**Bernd Schaunitzer| Polytechnische Schule Gleisdorf | Gleisdorf | Austria**

# Construction of a Circulating Fluidised Bed Laboratory Unit

## with Data Logging and Evaluation

Within the framework of a project between the Polytechnische Schule Gleisdorf and the Montanuniversitaet in Leoben, school pupils planned and constructed a circulating fluidised bed unit for use in the university laboratories.

Pupils specialising in electrical engineering, information and communication technology, metalwork and mechanical engineering, as well as commerce and clerical work contributed to the creation of the unit, from planning and building the frame to programming the built-in microcontroller for collecting and analysing the data generated.
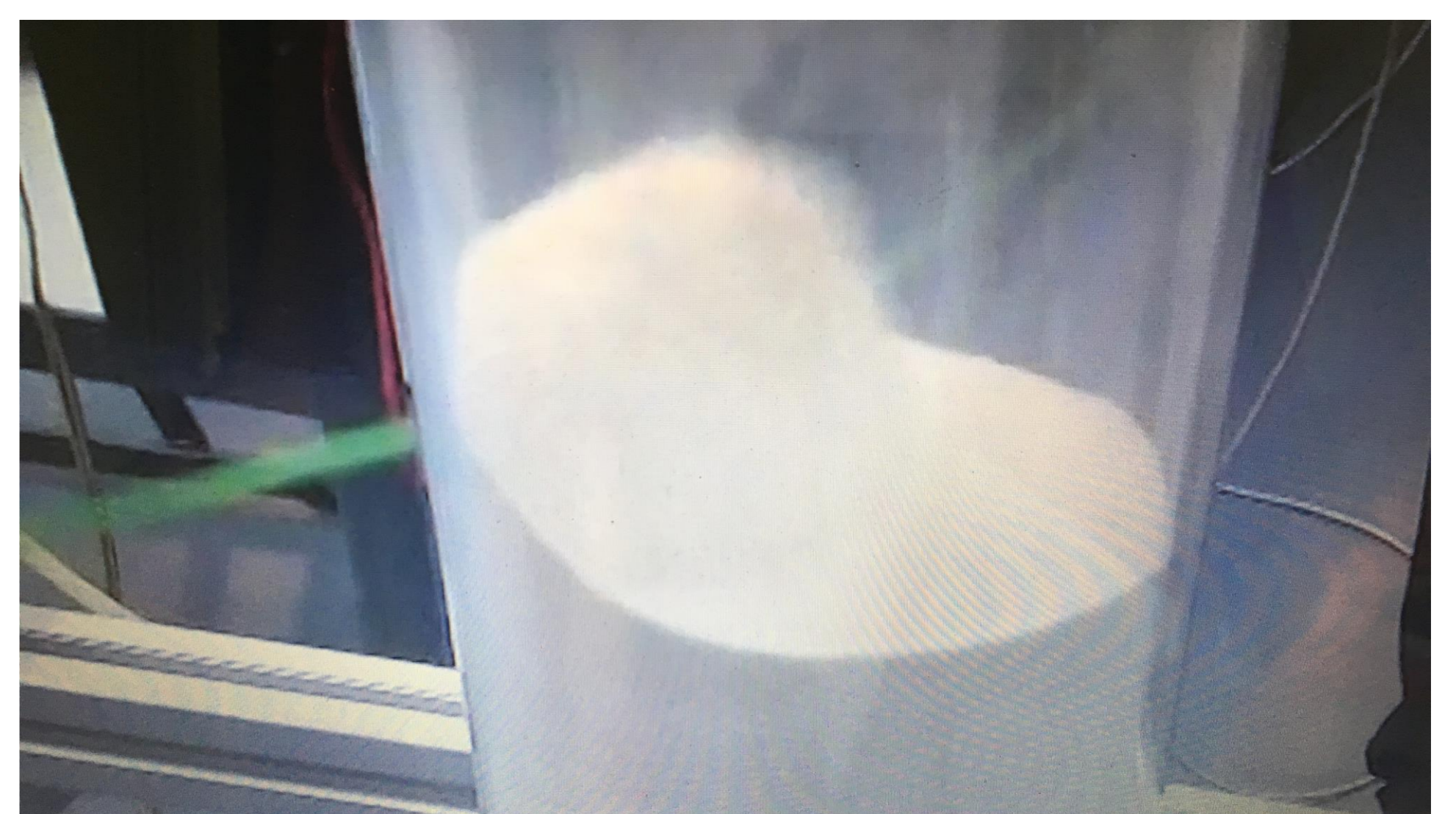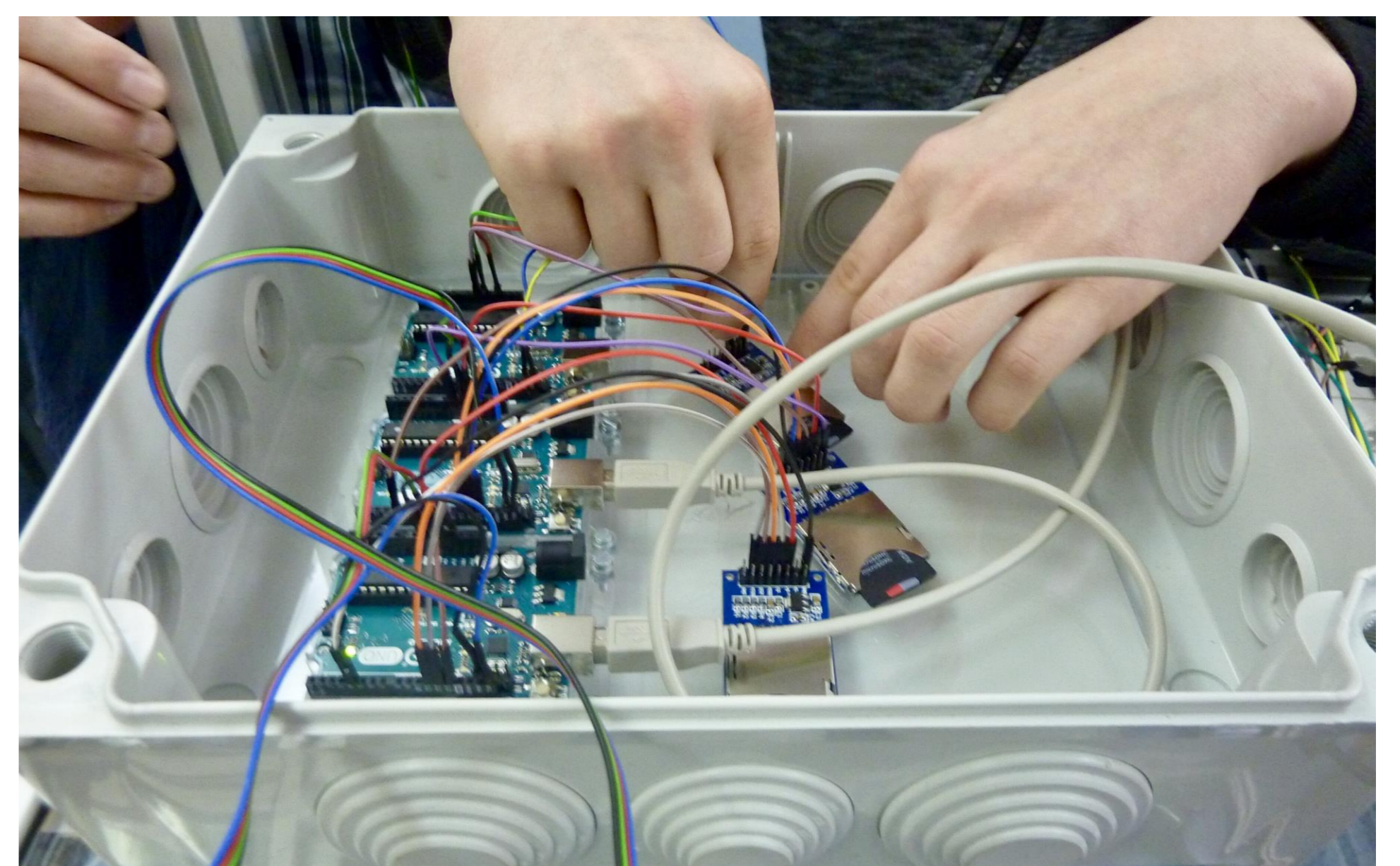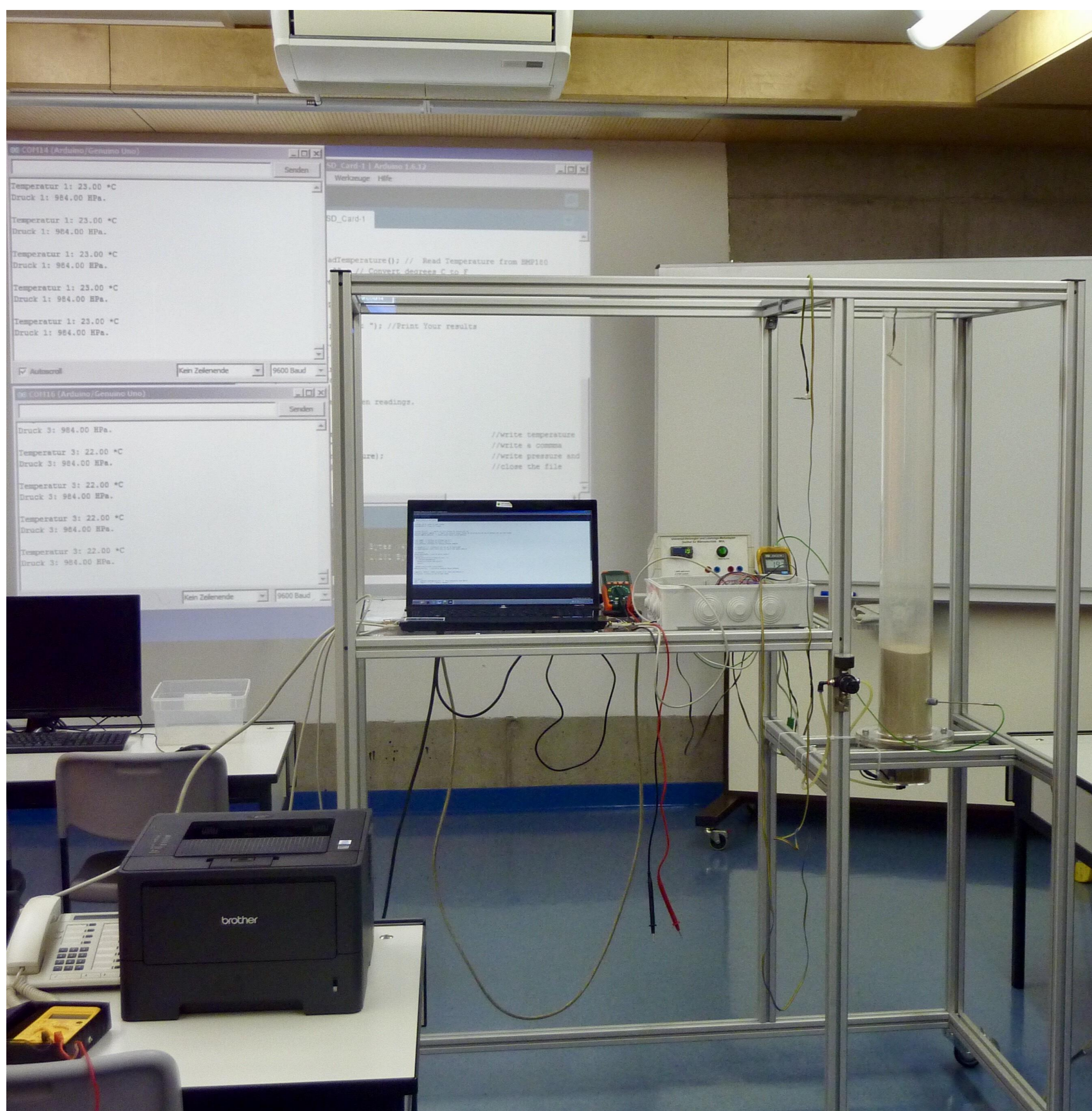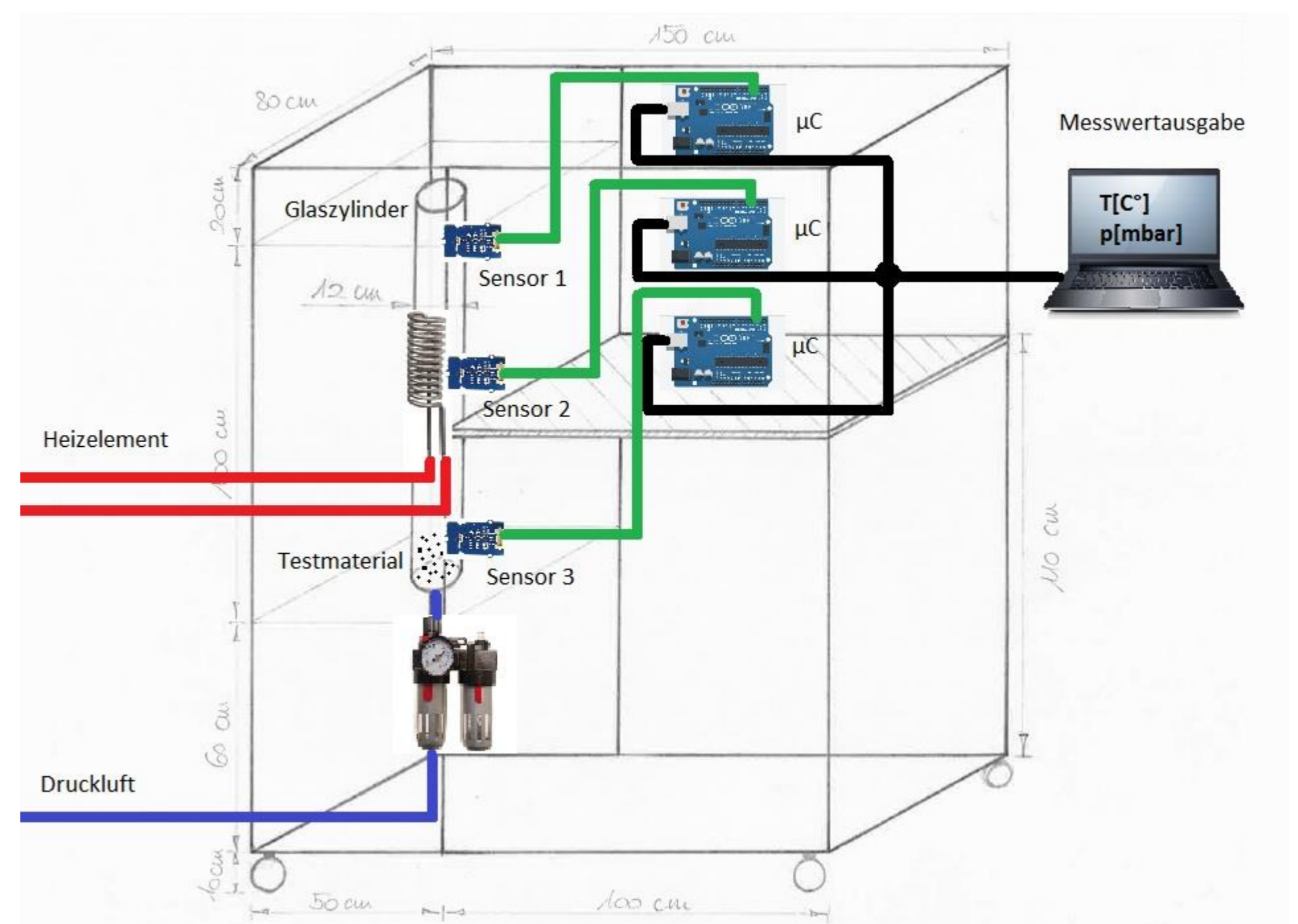








