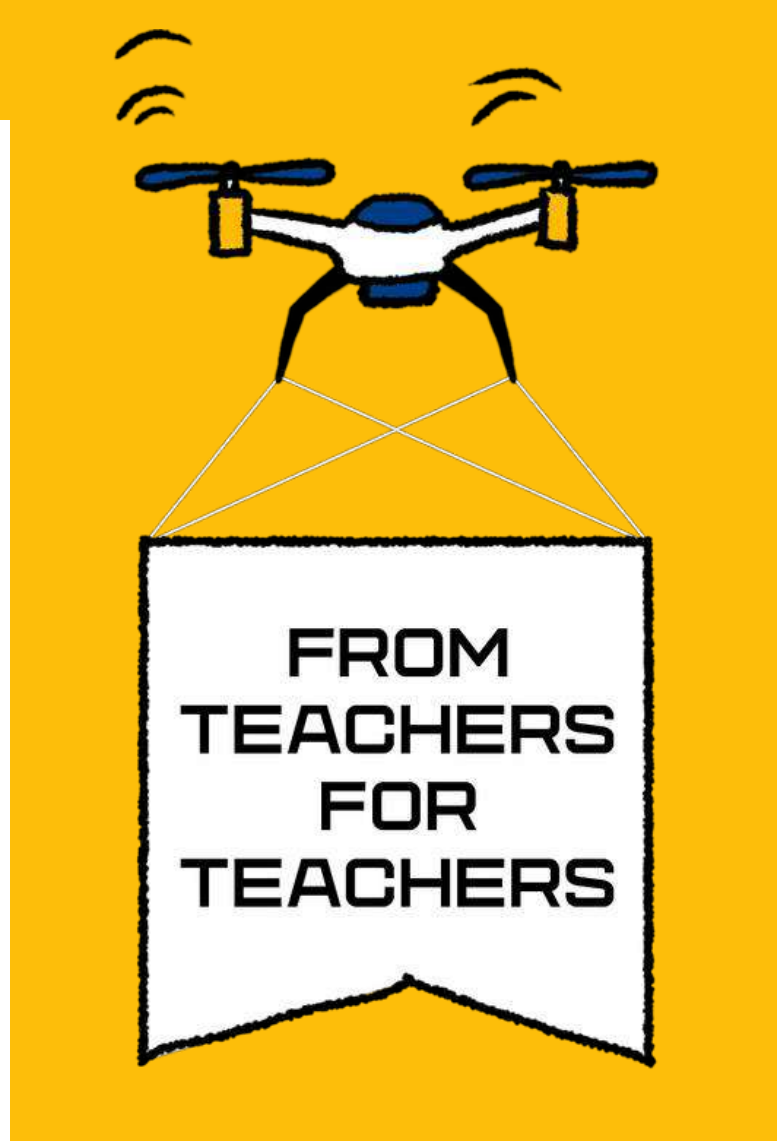
Form: Demonstration of phenomena

Materials: Generally available materials used in everyday life with a high proportion of recyclable materials, plants, seeds

Project description: How can plants nourish themselves - after all, they don't eat like humans, animals? Yet they live and grow. This fascinating question became for the young man the beginning of an extraordinary adventure in search of answers. Browsing books, watching movies, trying experiments resulted in the creation of this project. The project presents several experiments that illustrate the feeding process of plants.







# SCIENCE FOR THE YOUNGEST

Monika Kos | Dezydery Chlapowski Primary School | Poznan | Poland

## Electromagnetism in action

**Teams members:** Barbara Bujak, Wiktoria Górna, Gabriela Ławniczak, Maria Marczak, Julia Pawlak, Katarzyna Pietrzak, Michał Rytter, Lena Tereszczyńska, Jan Wabich.

Our fascination with the electricity and other related phenomena was the main origin of this projekt.

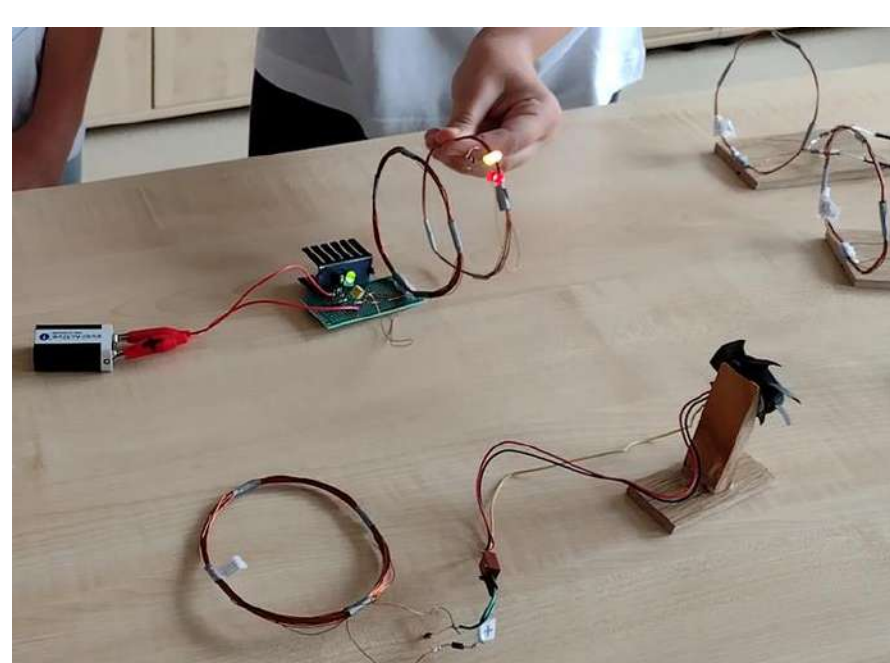
We started with simple experiments in electromagnetism. Then we applied the knowledge which was gained in three research projects.



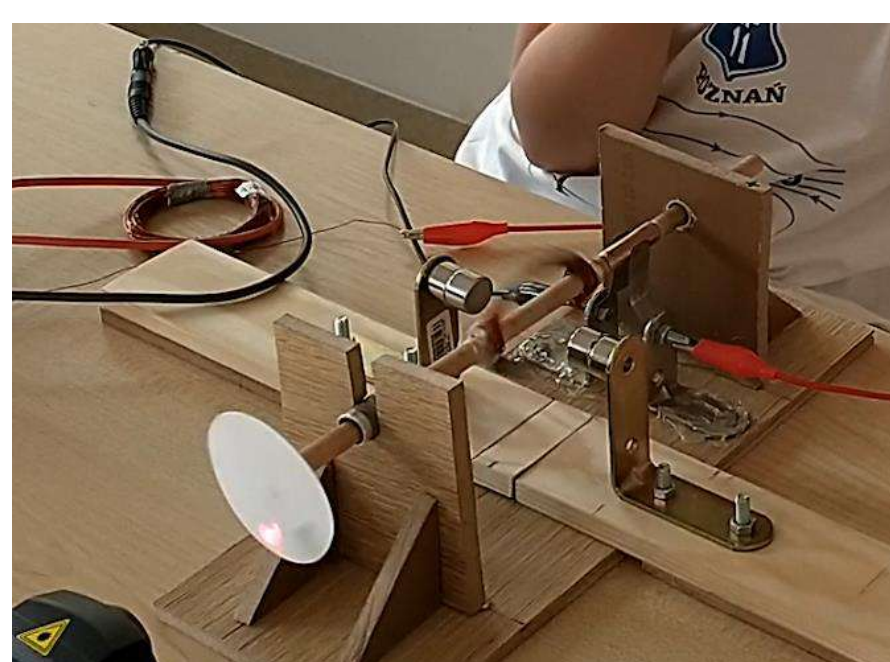
We built a model of power plant, through which electricity was generated. We became curious about factors which can affect the performance of our power plant.



We wanted to transmit electricity. We used electromagnetic induction and we discovered what affects the transmission.



We were amazed how electricity could be used. Hence, we developed a model of electric motor and checked how it works.