The unit is currently in use at Montanuniversitaet in Leoben, where it contributes to the research on thermal processing technology.
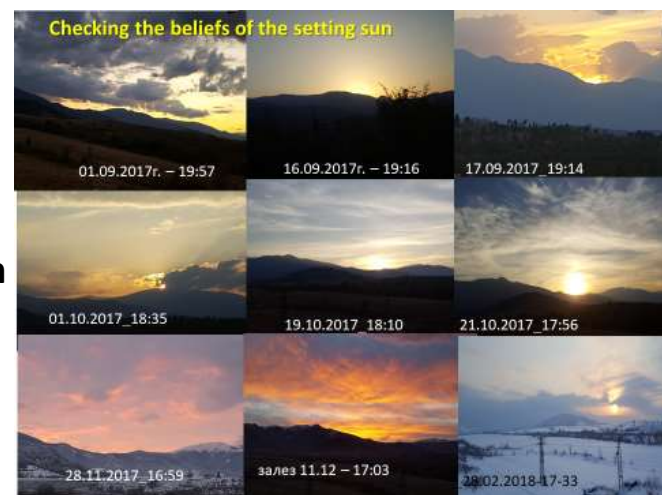
**Radka Kostadinova /Ivan Vazov High School / Varshets / Bulgaria**

# Folk beliefs about weather and astronomy

## Reliability of Folk Meteorology According to Observations of Astronomical Objects

**The purpose of this project is to study the popular believes about the weather dependence on the position of different astronomical objects such as the sun, moon, constellations and to check their accuracy.**

**The project is being implemented over a long period of time – one year. First, the folk believes about meteorological and astronomical objects is studied from the literature and the locals. To assess the truth in the people's believes, we observe astronomical objects. The students worked hard to collect and analyze a large amount of information. They enjoyed working on the project ,as it was connected to their local culture and traditions.**



Checking beliefs of halo Moon:
07.09.2017    11.10.2017    09.11.2017
05.12.2017    09.12.2017    31.12.2017



Checking the beliefs of the setting sun
01.09.2017г. – 19:57    16.09.2017г. – 19:16    17.09.2017_19:14
01.10.2017_18:35    19.10.2017_18:10    21.10.2017_17:56
28.11.2017_16:59    залез 11.12 – 17:03    28.02.2018_17-33



| № | Sunset weather check | | | |
|---|---|---|---|---|
| | Believe | Time | The weather in the next day | % Credibility |
| 1 | If at sunset, the sky is red - the weather will be nice or even nice | 12.09 | 13.09 Sunny and hot | 100% |
| 2 | | 16.09 | 17.09 Sunny and warm | 100% |
| 3 | | 19.09 | 20.09 Cloudy, light rain | 0% |
| 4 | | 03.10 | 04.10 Partly cloudy | 50% |
| 5 | | 13.10 | 20.10 Sunny | 100% |
| 6 | | 19.10 | 27.10 Sunny | 100% |
| 7 | | 26.10 | 29.11. Rain | 0% |
| 8 | | | | average 65% |
| 1 | If there are many clouds at sunset and red clouds, expect a strong wind the next day; | 12.12 | 13.12 clear and quiet | 0% |
| 2 | | 05.12 | 06.12 clear and quiet | 0% |
| 3 | | 30.11 | 31.11 cloudy, yellow wind code | 100% |
| 4 | | 22.11 | 23.11 part. sunny, light breeze | 50% |
| 5 | | 10.11 | 11.11 cloudy | 0% |
| 6 | | | | average 30% |
| 1 | If the sun is red at sunset, a very strong wind is expected the next day. | 22.10 | 23.10 cloudy, windy | 50% |
| 2 | | 15.10 | 15.10 Cloudy skies, wind. | 50% |
| 3 | | 14.10 | 09.10 cloudy, precipitation | 0% |
| 4 | | 08.10 | 02.10 sunny | 0% |
| 5 | | 01.10 | | average 25% |

**CONCLUSION:** Local, folk believes about the weather can be trusted, but one should always check with the forecast satellite maps

**Asinou Primary School| Nicosia | Cyprus | Georgia Mylordou**

# Introducing educational robotics and creation digital learning environment in the teaching of mathematical concepts

The present work is a didactic approach in which two subjects of Mathematics and Design and Technology are involved. This didactic approach is based on the use of educational robotics (LEGO Mindstorms EV3 educational core set) for teaching mathematical concepts. It has been applied to children aged 11-12 years and is based on experiential - exploratory learning. The basic concepts that could been taught by using robotics are proportions, distance measurement, negative and positive numbers, and understanding basic geometric properties such as the perimeter. There is also the possibility of intuitive awareness of complex phenomena such as the relationship between speed, time and movement.

Lesson plans are organized in the form of digital games, combining the virtual with the real world. Each lesson is designed to accomplish a mission such as planning a robot to explore Mars or mapping specific EEZ Cypriot plots.
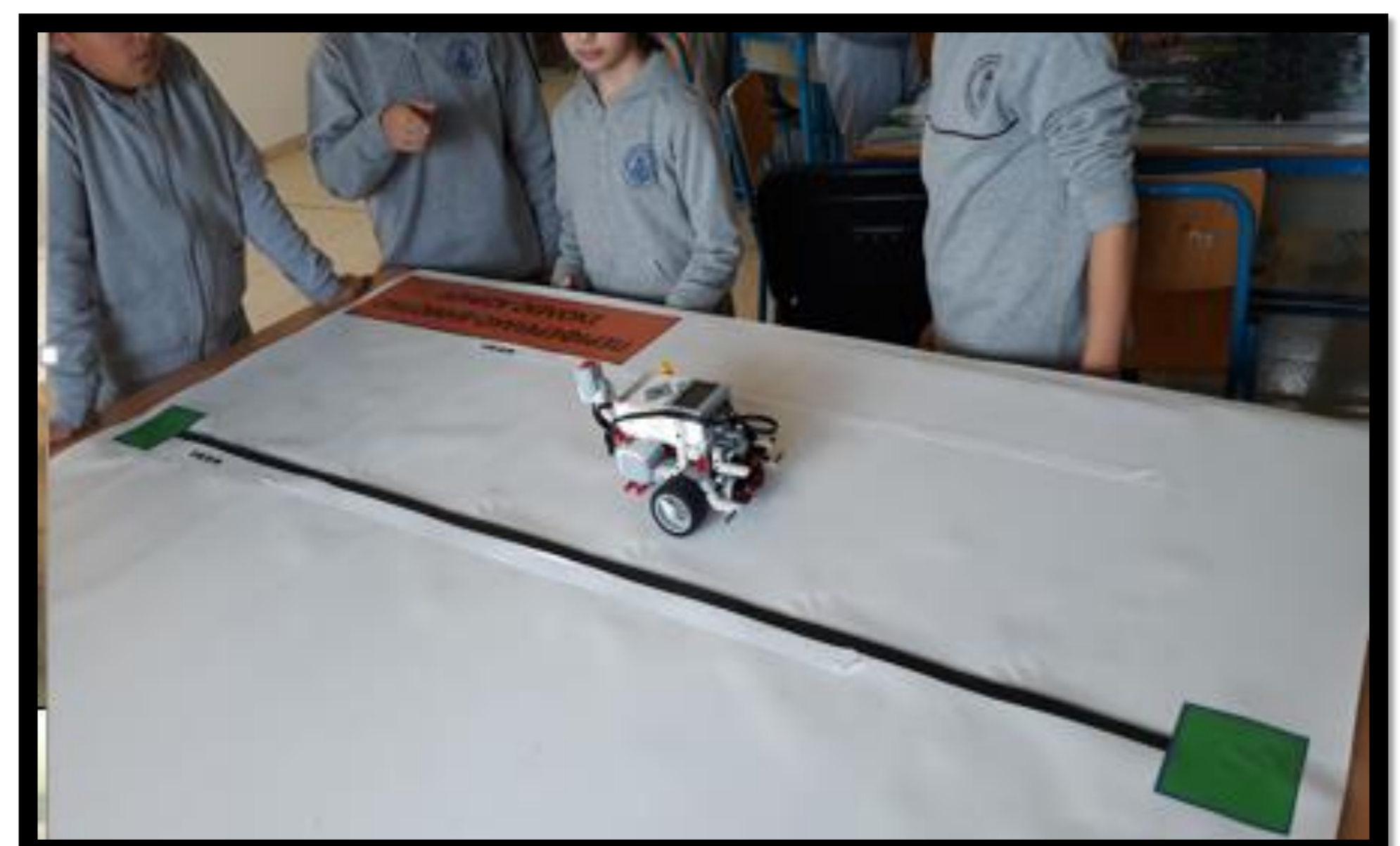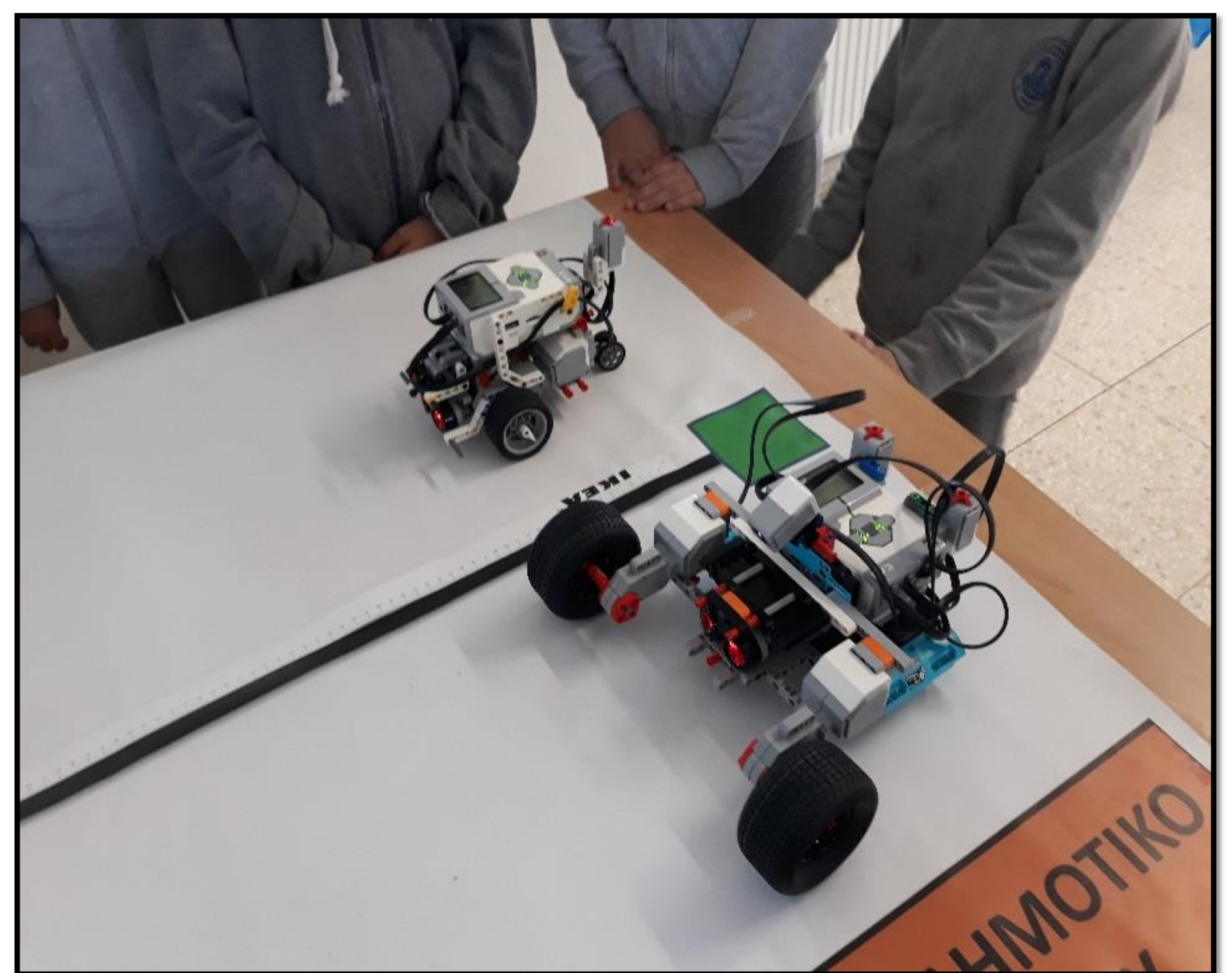




This project has been a challenge but also a 2-year work to incorporate educational robotics into the current curriculum of Cyprus.

**Aira Karassaari and Hanna Littow | Keminmaa comprehensive school  | Keminmaa | Finland**

# Young People Learning Statistics
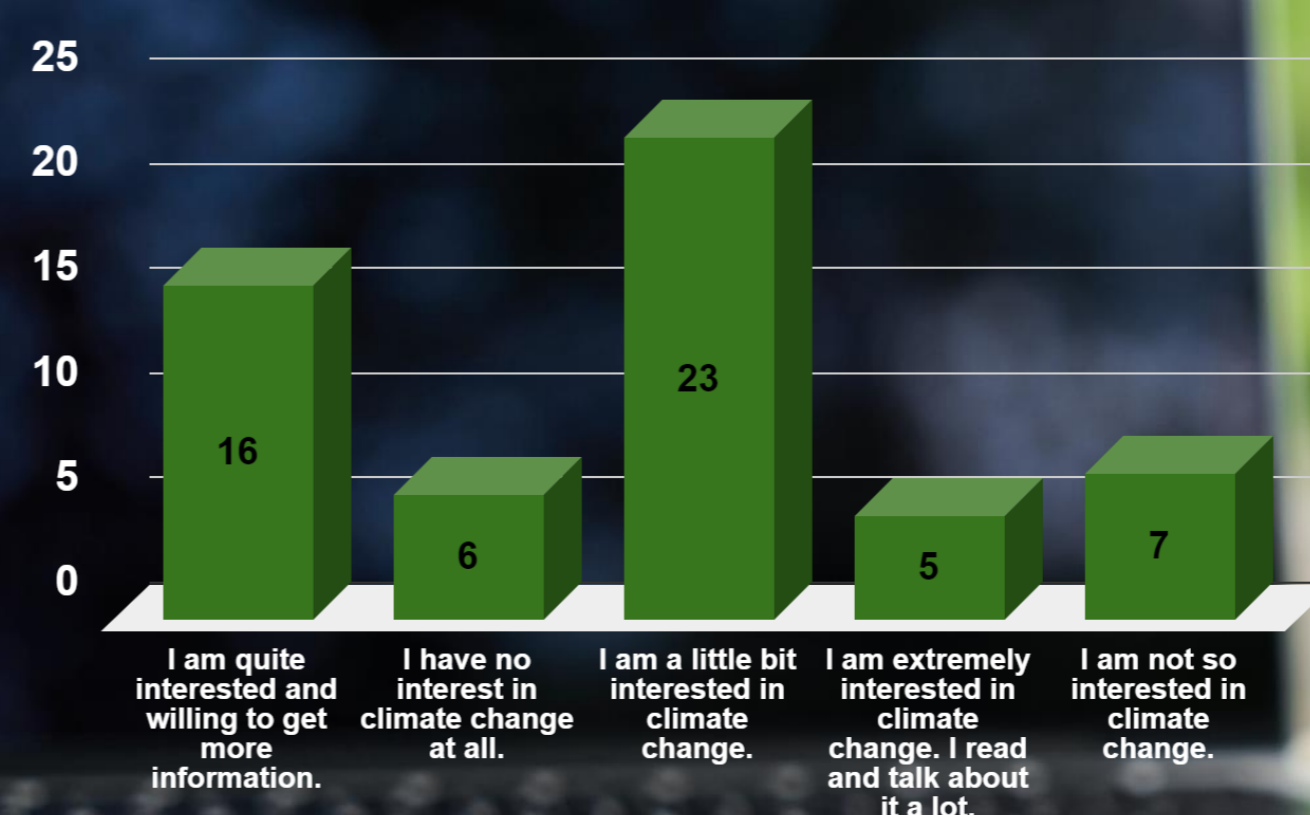
## Practise combines math and native language studies

Purpose of this practise is to learn statistics in a modern and practical way. Students

- choose interesting topic
- prepare a questionnaire
- make a report
- give a presentation
- write a column

Topics reflect students wide interest in our society, to their lives and things that are related to their future.





Vastanneista suurin osa pelaa 1-2h päivässä joka on suosistusten mukainen aika.

Poikien vastaukset

Tyttöjen vastaukset



**How interested are you in the climate change?**

| | |
|---|---|
| 16 | I am quite interested and willing to get more information. |
| 6 | I have no interest in climate change at all. |
| 23 | I am a little bit interested in climate change. |
| 5 | I am extremely interested in climate change. I read and talk about it a lot. |
| 7 | I am not so interested in climate change. |

According to the survey only few were extremely interested in the climate change. Most people were interested in subject a little bit. My hypothesis was that more people in our school would have been very interested in the climate change.

\* Statistic survey by student Emmi Juntikka

Carrying out this research students learn a useful tool for prosessing information. Working this way provides opportunities for experimentation and active learning and increases students sense of responsibility. All work is done in a digital environment.

Practise combines math and native language studies but it is easily transfered to any subject or age group. Exploratory and inquiry learning have both been thought of. The practise is strongly based on our national core curriculum for basic education.

## Statistics is for everyone!

Marie-Amélie Cazelles-Serin | Anna de Noailles Middle School | Larche | FRANCE

# Augmented Reality Sandbox

## From maps to 3d Models

The Augmented Reality Sandbox is a technologic device which combines a real situation and virtual elements. The real data, usually collected outside, can be greatly enhanced through the use of virtual resources which helps to increase the students'knowledge as it relates to real life situations.

In other words, the AR Sandbox allows us to understand, in a more efficient way, the circumstances that lead to natural events such as floods, tsunamis, volcanic eruptions along with the associated risks and the measures that can be taken to decrease the negative effects of such natural events.

### General Operating Principle



3D Camera
Short-throw Projector
PC with AR Sandbox Software
40"
Sand     "Water"
30"
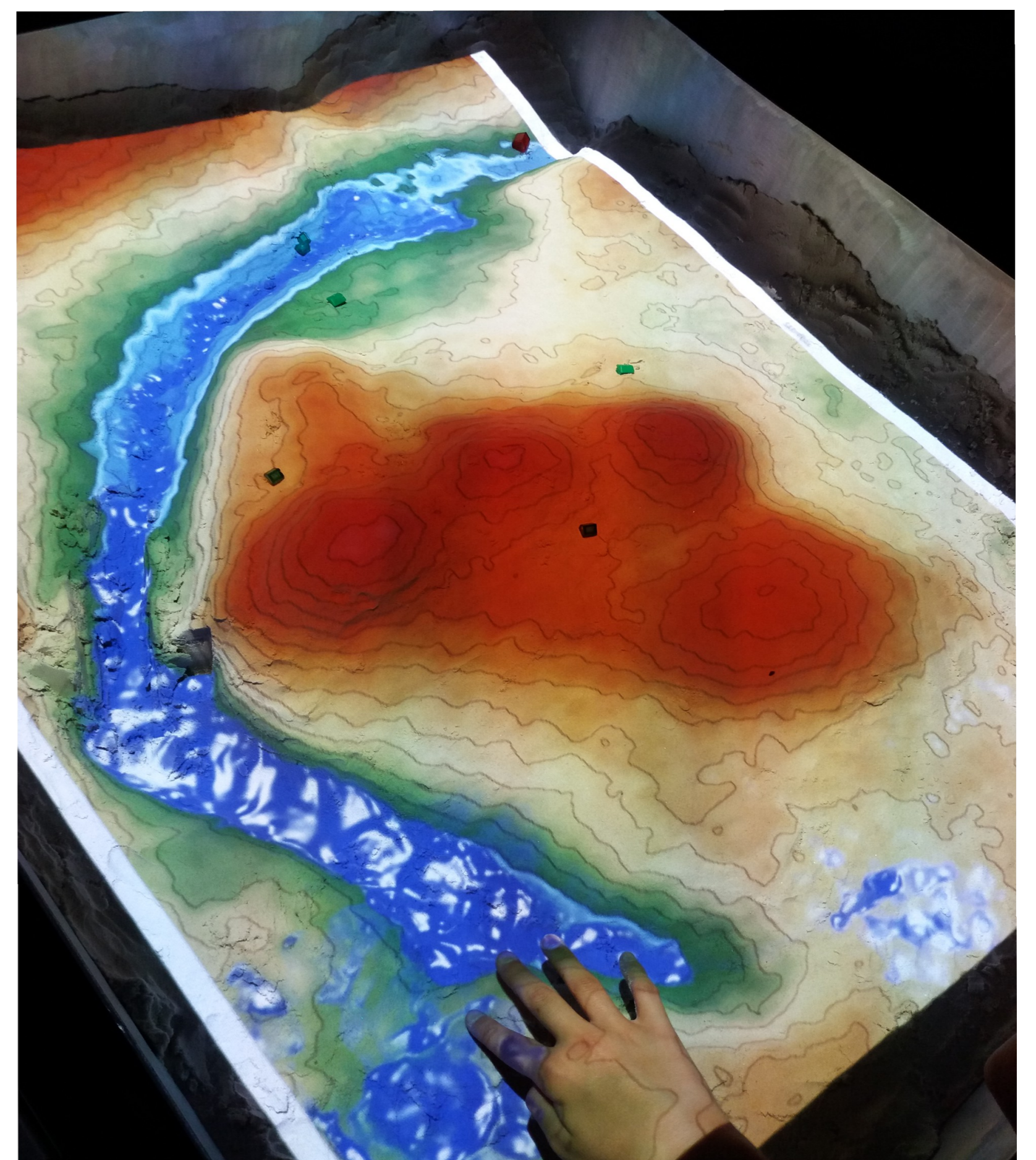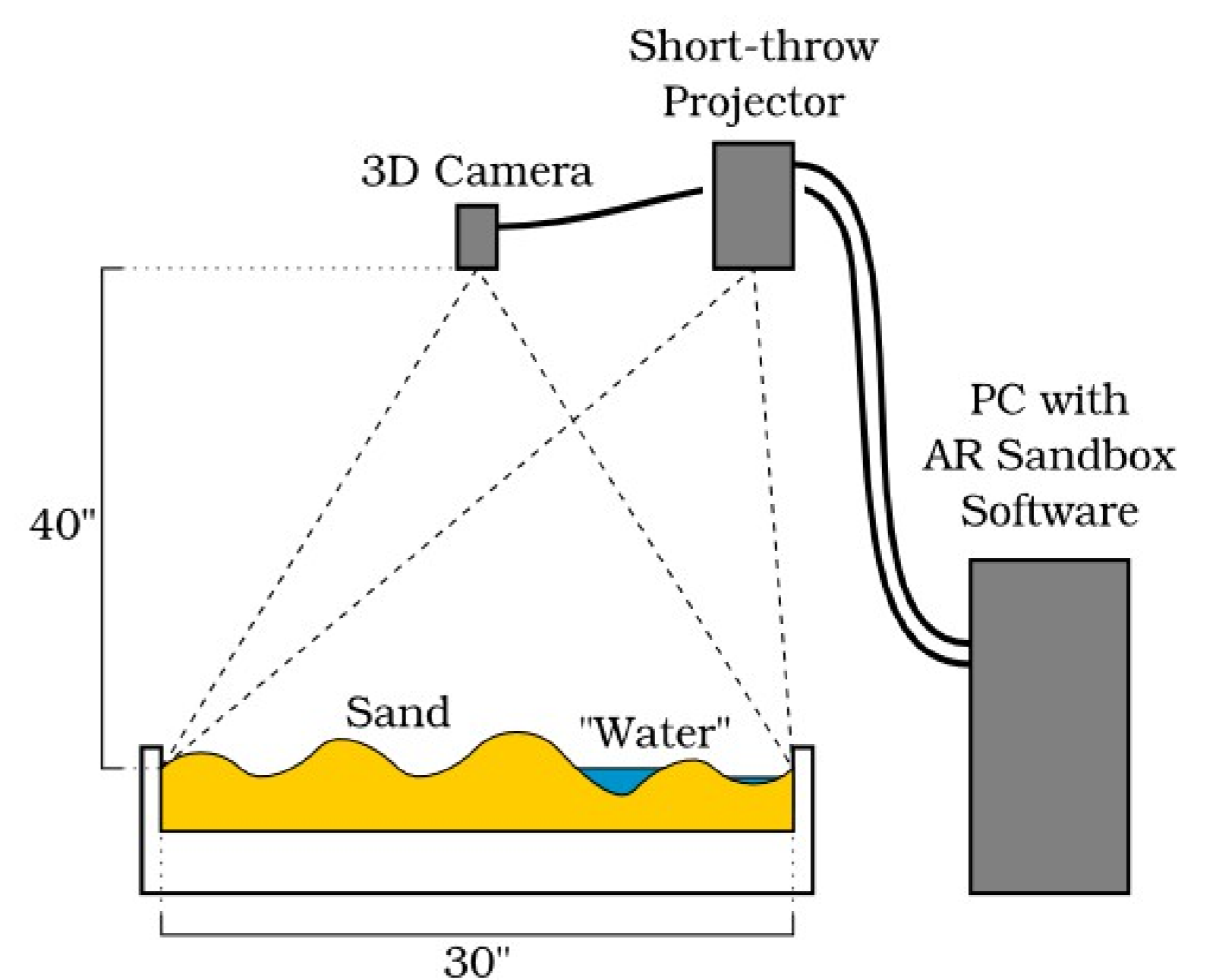




Positive points for the pupils :
- Group work involving a strong involvement
- Flood risk awareness
- Investigative processes including an outside session and leaflets making

The AR Sandbox is an innovative and motivating device that allows students and teachers to build analogic models reinforced by 3D technology.