**We noted that:**

- The voltage decreases with increasing distance between the coil and the rotating magnets.
- The highest voltage occurs when the coil is placed perpendicular to the plane of the rotating magnets.
- The induced voltage decreases as the rotation speed of the magnets decreases.

**We observed that:**

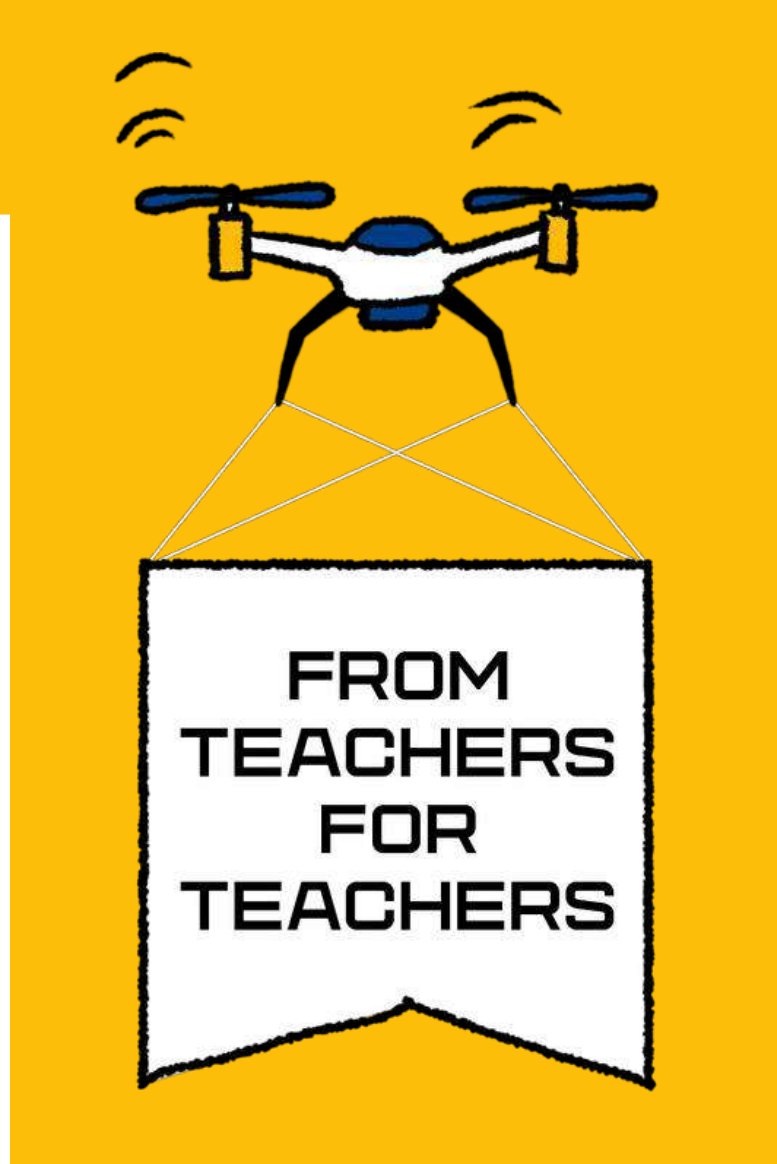
- The voltage induced in the secondary winding decreases with the distance between the coils.
- The value of the induced voltage increases as the number of turns increases.
- The electromagnetic field does not penetrate metals.

**We conclude that:**

- The rotor speed increases as we increase the number of magnets close to the rotor coil.
- The revolutions speed increases as we increase the number of turns of the rotor coil.
- The higher the voltage applied to the rotor winding, the higher the rotor speed.

**Conclusion:** Electromagnetism is magic. Our science team had a great time... and we will.





# SCIENCE FOR THE YOUNGEST

Rute Carmo Oliveira; Isabel Poço; Teresa Reis | Nobel Algarve British International School |  
Lagoa | Portugal

## Nature Answers

### Why?

Since children are the ones that will have to solve some of the global challenges we are facing, water shortage, resources saving, etc, we need to invest on them.

As Science teachers, we feel that older students present many difficulties when it comes to knowing how to observe.

Because observation is essential for Science and we believe that we can only evolve with collaborative work.

### How?

We introduced the project to our school teachers and extended the invitation to the Council of Lagoa by sharing our resources in a Good Practices event.

We researched and created a [website](#) to share all the necessary information about each challenge and [tutorials](#) of the proposed STEAM activities, we also provided support in activity preparation and clarified doubts in a team, on [Teams platform](#).



We observed the playground trees and with its shape, we built a support structure.



We learned how to save resources with the bees and soap bubbles.



We were looking for snails.



We used wax to make waterproof paper and do our works of art.

### What?

With nature and in nature our pre-school and primary children went outside to observe, listen, touch and search for the answer to challenges such as saving resources, protecting ourselves, saving space, keeping ourselves dry and clean and building things in a safe way just like nature does.

STEAM activities were performed with very simple, low cost and easily achievable materials. These materials can be found in any school, such as paper, water and soap.

**Conclusion:** Outside the classroom, in nature, we learn how nature is able to solve problems that we also face. We learn how important it is to observe what surrounds us.





Y Y

Sandra Vasconcelos e Marta Ferreira | AE Pedro Eanes Lobato | Amora, Seixal | Portugal

## WHY? Teach English for Science

English is becoming the most spoken, written and read language by Science and scientists. Being so, this project aims that pupils learn English for Science and learn Science to be more motivated to learn English.

To celebrate the 50th anniversary of the Moon landing we wish to teach our students more about the natural satellite of our planet Earth, to improve their knowledge.

### What our project is about:

With this project, students will learn English vocabulary applying it to Science thru several activities such as exploring the Moon and its characteristics.

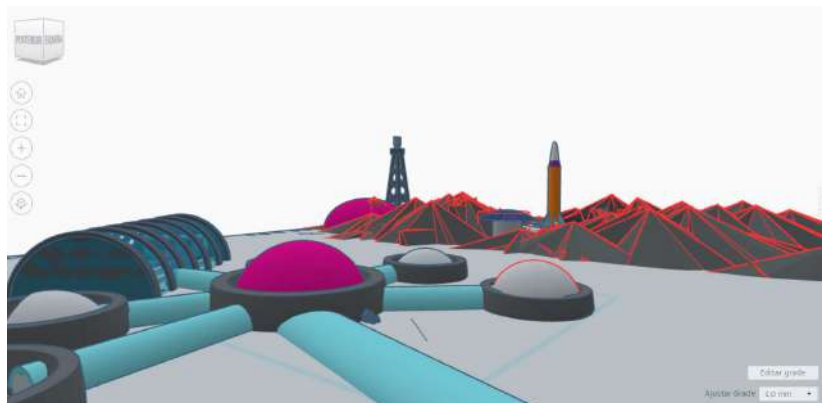
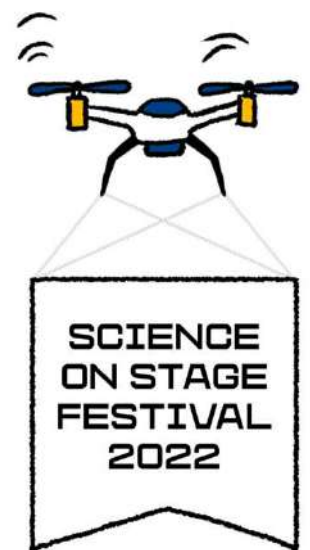
Using Inquiry-Based Science Learning as a motivational start to discover about Space and its components, the students will be asked to develop some drawings or modeling of a Moon Shelter and a Bionic Hand.

Through these activities, students will learn a foreign language at the same time they learn about Science that will help them to develop some skills, like critical thinking, creativity, and collaboration.

And finally, using the ICT they will produce a Thinkercad Moon Camp.