**Dr. Daniel Janssen | Gymnasium Dionysianum | Rheine | Germany**

# Machine Learning in school

Neural Networks, Deep Learning, Machine Learning - these are catchwords that have generated a tremendous media response in recent years. The presented teaching unit not only examines the technical side, but also the social and ethical impact of this development. Pupils learn how artificial neural networks are constructed and how these can learn in a self-organizing way. They design neural networks with the modeling tool MemBrain, compete to see which group achieves the highest recognition rates in the famous IRIS data set and use the JAFFE data set and Gimp to design their own face model in order to recognize faces and calculate recognition rates, respectively. As deep learning techniques will determine our daily life even more in the future, a critical examination of this topic is important in modern STEM education.



$$w_{ij}(t+1) = w_{ij}(t) + \eta(y_j - o_i)x_i$$
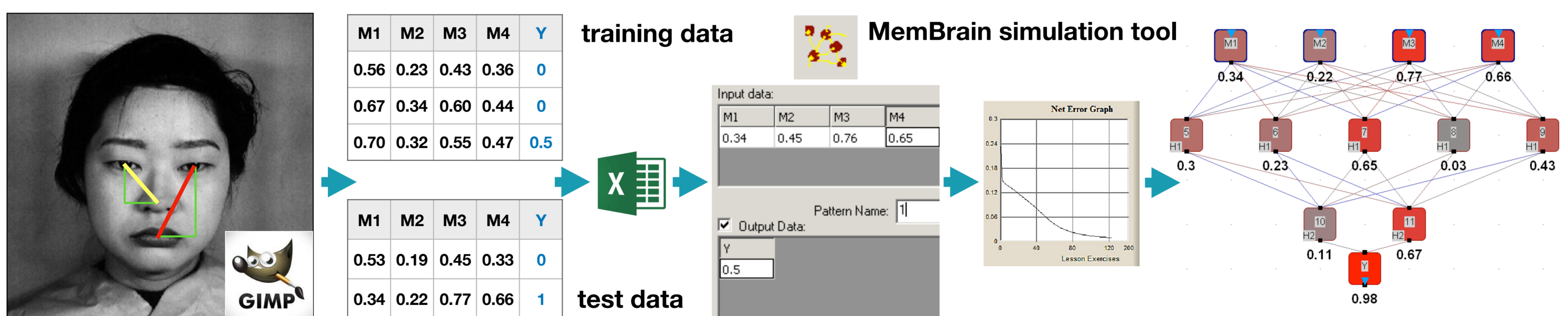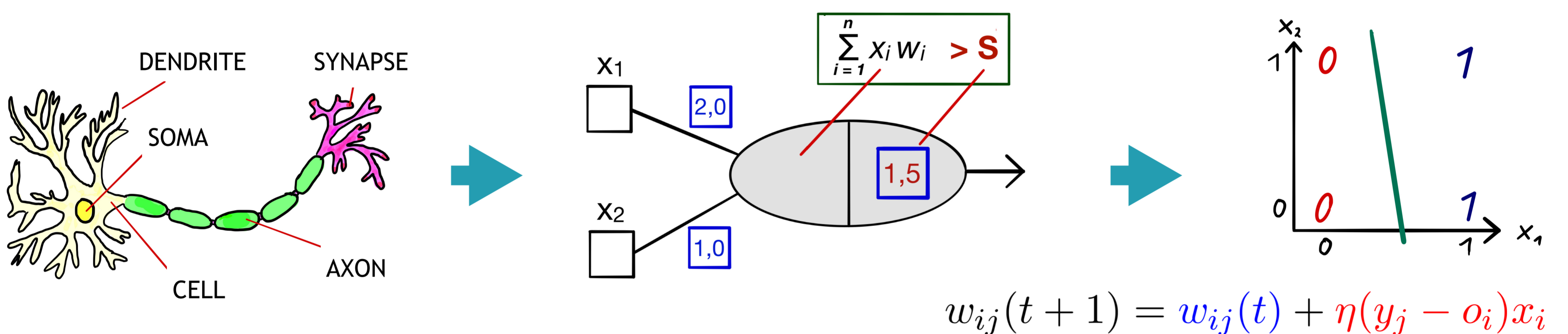


**Face recognition with artificial neural networks:** Pupils design their own simple face model and train their own neural network with MemBrain. Subsequently, pupils test if their network can recognize the learned faces from new unknown photos.

What if training data are not sufficient for the planned task? What about military application of face recognition? This will be our future. So let's talk about that!

autonomousweapons.org

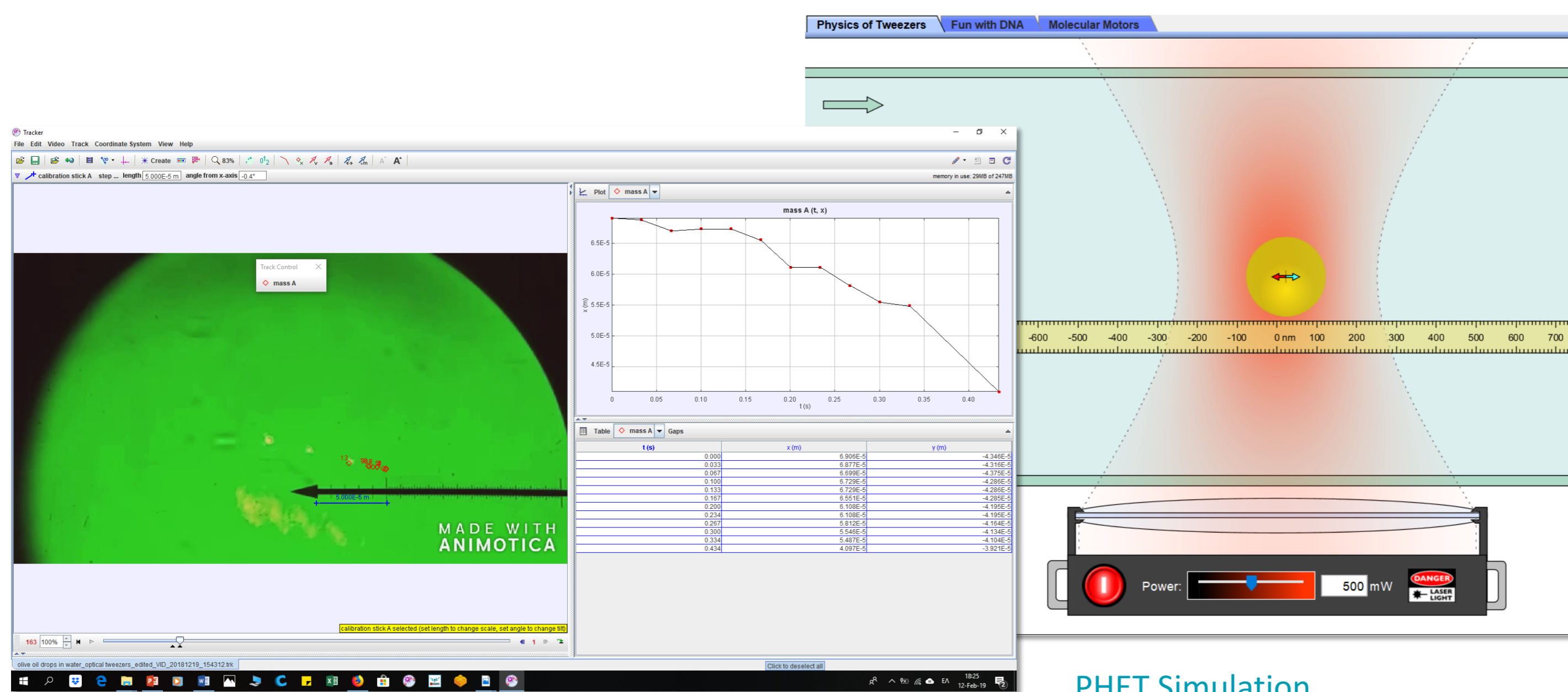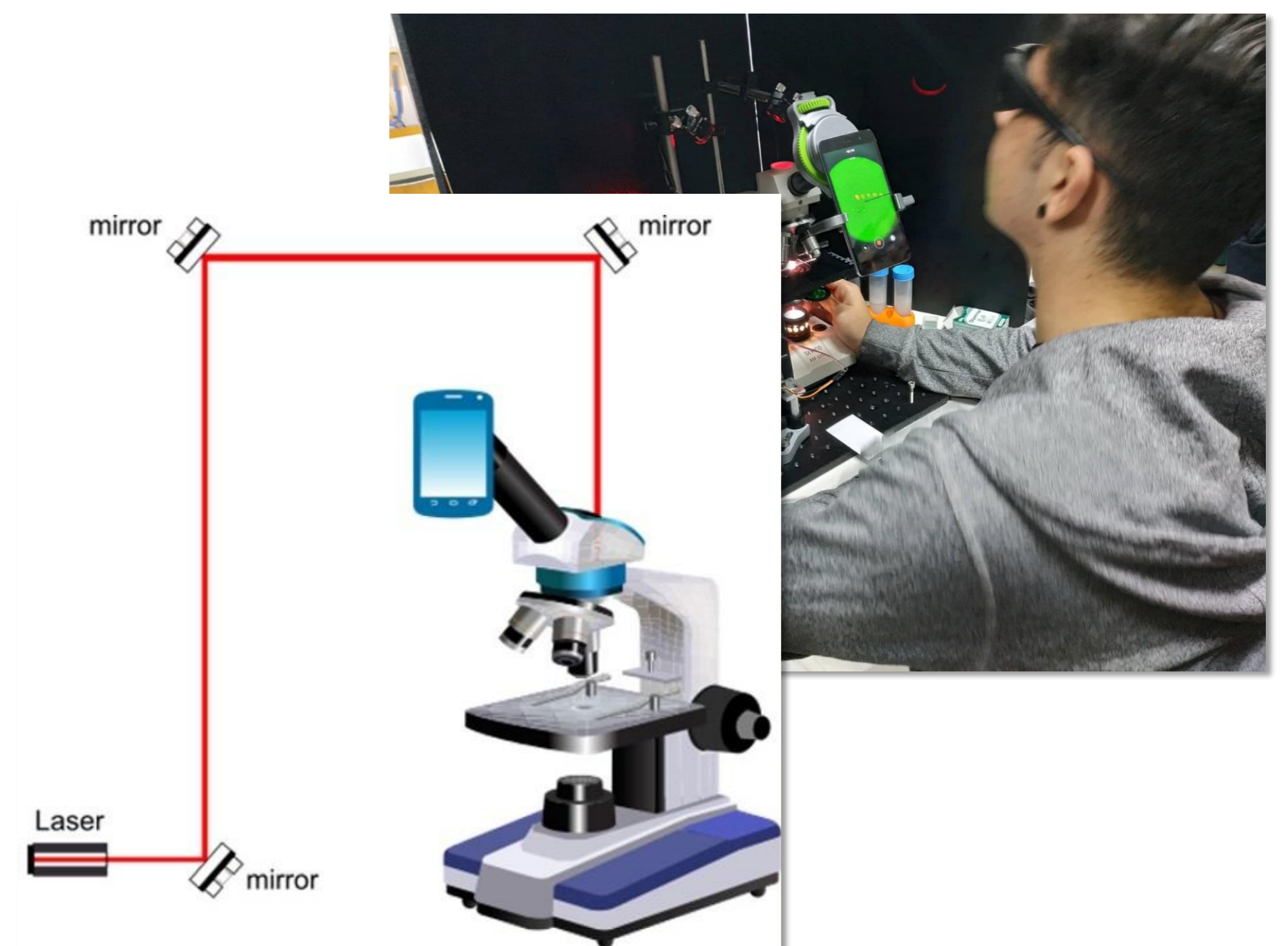# Digital Literacy and Science Education
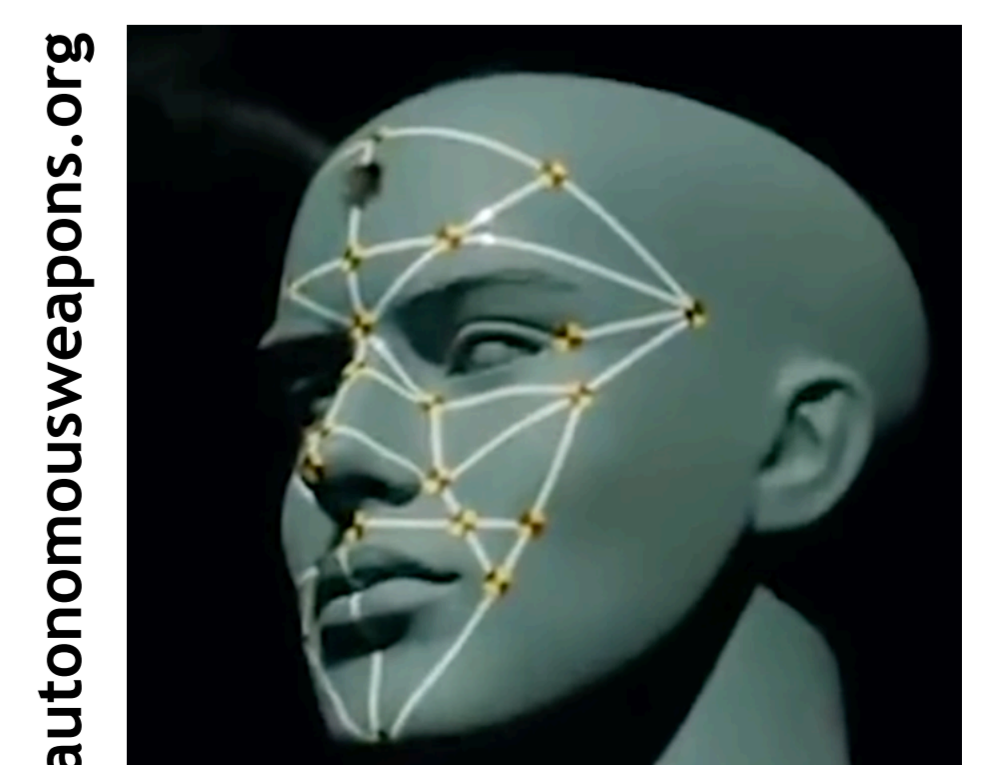
Michalis Orfanakis | Gen. Lyceum of Makry Gialos, Gymnasium Koutsouras | Ierapetra | Crete | Greece
Mikis Mylonakis | IESL – FORTH | Heraklion | Crete | Greece
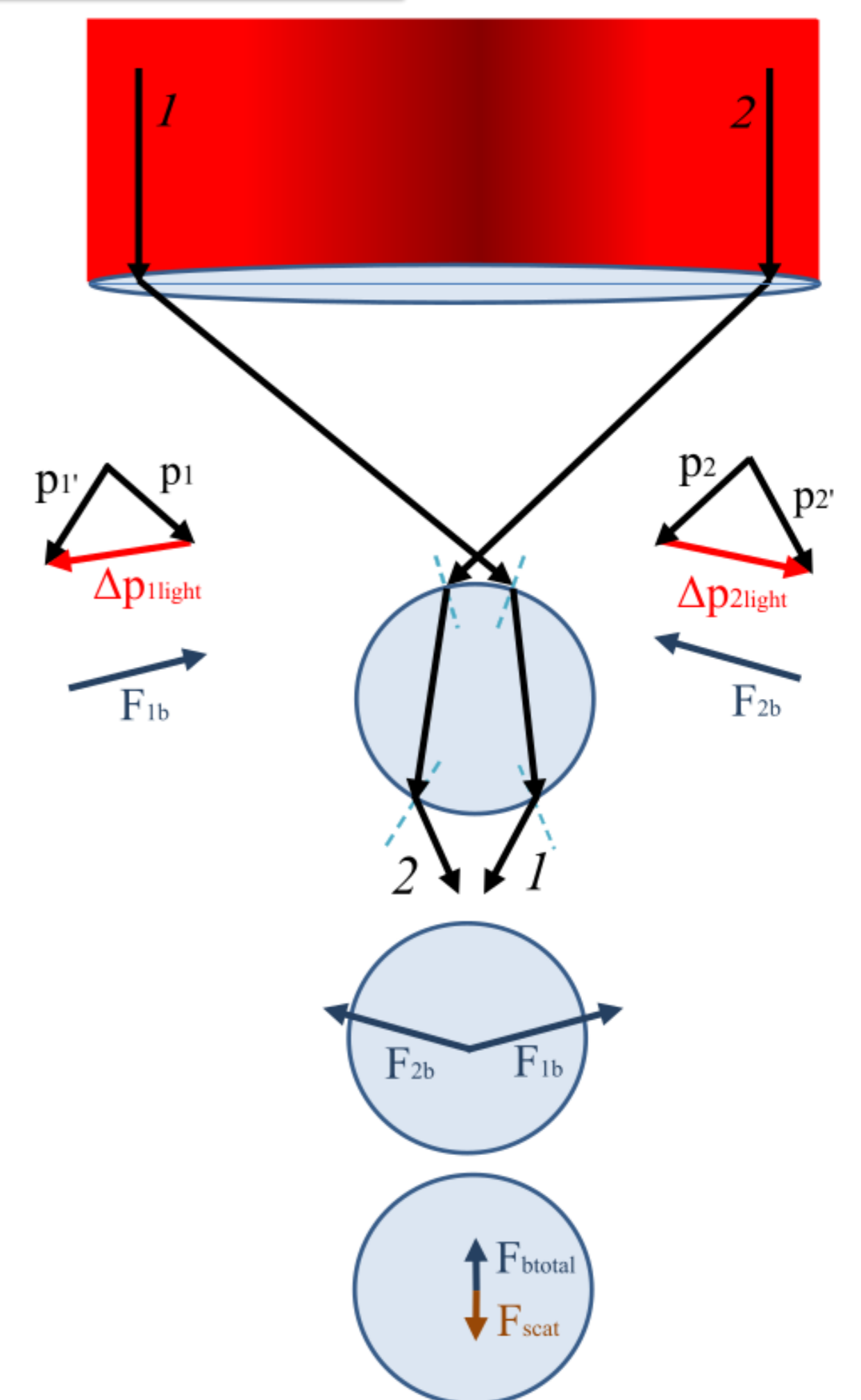
# Optical Tweezers
## The Nobel Prize in Physics 2018 @ your school