### Materials used in this project:

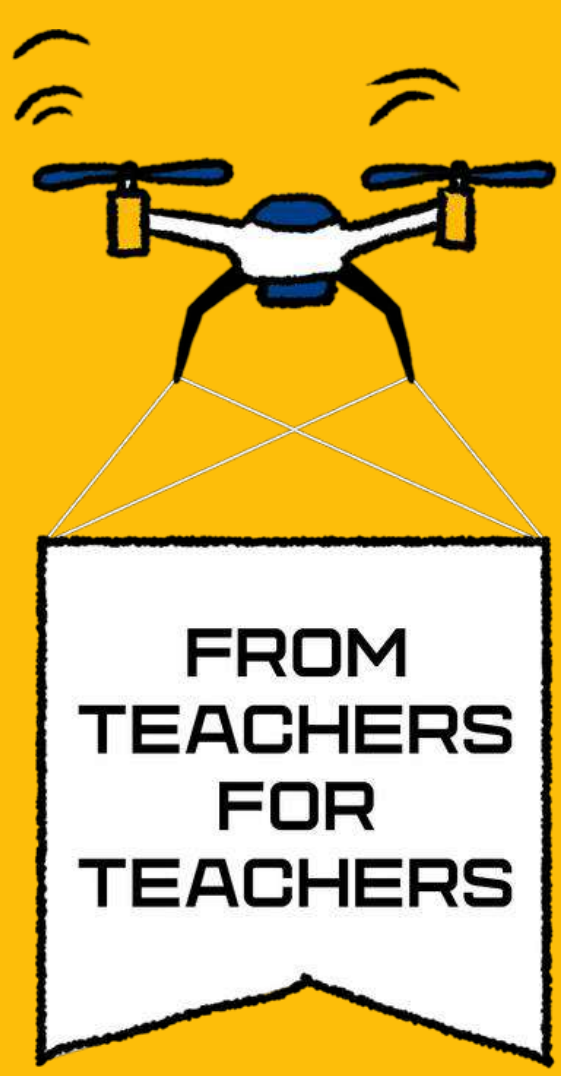
Flash cards, Moon photographs, PC, app Thinkercad, paper crafts, posters, drawings and Moon shelters models made at home with reused and low-cost materials.



How it works, how others could do it too:

Students learn how to speak the basic English to communicate in Science... and have FUN!





# SCIENCE FOR THE YOUNGEST

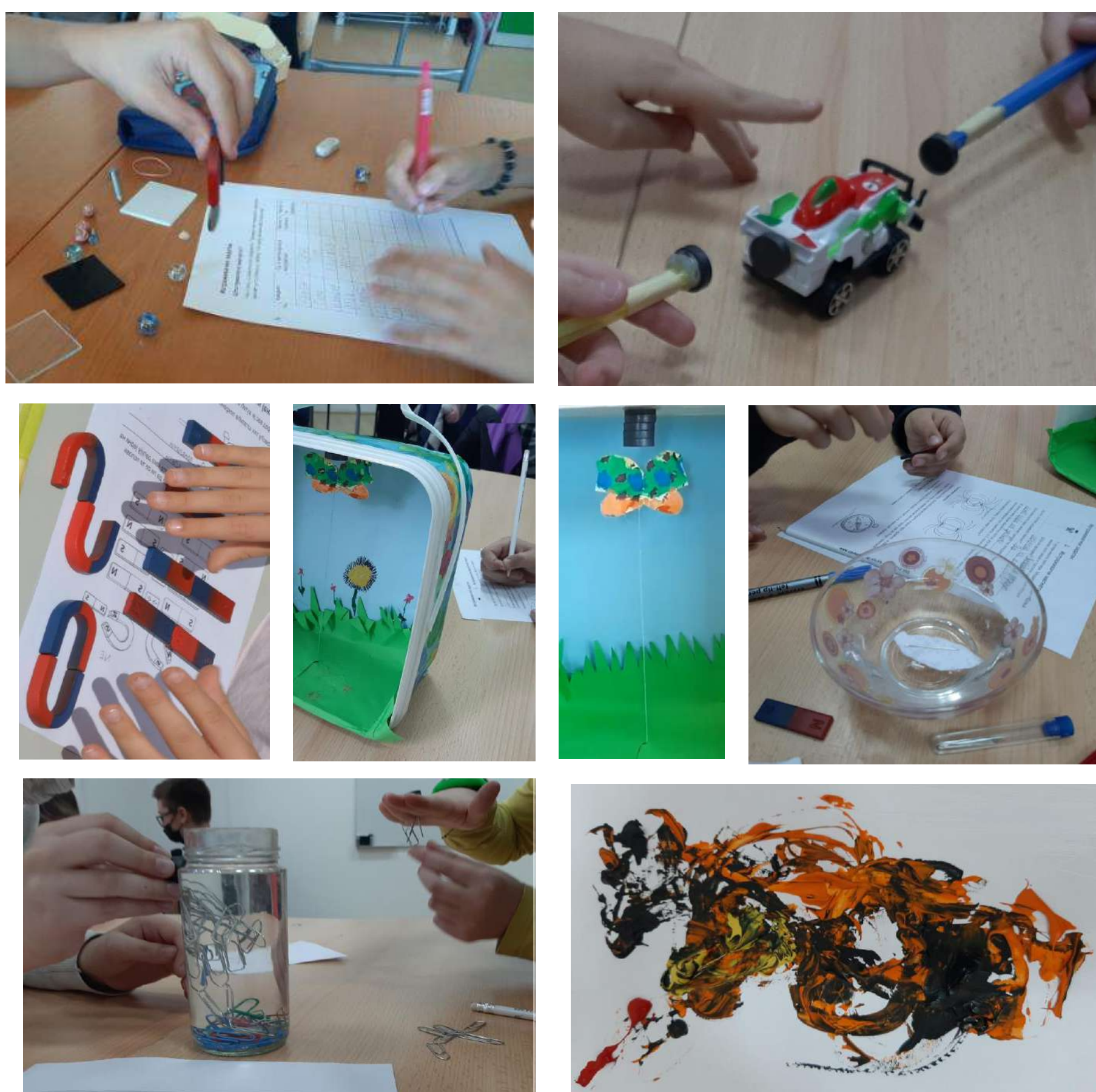
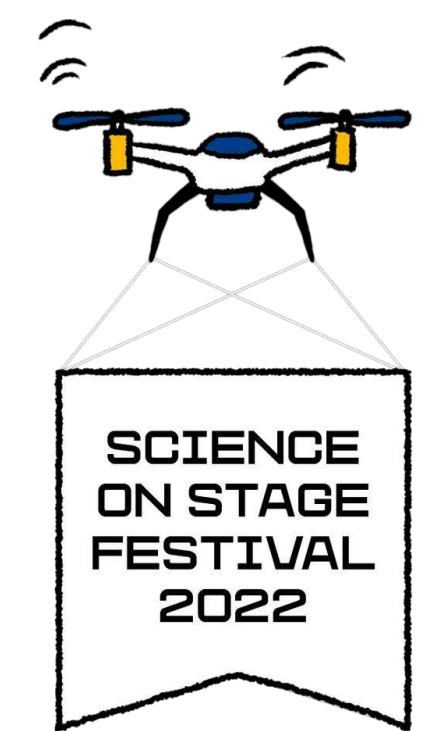


Tanja Olear Gojic | Primary School Dragan Lukic | Belgrade | Serbia

## The Magical World of Magnets

The Magic World of Magnets project introduces students to magnets and magnetism, and develops the ability of logical, abstract and divergent thinking through the role of small researchers and creators.