- The 2018 Nobel Prize in Physics explained with high school Physics based on hands-on experimental activities, simulations and diagrams.

- Optical trapping and manipulation of cells, particles and micro organisms.

- Measurements of extremely weak pN forces of optically trapped objects with "Tracker" open source software.

- The first ever Optical Tweezers modality developed for Secondary Education.

Tracker Software

PHET Simulation

**Brings modern Science in School.**
**The most simple and low cost microscope Optical Tweezers ever made.**
**Build your Optical Trap and work like Scientists do.**

https://goo.gl/1h1Zig

**Michelina Occhioni| IC San Cesario di Lecce | San Cesario di Lecce | Italy**

# Techland

## mathematics and science in a virtual world

Techland is an OpenSim virtual group of educational and service islands focused on Maths and Science for K6–K8 degree students.

Since 2010 it has worked to engage pupils and to make learning easier. Students and teachers log in as avatars and explore, meet together, collaborate, build and code, expressing creativity and knowledge.

Year by year teachers' and students' activities have continuously developed and improved, tending to be harmonized and blended together. Students also actively contribute building from scratch entire islands focused on specific topics. Learning by doing and collaborative learning join together in the **Inquiry-based learning methodology** where teachers facilitate and support learning.

Grid loginURI: http://techlandgrid.it:8002

## Steps of an IBL project in a VW

1. Get information (research and hands-on experiments)
2. Build scenarios and 3D learning objects (interactive scripted objects)
3. Develop contents (panels and multimedia presentations
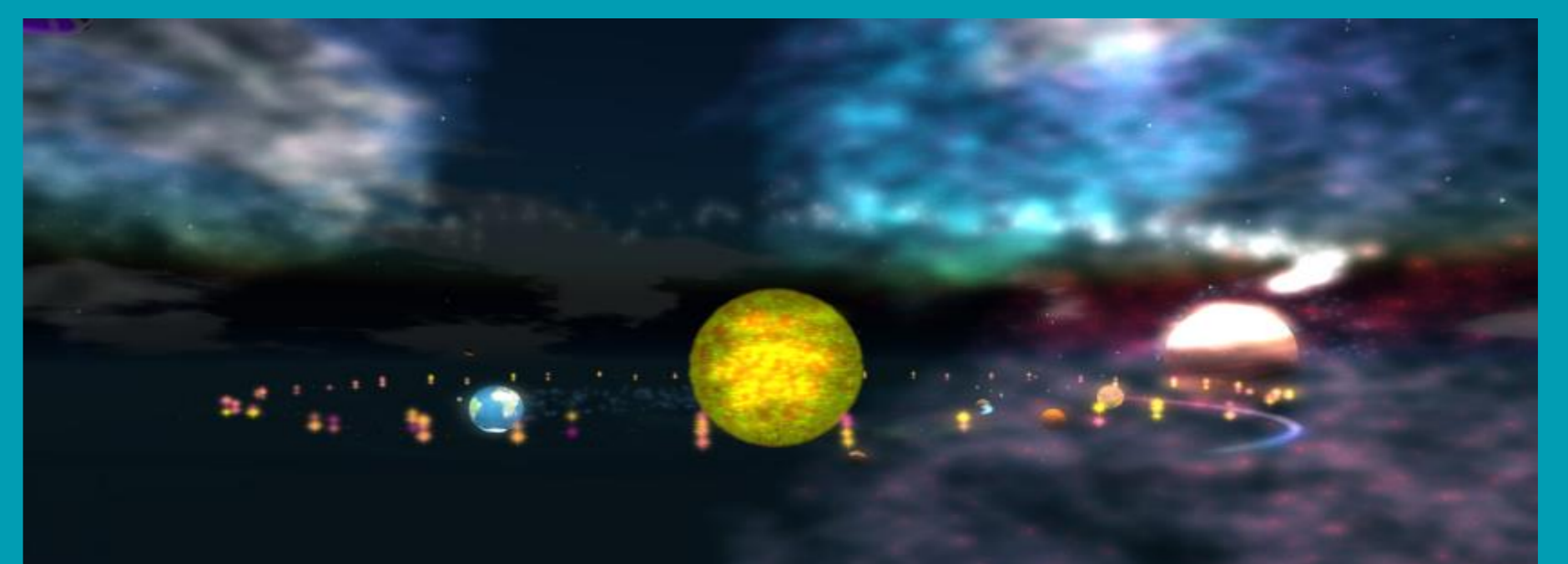4. Make *machinima* videos and videolessons (screen capture)

techland

**www.virtualscience.it**



*Welcome Area, Mathland, Statland , Techstore*



*Bioland, Earthland and Waterland*



*Spaceland*



*Metroland*
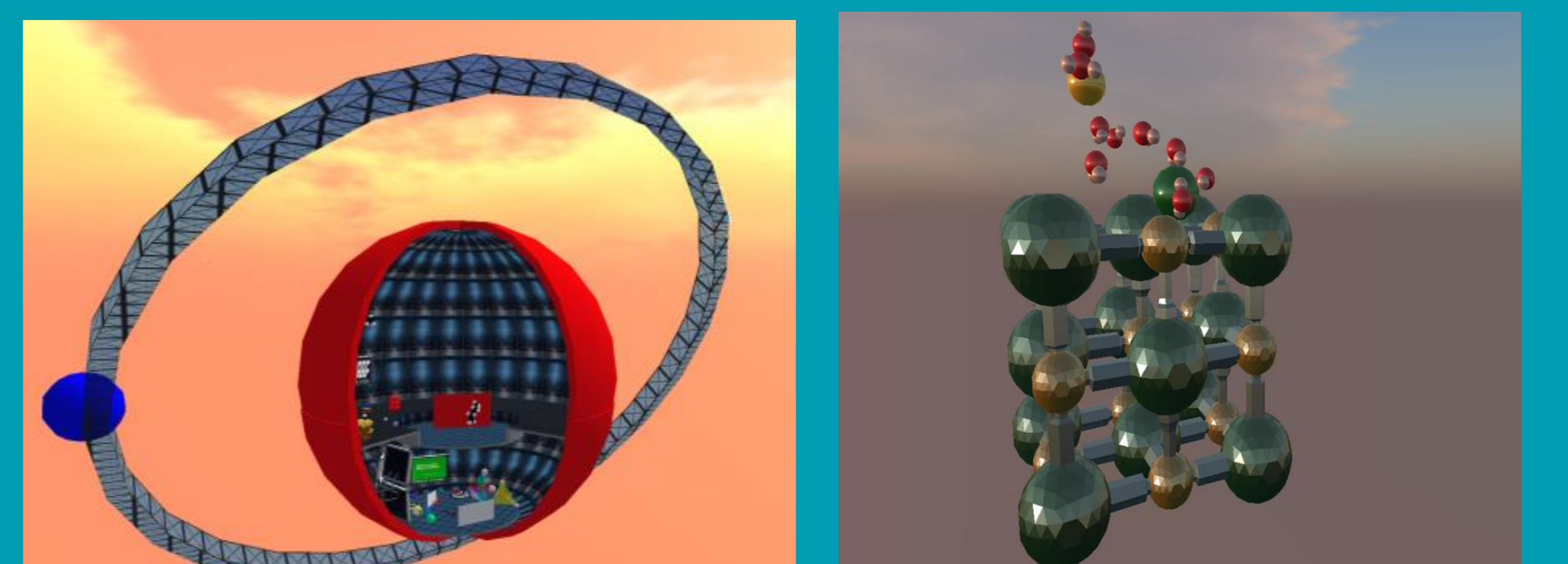


*Atom Palace & Crystal Palace (Chemland)*

Michelina Occhioni
aka **Michelle Techland**
owner of Techland

Beyond the concept of "classroom" as the only learning environment.