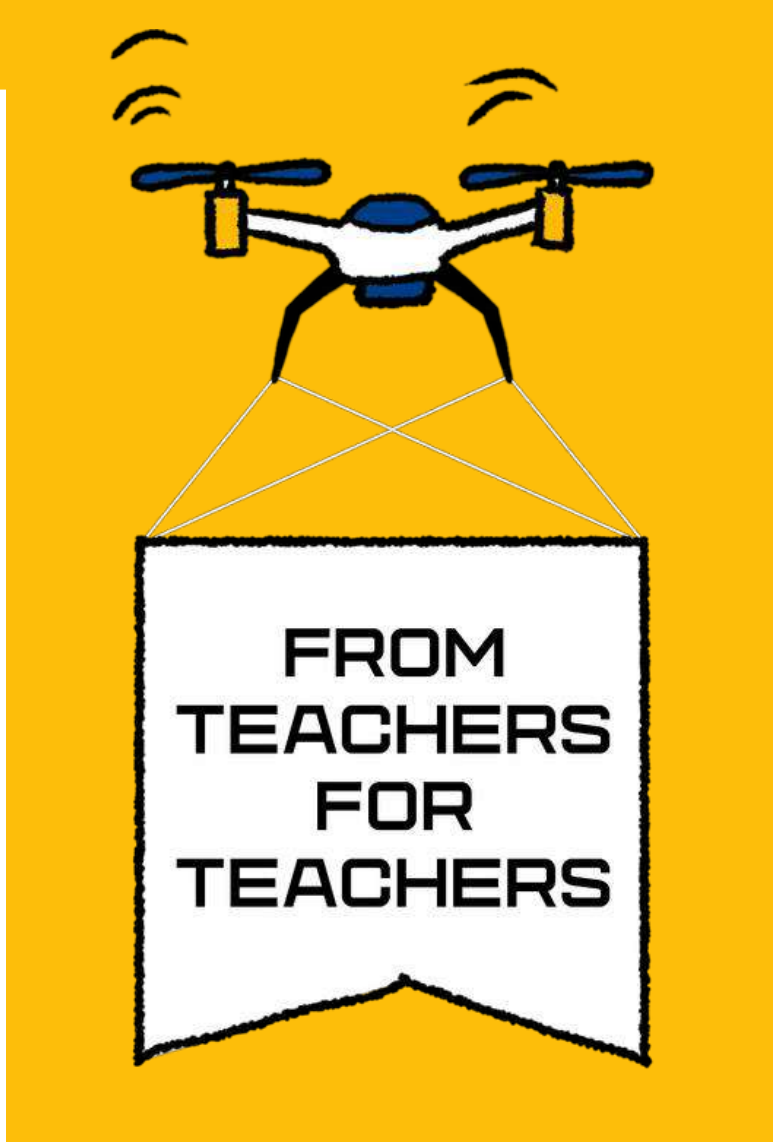
Using the work station method, students go through different tasks and experiments, which lead them to conclusions about the characteristic of magnets. Students write down their observations, discuss and coming to conclusion, which they present. At the end of each experiment, they consider where this characteristic could be applied in everyday life. Using of functional knowledge from physics and mathematics, they construct their architectural works of art with Geomag magnets. In the end, they have to solve the Escape room and if they are interested, they make their own toy at home using the magic of magnets.



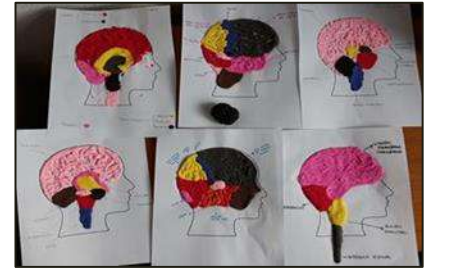
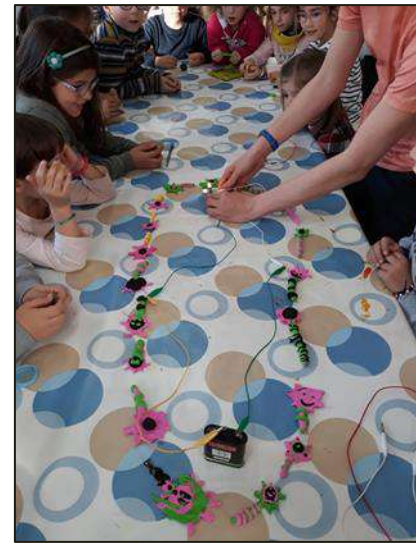
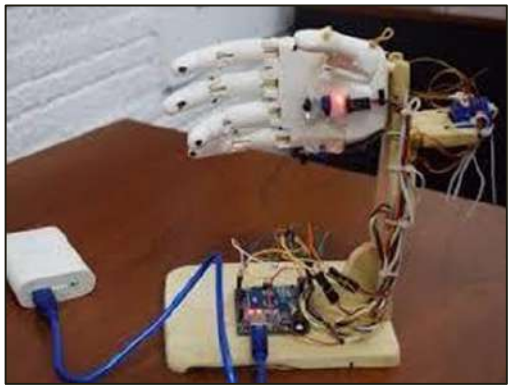
Workstation 1: What does the magnet react to?  
Workstation 2: Meet the magnetic force!  
Workstation 3: Explore the magnetic field! Make your compass.  
Workstation 4 is: The action of magnetic force through water and the body.  
Workstation 5 is: Painting with magnets.  
Activity for all: Magnetic constructions  
Goal was to introduce students with magnets and magnetism, to interest children in the research of natural phenomena and to encourage them to use modern technologies in their research; developing team spirit, mutual communication and cooperation in conducting research work; emphasize the importance of science and scientific achievements for everyday life; encourage scientific literacy of the general population and thus destroy unfounded fears of students or prejudices.

**Get involved! Be active! Explore!**  
**Collaborate! Create!**  
**STEM is for everyone!**





# SCIENCE FOR THE YOUNGEST



Bárbara de Aymerich | Escuela de Pequeñ@s Científic@s Espiciencia | Espinosa de los Monteros | Spain

## OUR BODY, THE BEST PLACE TO LIVE

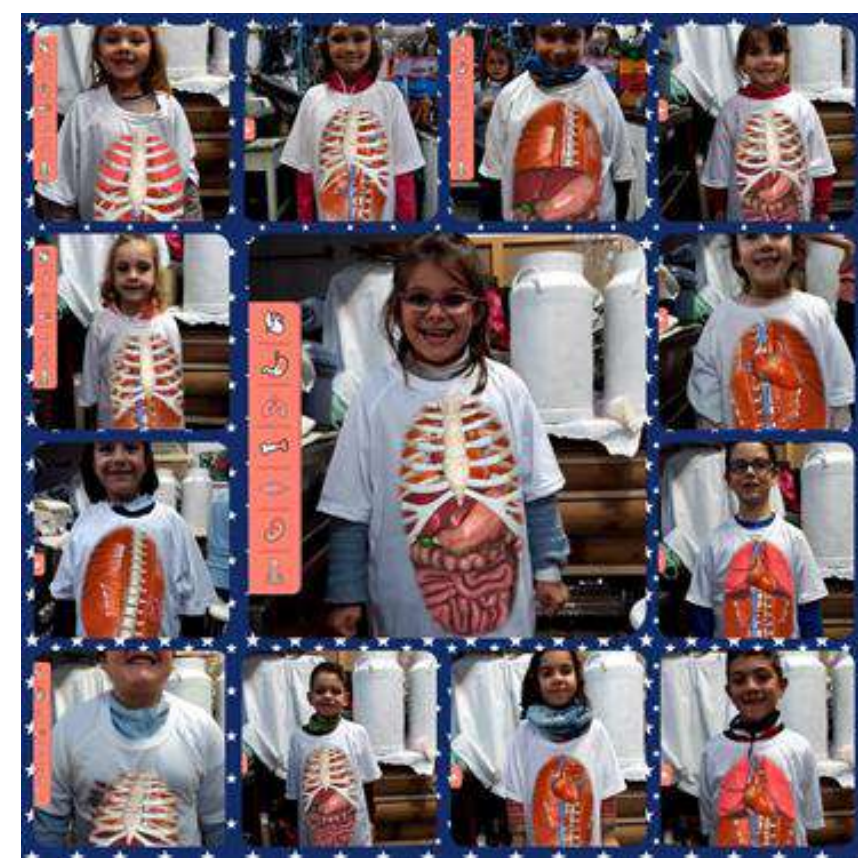
VR, AR, inquiry and modeling for the study of the human body in early childhood education