**Livia Pirovano| ITIS „Marconi" | Gorgonzola | Italy**

# Walking along the chromosomes

Adopt a chromosome is a CusMiBio project for high schools. Each school has "adopted" a different chromosome, teachers with their student created "gene cards" of some of the most relevant genes present on it and prepared **a poster**; when a gene card has been completed the name and the position of the gene are annotated on the chromosome together with a QR code allowing to access to all the information collected in the card, (gene, protein, mutations, relevant aspects of the associated disease, curiosities, links to videos…).
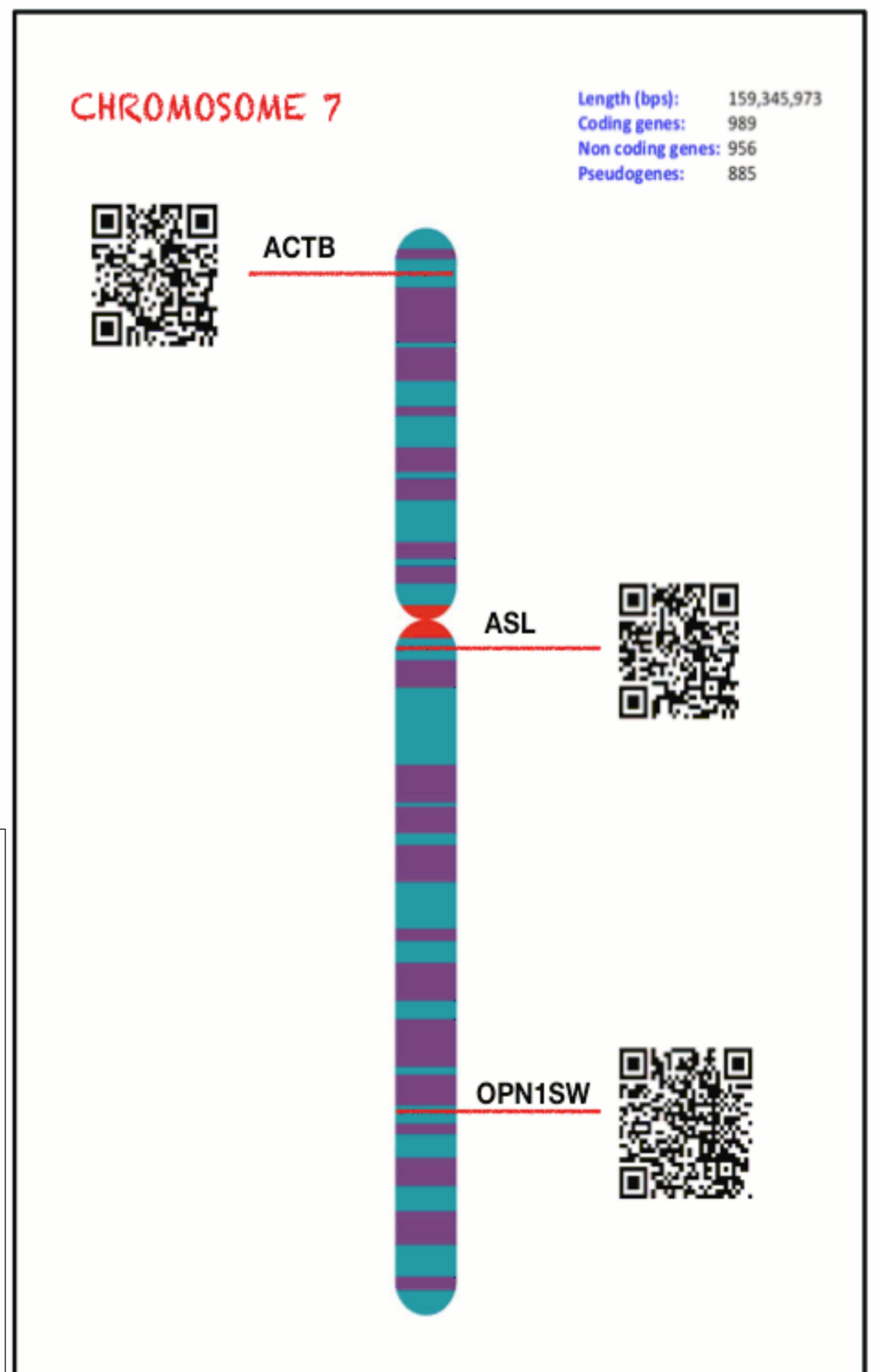


**Fig 1**: poster of chromosome 7 with 3 genes annotated and respective QR codes



**Fig 2**: an image in the opsin (OPN1SW) gene card.
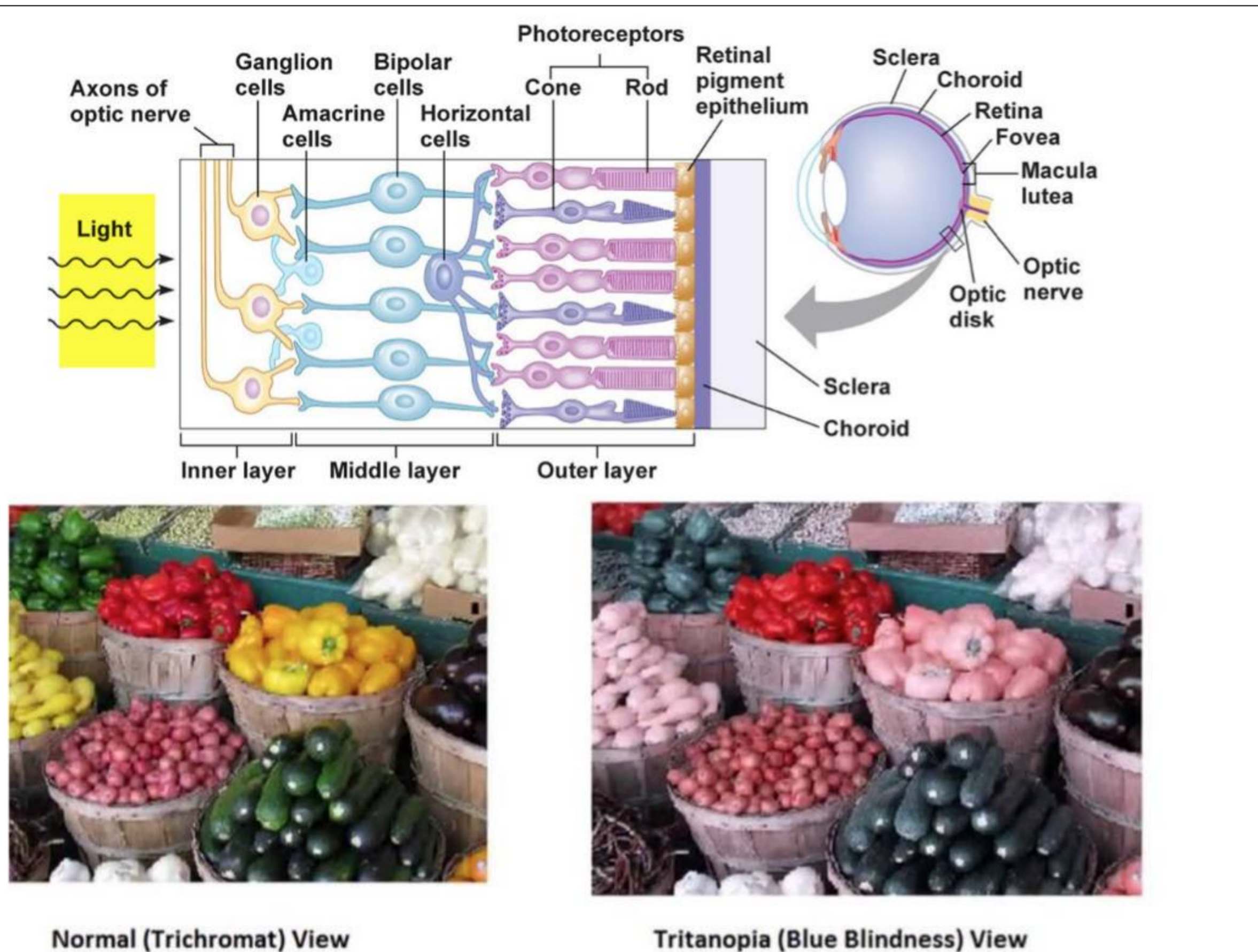
The results of the collaborative work between CusMiBio and High Schools are placed on a dedicated space in the CusMiBio website (www.cusmibio.unimi.it/genoma.html) and are updated continuously with the contributions of the participants to the project.

**Conclusions:** teachers working in tandem with their students can create new "gene cards" visiting the **relevant databases**. This procedure of "**Citizen Science**" can increase the public's understanding of science.

**Mnuar Yernat| Nurmakov School | Karaganda city | Kazakhstan**

# Modern science classroom
## Data-based guide to fostering curiosity and scientific thinking

It is one of the best ways to encourage children's interest in science and STEM concepts by providing them with classroom technologies such as sensors, interfaces and data collection and analysis software. The PASCO Digital Library contains hundreds of FREE experiments and lab activities for children to learn to be thinkers, builders, and inventors.



Look for equipment that encourage important Scientific skills such as creativity, exploration, observation, and flexible thinking. They are not some brilliant new inventions. They just combine innovative, easy to use products with world-class support. But seeing the truth of them will cast a light on what science should be, and that light will inspire teachers to find their own ways of practice.
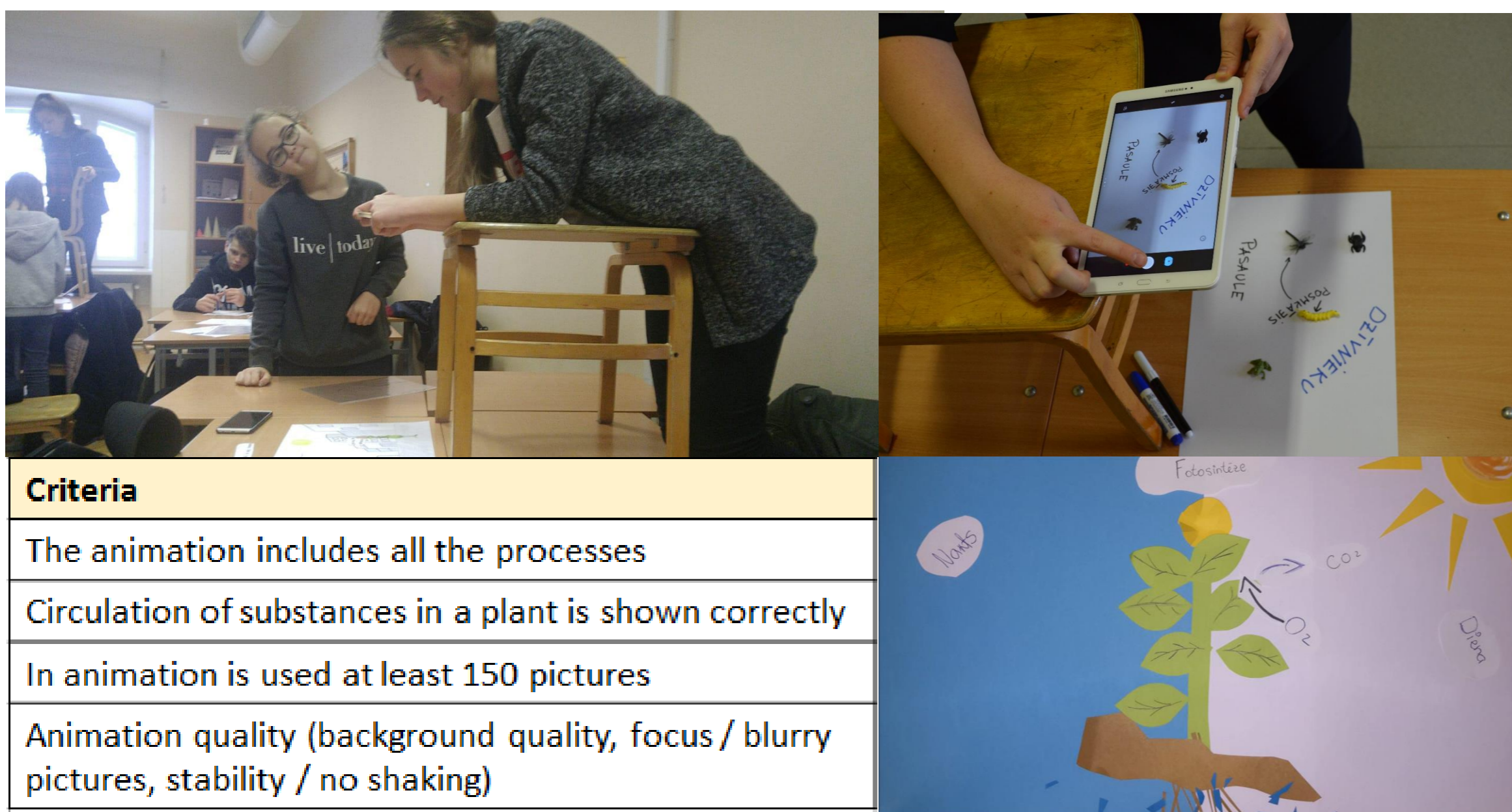






*"it fits all ages, even the seven ages of man! it satisfies brilliant children and discovers intelligence in the dull. it secures attention, interest, concentration without effort on the part of teacher or taught"*

**Charlotte Mason**

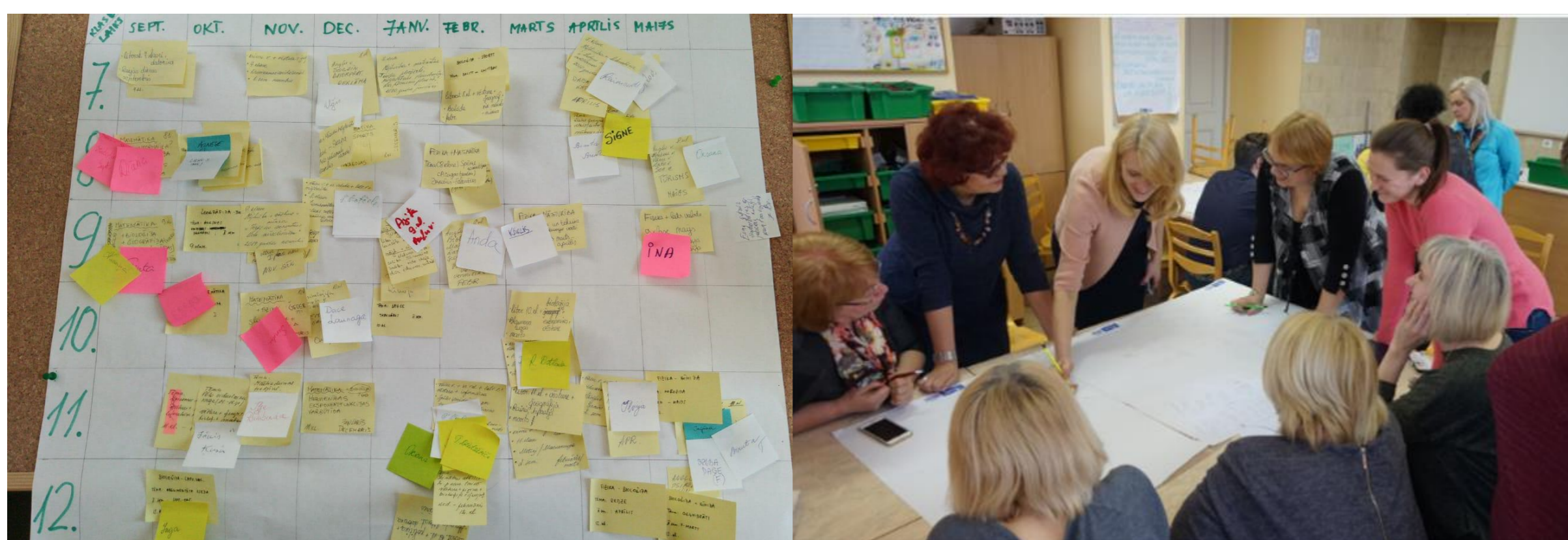**Liene Sabule, Liene Krieviņa | Jelgava State gymnasium | Jelgava | Latvia**