### METHODOLOGY

Carrying out different experiences using active methodologies to improve knowledge and care of the human body:

- 1.- **MODELS.** - Representations of many parts of the body joined with simple physico-chemical concepts, using cheap and attractive materials.
- 2.- **NEW TECHNOLOGIES.** - Use of VR and AR as a source of information for the knowledge of the real appearance and functioning of the human body.
- 3.- **INQUIRY.**- Research experiences to improve the knowledge and care of the human body:

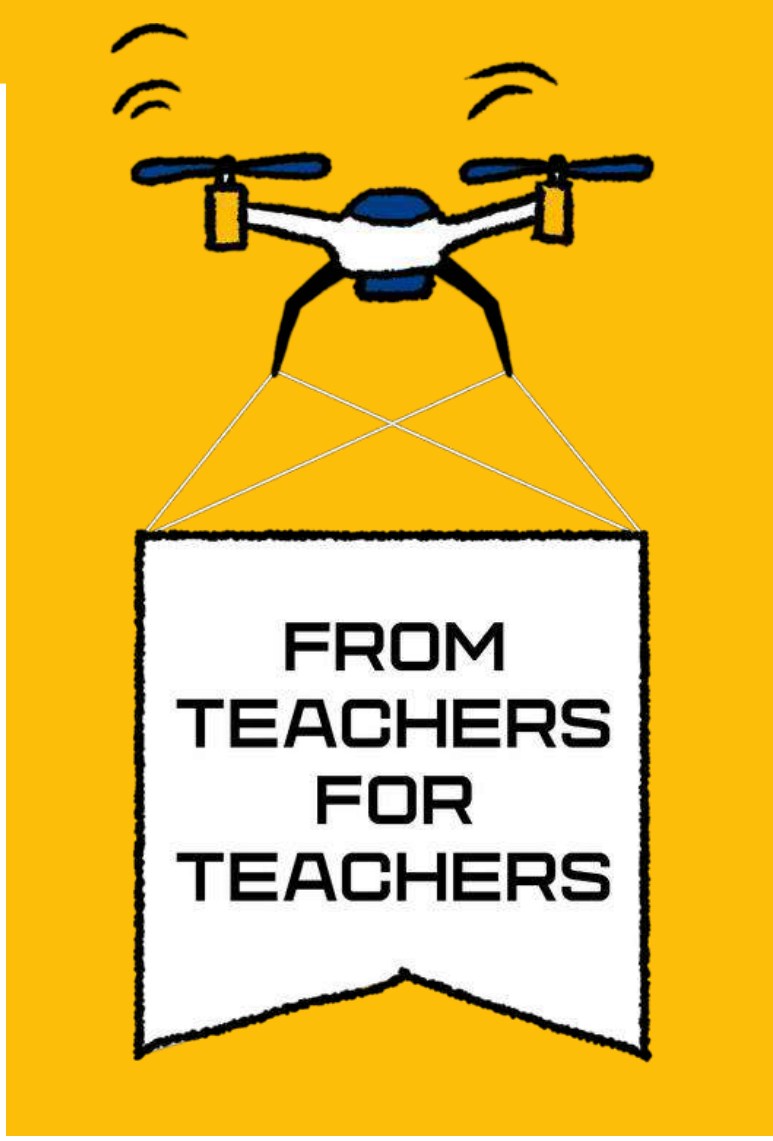
- **RESEARCH ON SKIN CARE.** - We are involved in the importance of protecting our skin to avoid the action of the sun's rays, using photochromic beads and different sun creams.
- **RESEARCH ON THE EFFECT OF CARBONATED DRINKS ON OUR TEETH.** - We know that these drinks have acids and sugars that damage enamel and favor the appearance of spots and cavities. Using eggs like tooth enamel (similar composition), different carbonated soft drinks and pH meters, we were able to observe interesting results.
- **BIOMETRIC RESEARCH.** - To know the biometric data and compare them with the standardized tables of the WHO, we calculate our BMI, to compare them with 50th pct. To visually check our results, we made tables and graphs with building blocks. We also conducted surveys on eating habits to appreciate the deficiencies or excesses of some foods.
- **RESEARCH IN NEUROSCIENCE: SPEED OF RESPONSE TO DIFFERENT STIMULES.** - We evaluate the speed of response to tactile, visual and auditory stimuli, using 30 cm plastic rulers in a pair game. We check the variation with respect to the age and sex of the students.
- **And so on...**



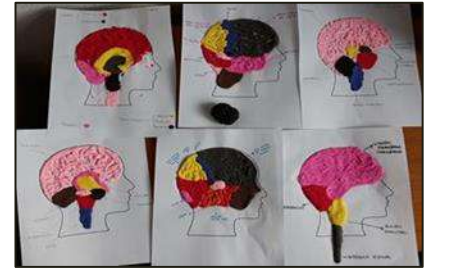
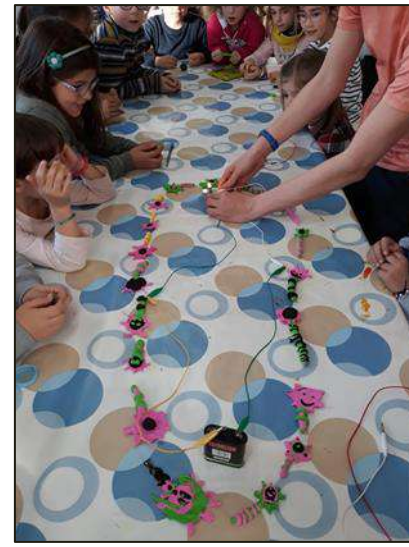
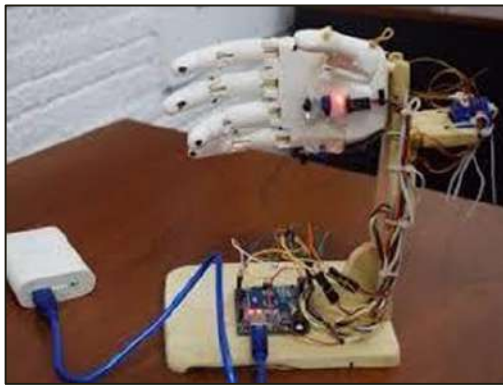
### CONCLUSION

The experiences based on models, technological resources and IBL, improved their scientific and mathematical skills, brought them closer to scientific methodology and made them aware of the importance of science in knowing their own body and in achieving and maintaining health.





# SCIENCE FOR THE YOUNGEST



Bárbara de Aymerich | Escuela de Pequeñ@s Científic@s Espiciencia | Espinosa de los Monteros | Spain