# Creating animation and video in science subjects

Computer literacy teachers with natural sciences (biology, geography) and English teachers collaborated in the project. The pupils within the project created animations and video in technology and various science subjects.
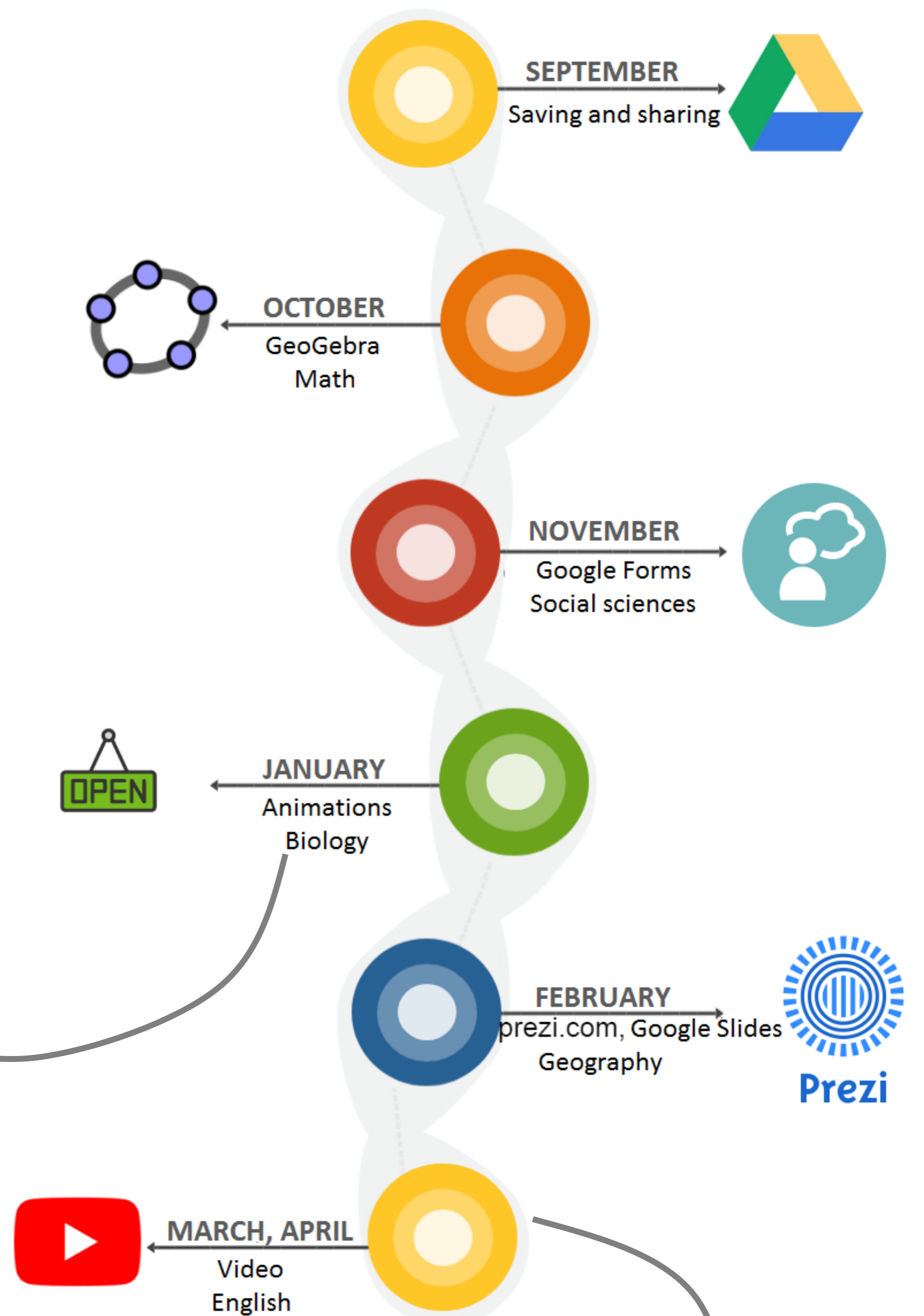


| Criteria |
| --- |
| The animation includes all the processes |
| Circulation of substances in a plant is shown correctly |
| In animation is used at least 150 pictures |
| Animation quality (background quality, focus / blurry pictures, stability / no shaking) |

As a result of the project, we have found that pupils progress in science and English has improved as well as cooperation and digital skills. Another benefit was the promotion of **teacher co-operation** in various fields and the enhancement of pupils' competences. The project will continue next year, expanding the number of teachers involved.

## COMPUTER LITERACY

grade 7

**SEPTEMBER**
Saving and sharing

**OCTOBER**
GeoGebra
Math

**NOVEMBER**
Google Forms
Social sciences

**JANUARY**
Animations
Biology

**FEBRUARY**
prezi.com, Google Slides
Geography

**MARCH, APRIL**
Video
English



Conclusion: The project was valuable - the competences of pupils and teachers in the fields of science and technology were improved and various skills developed.
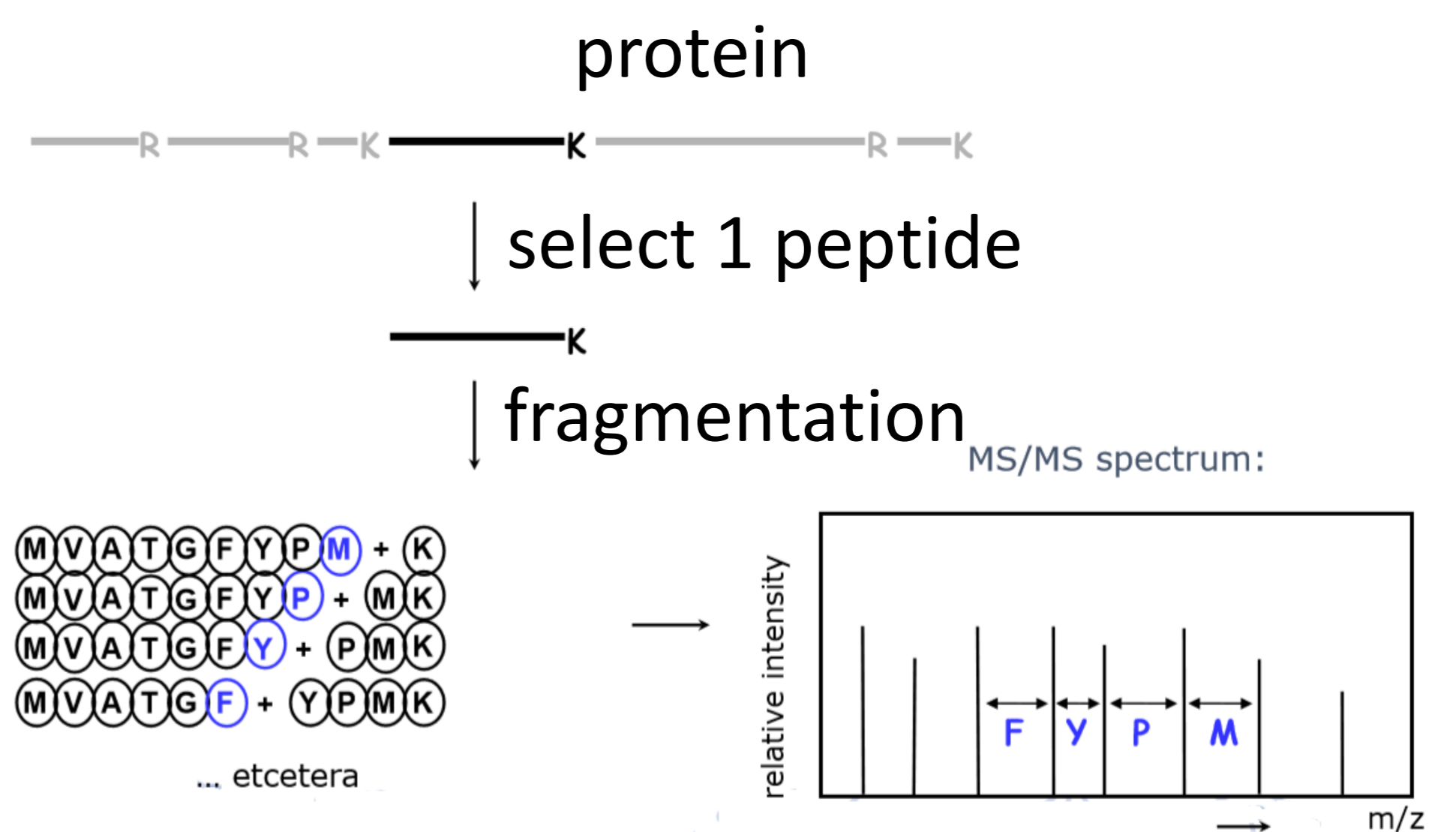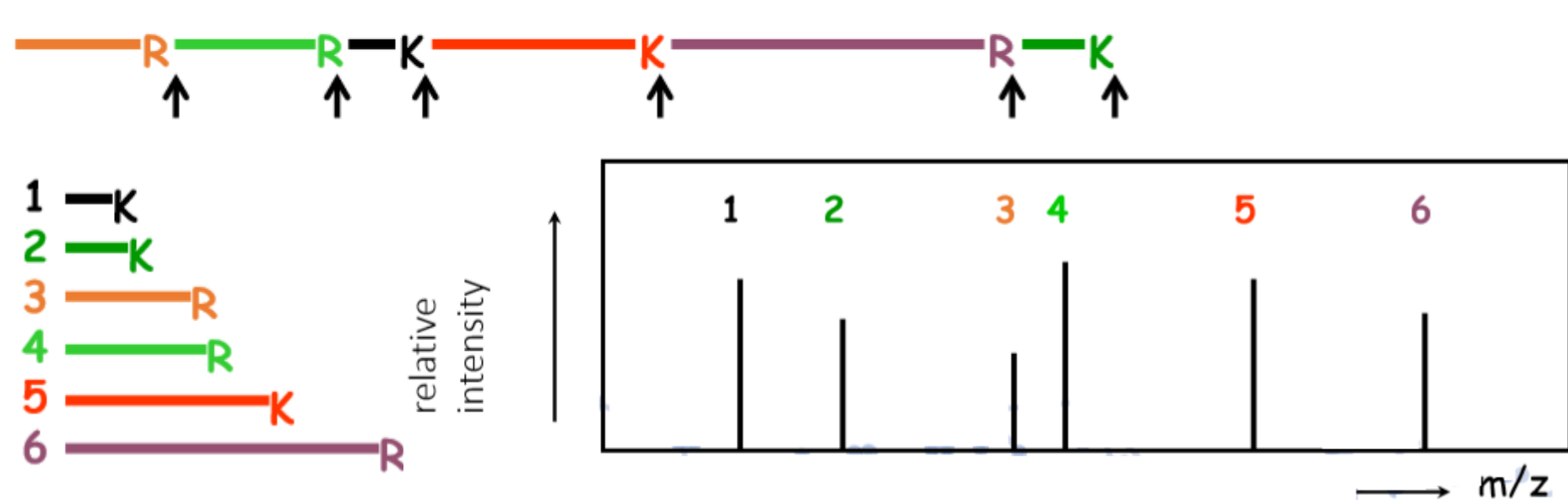
**Andrea van Bruggen- van der Lugt, Simone Lemeer, The Netherlands**
**U-Talent, Freudenthal Institute, Utrecht University**
**Biomolecular Mass Spectrometry and Proteomics, Utrecht University**
**Willem van Oranje College, Waalwijk**
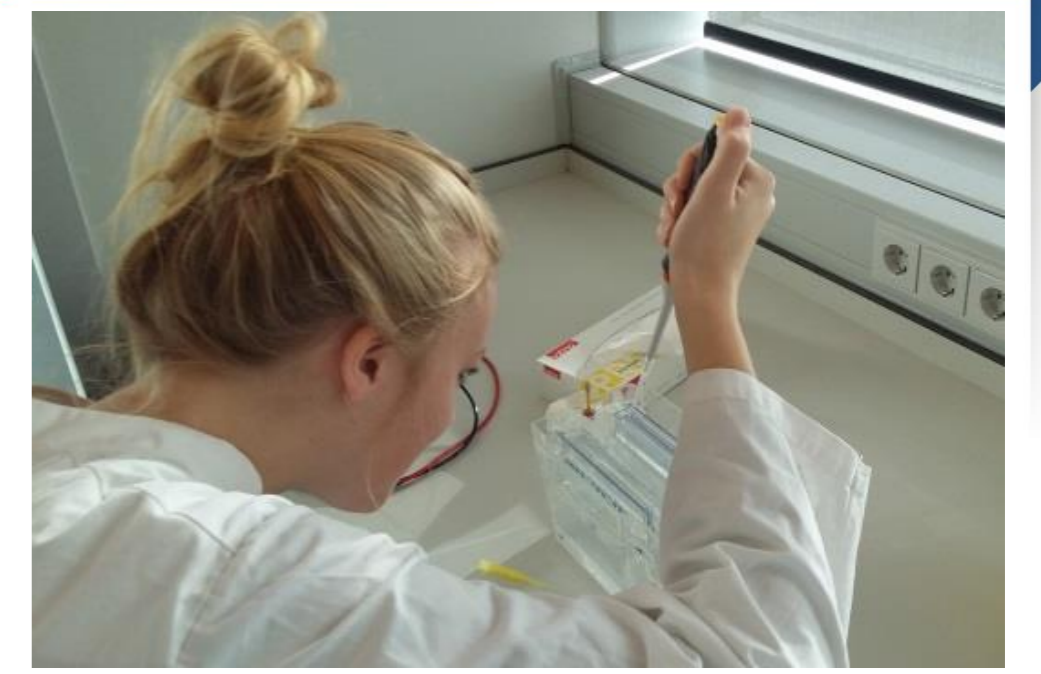
# Proteomics

## Mass spectrometry applied to protein analysis

Proteomics is the study of the proteome, the entire set of proteins that is produced by an organism. In proteomics research, mass spectrometry is an important tool for measuring changes in protein expression and protein modifications.