## OUR BODY, THE BEST PLACE TO LIVE

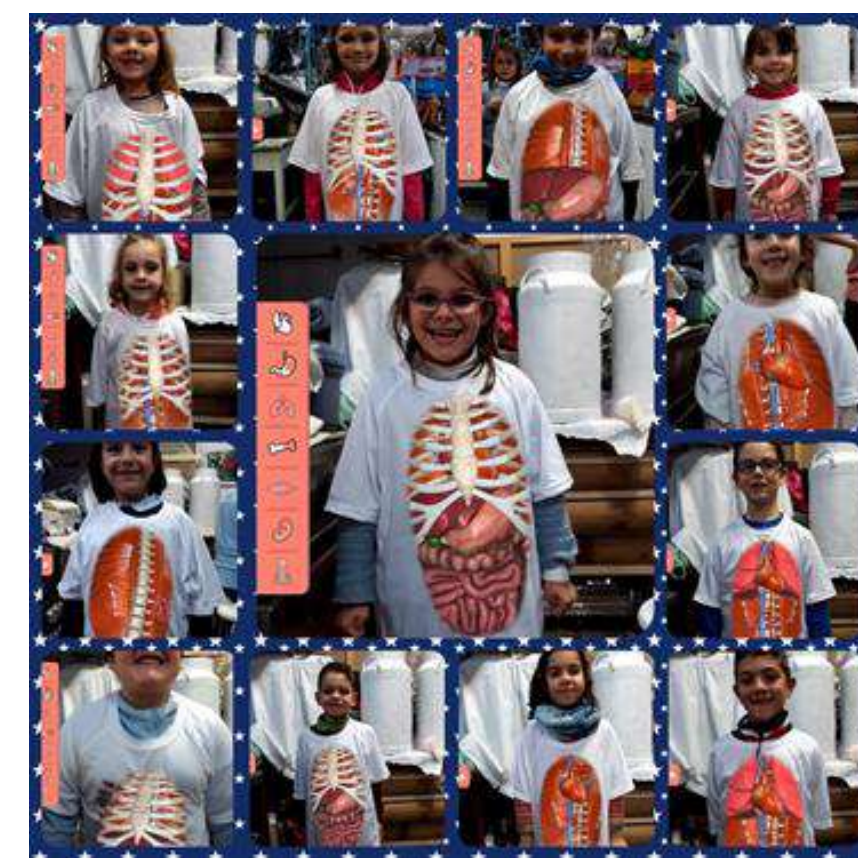
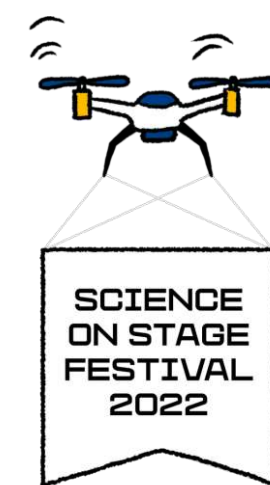
VR, AR, inquiry and modeling for the study of the human body in early childhood education

### METHODOLOGY

Carrying out different experiences using active methodologies to improve knowledge and care of the human body:

- 1.- **MODELS.** - Representations of many parts of the body joined with simple physico-chemical concepts, using cheap and attractive materials.
- 2.- **NEW TECHNOLOGIES.** - Use of VR and AR as a source of information for the knowledge of the real appearance and functioning of the human body.
- 3.- **INQUIRY.**- Research experiences to improve the knowledge and care of the human body:

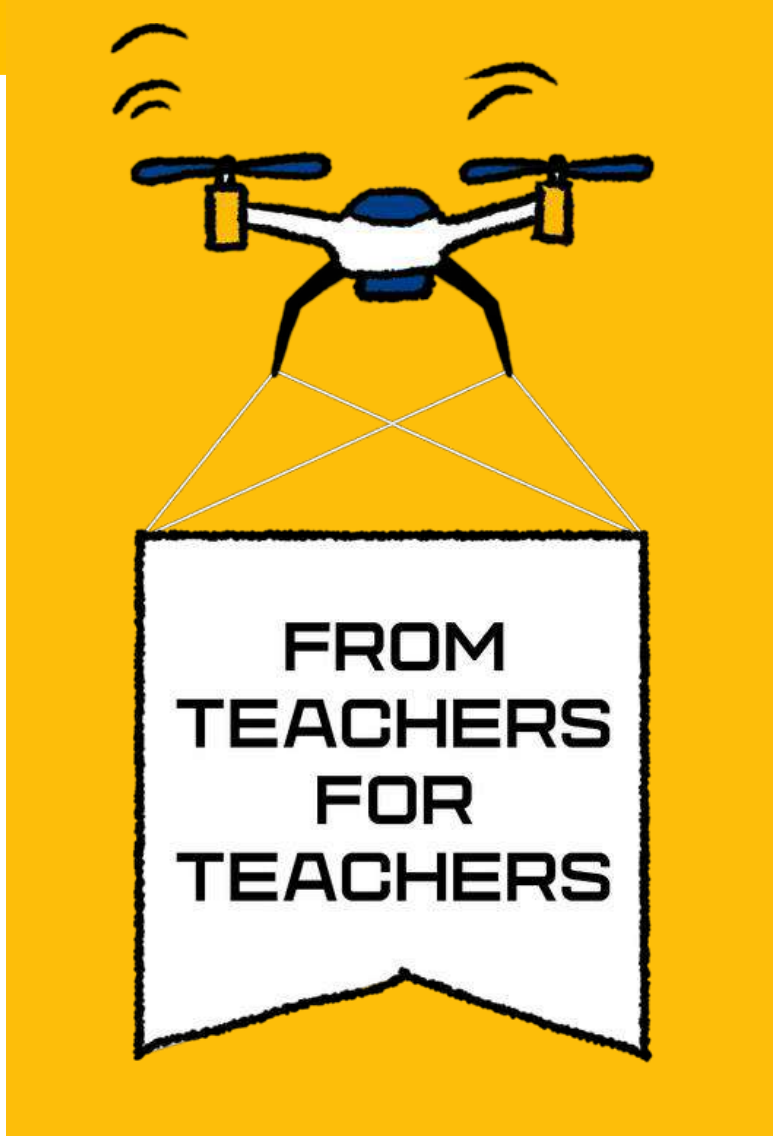
- **RESEARCH ON SKIN CARE.** - We are involved in the importance of protecting our skin to avoid the action of the sun's rays, using photochromic beads and different sun creams.
- **RESEARCH ON THE EFFECT OF CARBONATED DRINKS ON OUR TEETH.** - We know that these drinks have acids and sugars that damage enamel and favor the appearance of spots and cavities. Using eggs like tooth enamel (similar composition), different carbonated soft drinks and pH meters, we were able to observe interesting results.
- **BIOMETRIC RESEARCH.** - To know the biometric data and compare them with the standardized tables of the WHO, we calculate our BMI, to compare them with 50th pct. To visually check our results, we made tables and graphs with building blocks. We also conducted surveys on eating habits to appreciate the deficiencies or excesses of some foods.
- **RESEARCH IN NEUROSCIENCE: SPEED OF RESPONSE TO DIFFERENT STIMULES.** - We evaluate the speed of response to tactile, visual and auditory stimuli, using 30 cm plastic rulers in a pair game. We check the variation with respect to the age and sex of the students.
- **And so on...**



### CONCLUSION

The experiences based on models, technological resources and IBL, improved their scientific and mathematical skills, brought them closer to scientific methodology and made them aware of the importance of science in knowing their own body and in achieving and maintaining health.





# SCIENCE FOR THE YOUNGEST

Nerea Martínez Baranda | Escuela de Pequeñ@s Científic@s Espiciencia | Espinosa de los Monteros | Spain

## “WATCHERS OF THE AIR: STRAWBERRIES WITH SUPERPOWERS”

### Citizen Science, Chemistry and Sustainability in Early Childhood Education

1.- **Participation citizen science project "Vigilantes del Aire"**, the Foundation Ibercivis in which the capacity of strawberry plants as heavy metals and natural antioxidant scavenging is studied.

We collected strawberry stolons, planted, labeled and distribute them among our students. To each one of the pots was attached a location card and initial data.

2.- **Study and observation of the characteristics of strawberry plants**, taking samples

of the stems, leaves, roots and observe them with magnifying glass and with digital microscope, to notice the presence of the villi responsible for the uptake of heavy metals.

We found another plants with similar villi: borage (garden) and saxifrage (house).

We also looked, if there were more plants that were capable of capturing heavy metals such as strawberries: milk thistle, fennel, esparto grass or oleander were being used in phytoremediation experiments on contaminated soils. These plants do it from their roots, they absorb them, not with their villi.

3.- **Uptake of metals and vitamin C. Inquiry.** We have been told that strawberries have a lot of vitamin C, it was up to us to check it out.

Our **starting question**: Does the uptake of heavy metals have something to do with their vitamin C content?

Some did not agree very much because they said that the metals were captured by the hairs of the leaves and stems and that vitamin C was in the fruits.

To try to solve the problem, we developed several simple inquiries:

3.1.- The first question to answer **was if the strawberry (fruit) had vitamin C and to compare its content with other foods.**

We used a chemical reaction that **vitamin C has with iodine** (povidone iodine) and various foods that we believe have vit C in their composition (fruits, juices, soft drinks, vitamin C pills, vitamin complex pill).

**We analyzed the results** together and reached the following **conclusions**:

1. Strawberries do have vitamin C.
2. The fruit that has the most vitamin C of the ones we have analyzed is the Kiwi, followed by the lemon.
3. Strawberries have more vitamin C than oranges, tangerines or pineapple.
4. Ripe strawberries have more vitamin C than green ones.
5. Most commercial orange juices have more vitamin C than natural juice because it is added artificially as a supplement and preservative.
6. Vitamin complexes have more vitamin C than natural juices.
7. Orange-flavored soft drinks that have some juice in their composition, have less vitamin C than natural and commercial juices.

3.2.- We studied too **if there is vitamin C in the leaves, stems and roots** of the strawberries. We obtained some extracts, and we performed the previous test with povidone iodine, concluding that the leaves, stems and roots of the strawberries also had vitamin C, in less quantity than the fruits, but appreciable.

3.3.- Finally, we wanted to **link the presence of vitamin C with the ability to retain heavy metals.**

We found that vitamin C breaks down in the presence of some metals such as iron, copper and other transition metals.

We have not been able to verify it yet due to the pandemic, but we are looking for simple experiments to help us visualize it better (take effervescent vitamin C tablets and put them in acid solutions of steel wool or copper ...)

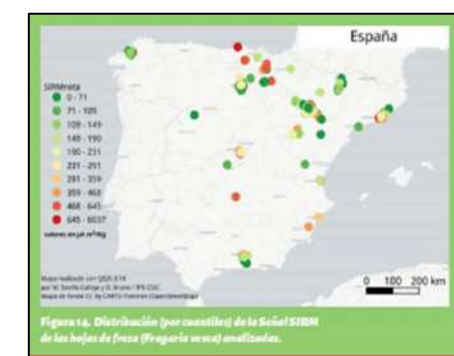
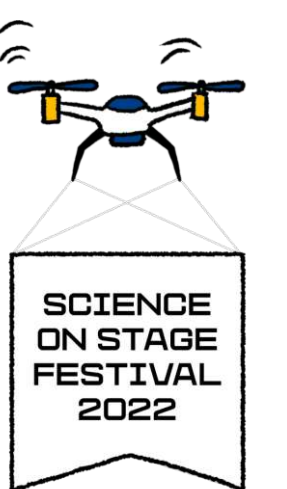
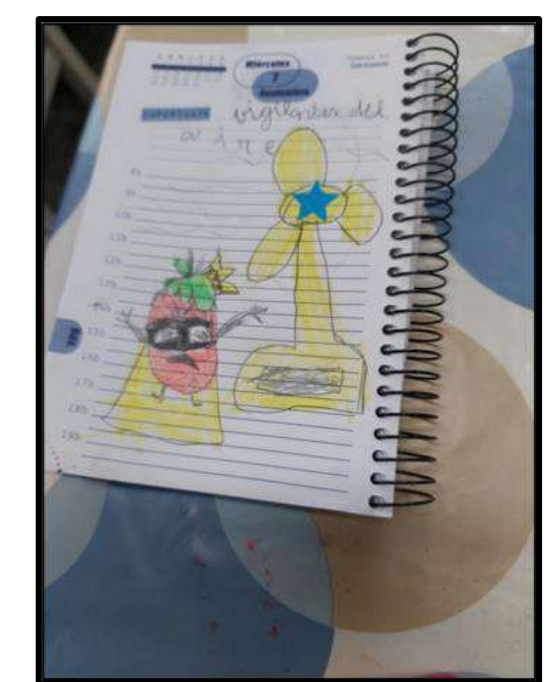
3.4.- **We drew on filter paper with the iodine-starch solution**, using our fruits as stamps.

4.- We designed a pet, an **image that reflected what we had understood** about the project. Most portrayed him as a super hero strawberry that was capable of taking down evil heavy metals from the air.

5.- **We take care of our plants at home and in our science school, collected them again, wand toke the leaf samples as indicated in the project protocol, let them dry, filled in the final forms and sent them to Zaragoza for its magnetic analysis.**

6.- **Diffusion on social networks and radio podcast.**

7.- We have sent our samples (14 were valid). We are very happy, the **air in our region is healthy, practically free of contamination by heavy metals.** Our scientific strawberries told us.

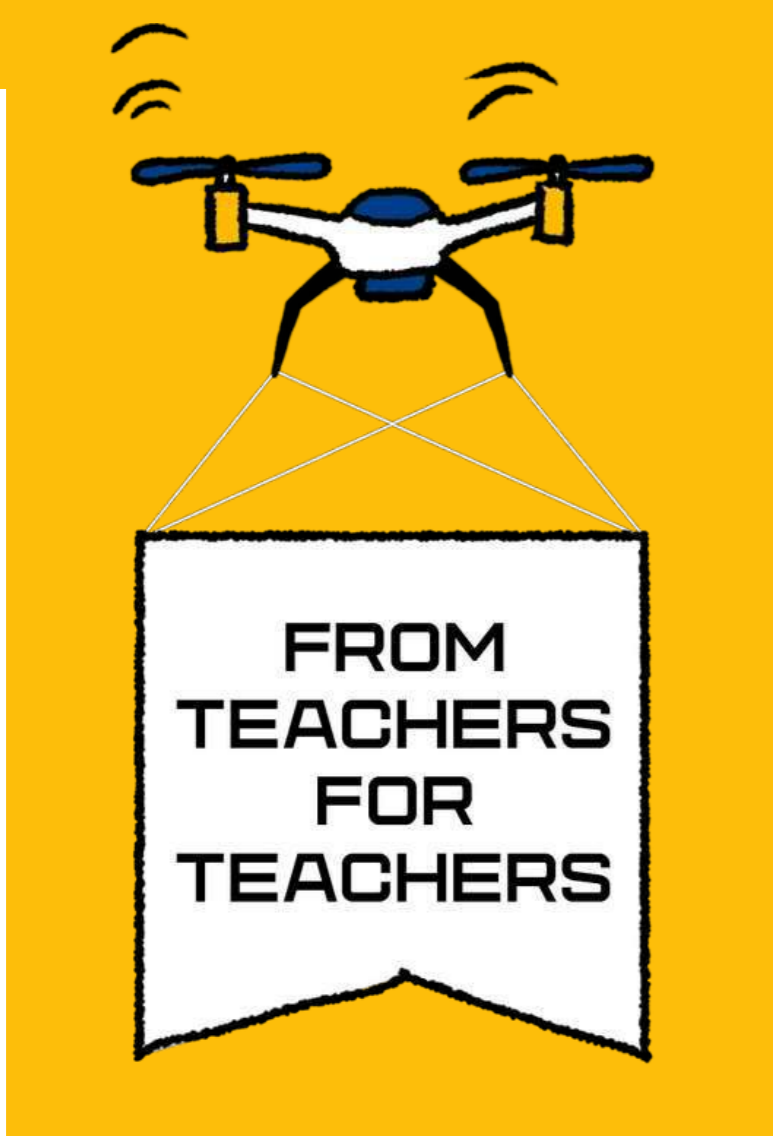


### CONCLUSION

**Participation in citizen science projects from the childhood stage helps to visualize and give social importance to the work of scientists and is a very interesting opportunity to introduce them to IBL and foster their critical thinking and creativity.**







# SCIENCE FOR THE YOUNGEST



M<sup>a</sup> del Pilar Orozco Sáenz- Juan A. Prieto Sánchez | C. Huerta de la Cruz | Algeciras| Spain

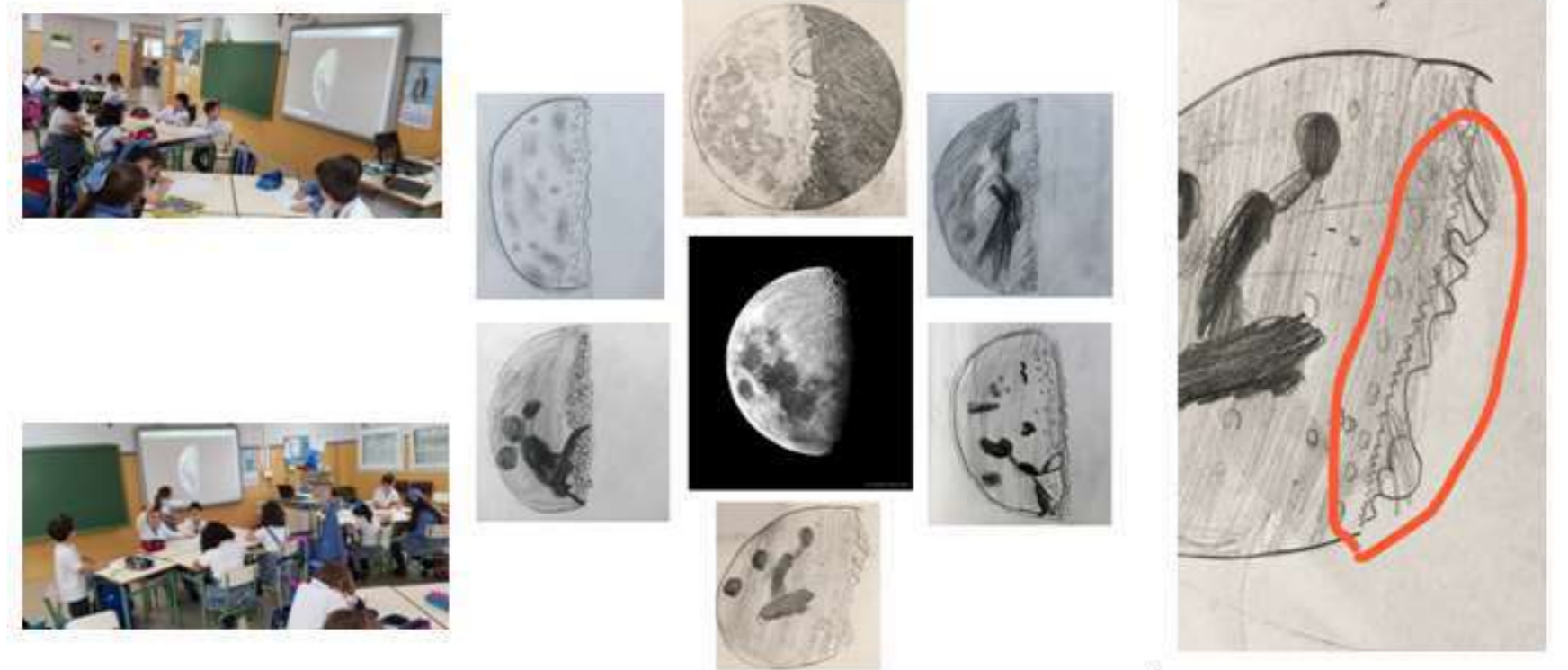
## Astrobiology: a new tool for engaging primary school students into science

Astrobiology is a new science that tries to unveil the existence of life as we know it, beyond our planet. To do so, astrobiologists must combine different traditional sciences such as physics or biology in order to define first of all the concept of “living organism”, subsequently define the conditions for life to exist and finally develop the technology to be able to study it. Our project was developed over four consecutive years.



### 1<sup>st</sup> year: KS1 students

Students were introduced to astronomy and had their first contact with a telescope. Following the treatise on astronomy “*Sidereus Nuncius*” by Galileo, they were able to study the characteristics of planet Earth and the Moon.



### 2<sup>nd</sup> year: KS2-year 3 students

Using the images taken by satellites, students carried out the identification of the characteristics of the Earth and the Moon. Subsequently, scientific modeling of the structures previously observed was produced.



### 3<sup>rd</sup> year: KS2-year 4 students

Colonization of the Moon. Students were asked to define and investigated the challenges that terrestrial organisms would have to confront to be able to survive outside our planet.



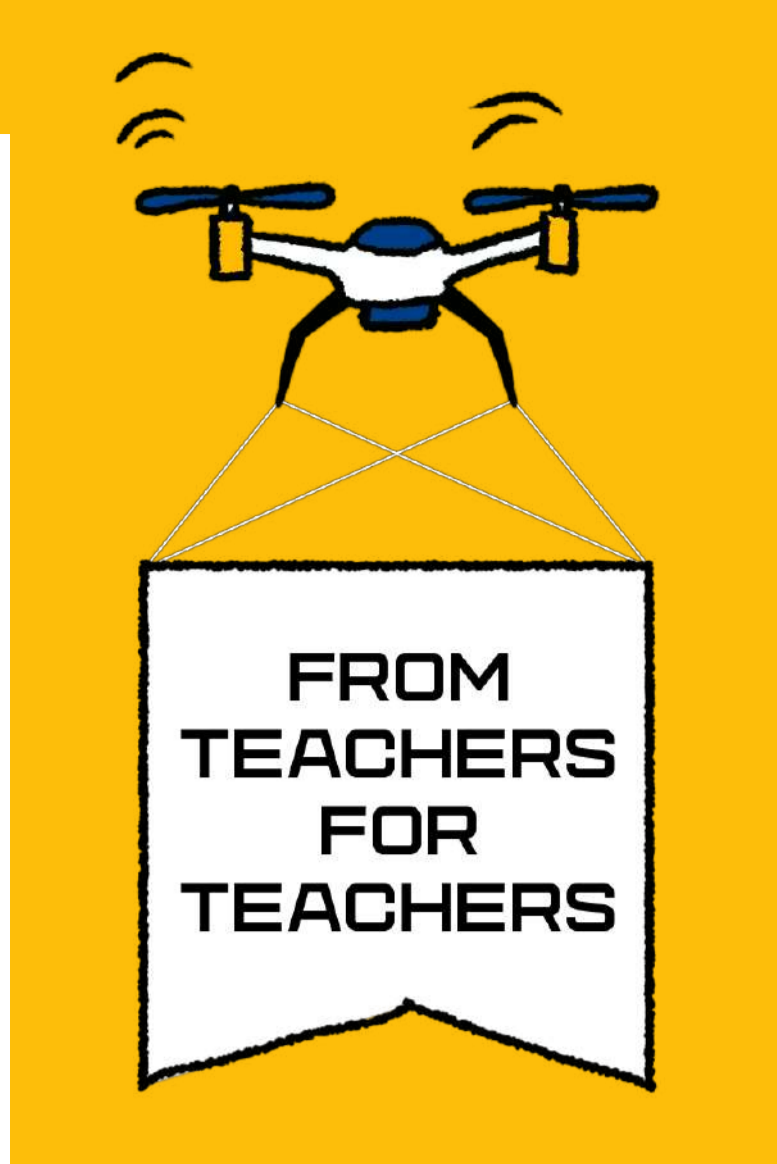
### 4<sup>th</sup> year: KS2-year 5 students

Aronauts: students explored the characteristics of Mars (Ares) and assembled a compendium of basic guidelines so as to help the future manned missions to the red planet..



**Conclusion:** Astrobiology is the guiding line that has allowed us to carry out several research projects in which primary school students follow the official science curriculum through multidisciplinary work whilst discovering the latest achievements in space exploration.





# SCIENCE FOR THE YOUNGEST

Jenny Rastovic | Älmhults Montessoriskola | Älmhult | Sweden

## Gingerbread House inc.

- inspire students to find their own solutions

By mimicing a 'real world' project we try to give our students an engaging way to understand that there are often more than one solution to a problem and that every task in a project is equally important if we want to reach the desired result.

When you as the teacher takes on an observing role, not acting as the expert, you inspire the students to find their own solutions rather than giving them a correct answer.

Since the materials used are inexpensive you get a lot of experimenting for your money without digging a huge hole in your budget.



Examples of tasks included in the project.

- Make sketches
- Construct blueprints in scale
- Experiment with recipes
- Bake sturdy parts
- Assemble from instructions
- Decorate

There are many solutions to a problem and every step in a project is equally important.