Proteins are digested with trypsin into smaller peptide species, after which the molecular weight of these peptides is measured.

In the practical part, students purify normal and sickle cell haemoglobin and digest them into peptides, which are analysed by mass spectrometry.



protein

select 1 peptide

fragmentation

MS/MS spectrum:



Subsequently peptides are fragmented, revealing part of their amino acid sequence.
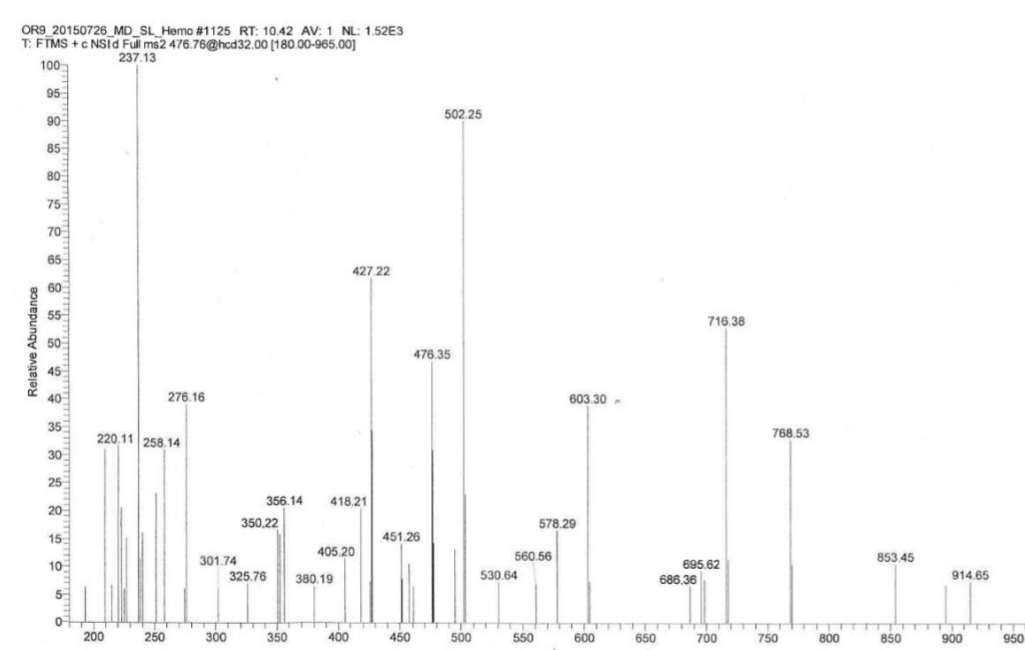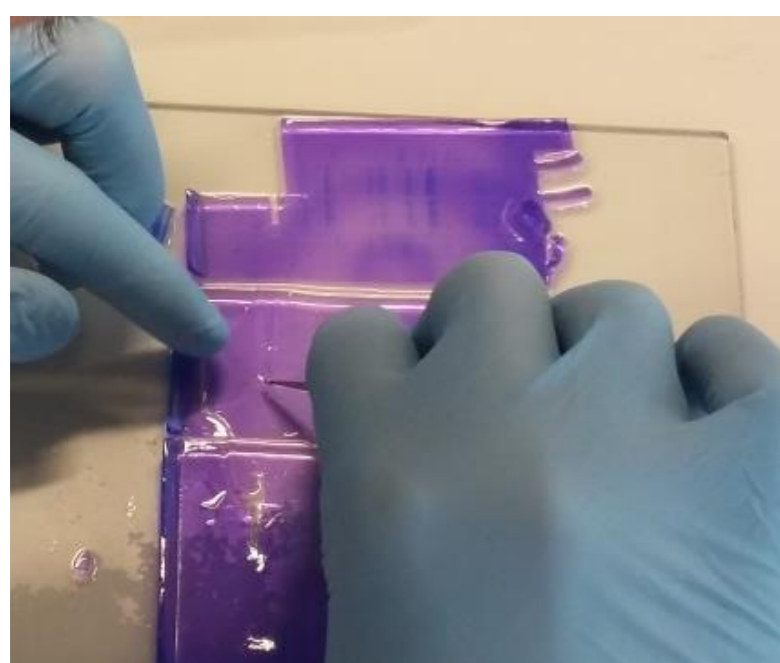
Finally, the students run the mass spectra data in the Mascot software engine to compare the fragment spectra against a database of known protein sequences, revealing the identity of proteins in the sample.

The project ends in predicting mass spectra of the native and mutant peptide fragments of the BRAF protein.

The students learn how to interpret mass spectra of fragmented peptides to find out which is the native or mutant version.

This project has been developed for talented students from secondary schools participating in the U-Talent Academy program at Utrecht University.
With Teachers Development Foundation the project has also been tested as a school project for talented students participating in the Beta program of Business and Research College at Willem van Oranje College, Waalwijk.

# Digital Literacy and Science Education

Audrey Boyd| St. Mary's Primary School | Fivemiletown| Northern Ireland

# How is biometric security changing the world we live in?

**What is biometric security?**
Biometric security is the use of physical and behavioural characteristics to identify someone.
Physical characteristics include facial, fingerprint, hand, iris, ECG and DNA recognition.
Behavioural characteristics include keystroke, signature, voice and gait recognition.

We received a Partnership Grant from The Royal Society which enabled our school to purchase equipment to run this investigaion in partnership with STEM professionals. We worked with our STEM Partner, B-Secur, to find out more about the world of biometric security. This partnership brought our research to life!

Our pupils used their digital literacy skills to research and present information about the physical and behavioural characteristics used for identification. They concluded that biometrics is having a positive impact on the world we live in but they identified some disadvantages, such as hacking and redundancies!

At B-Secur Headquarters the pupils observed their individual ECGs and how stress affects your pulse rate.
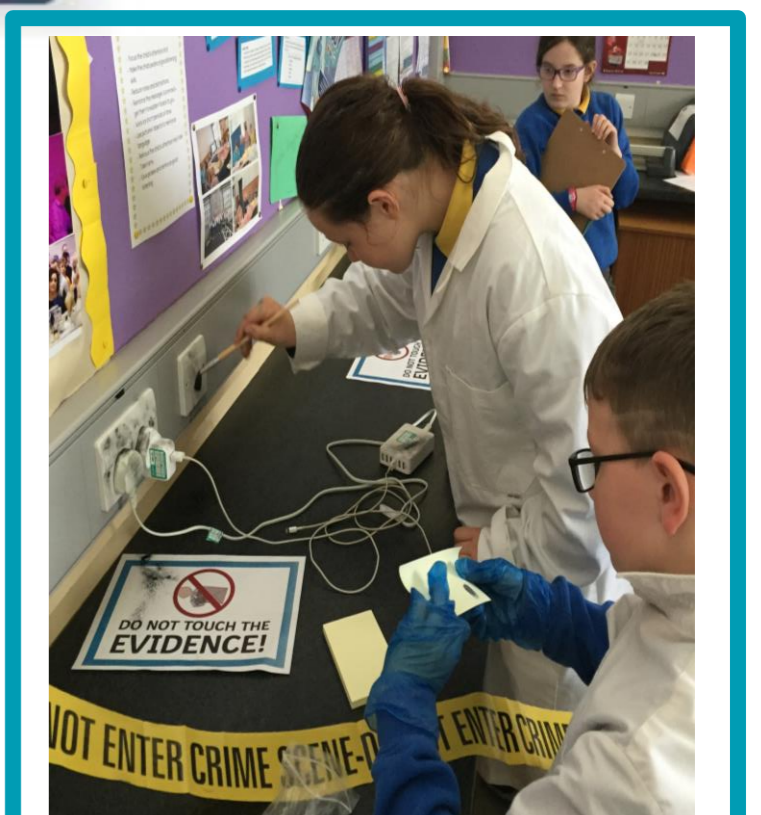
Crime Scene Investigation... fun biometrics!

In conclusion, developing a STEM Partnership with industry experts was key to the success of this project. Our pupils were engaged, actively learning and developing Science Capital. The teaching and learning linked to a world beyond the classroom and possibly to future careers!

**Danuta Borek | II General Secondary School | Szczecin | Poland**

# Chemanalyse
## your application to do chemistry laboratory practises
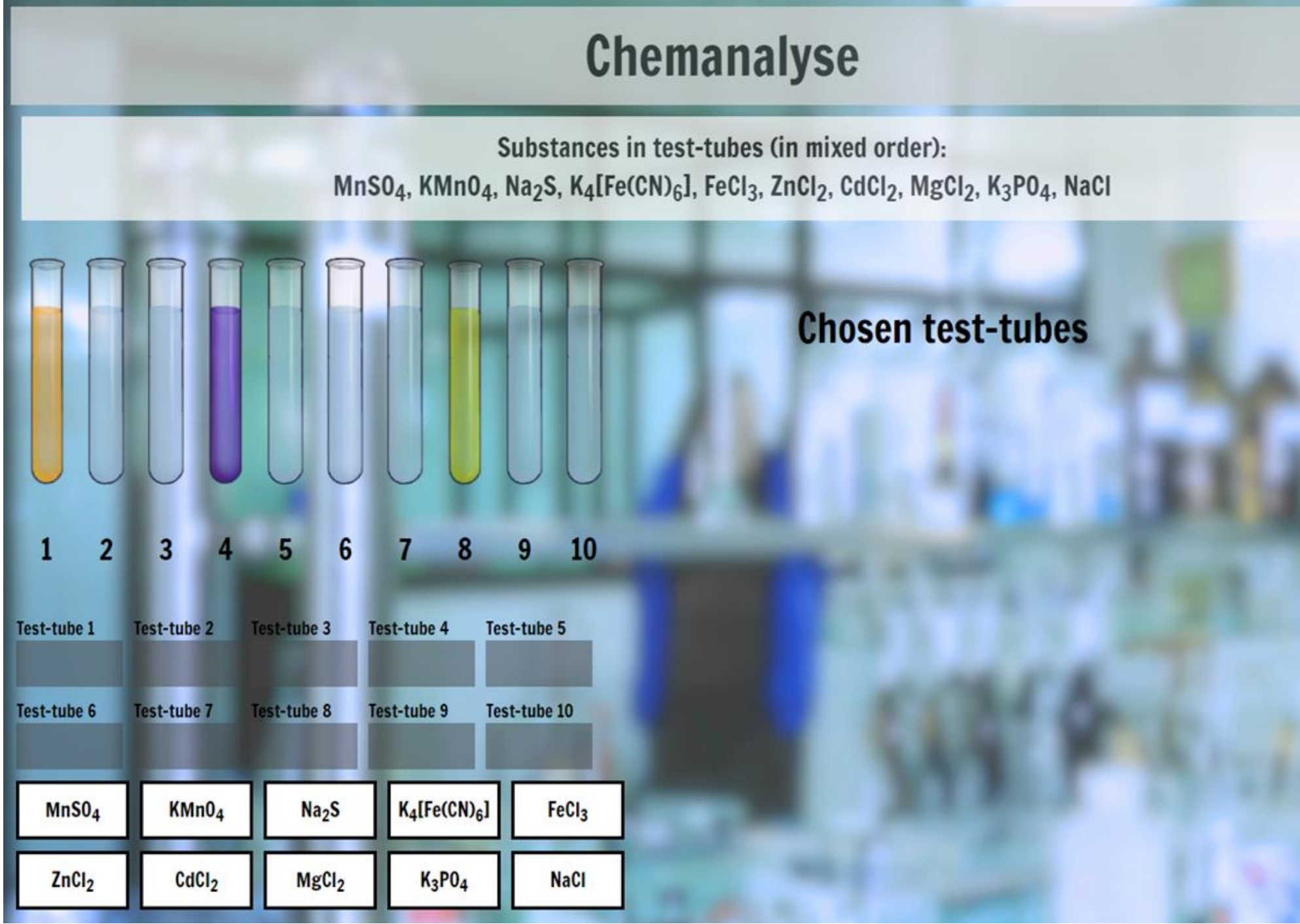


**Chemistry** is our joint passion. We spend a lot of time on solving difficult tasks, learning from well-known chemistry books and performing laboratory exercises and experiments. We know, that our comfortable situation of having a well-equipped laboratory within reach is rather a very seldom exception in Polish school. Even on the universities students do not have enough good access to laboratories due to lack of time and, at first, money. **We had an idea:** offering help for everybody, who wants to broaden horizons in learning chemistry, but do not have proper equipment. Our preposition is called **Chemanalyse** and it is the application one of the kind!





**Our application** is dedicated not only for people, who already had caught the bug and gain some knowledge in chemistry. Thanks to **extra materials**, which we prepared in addition to application, you can start your story from basic principles to more complicated tasks. We use in application two different types of exercises – with **six or ten test-tubes,** which are filled in solutions of salts, acids or bases. In future it will be also **indicators and organic compounds.** There are tasks with different levels of challenge, so the choice is quite wide. You can also use a mood **"blind tries",** in which you can show **all reactions**, which are available in Chemanalyse – also that reactions, which are not presented in tasks.

Chemanalyse can be used by almost everyone who is interested in chemistry. The application could be an useful educational tool for students who do not have a chance to learn chemistry in practice. Chemanalyse can become a well substitute!

**Elżbieta Nowak, Bartosz Piechocki| 4th Secondary Grammar School | Poznań | Poland**

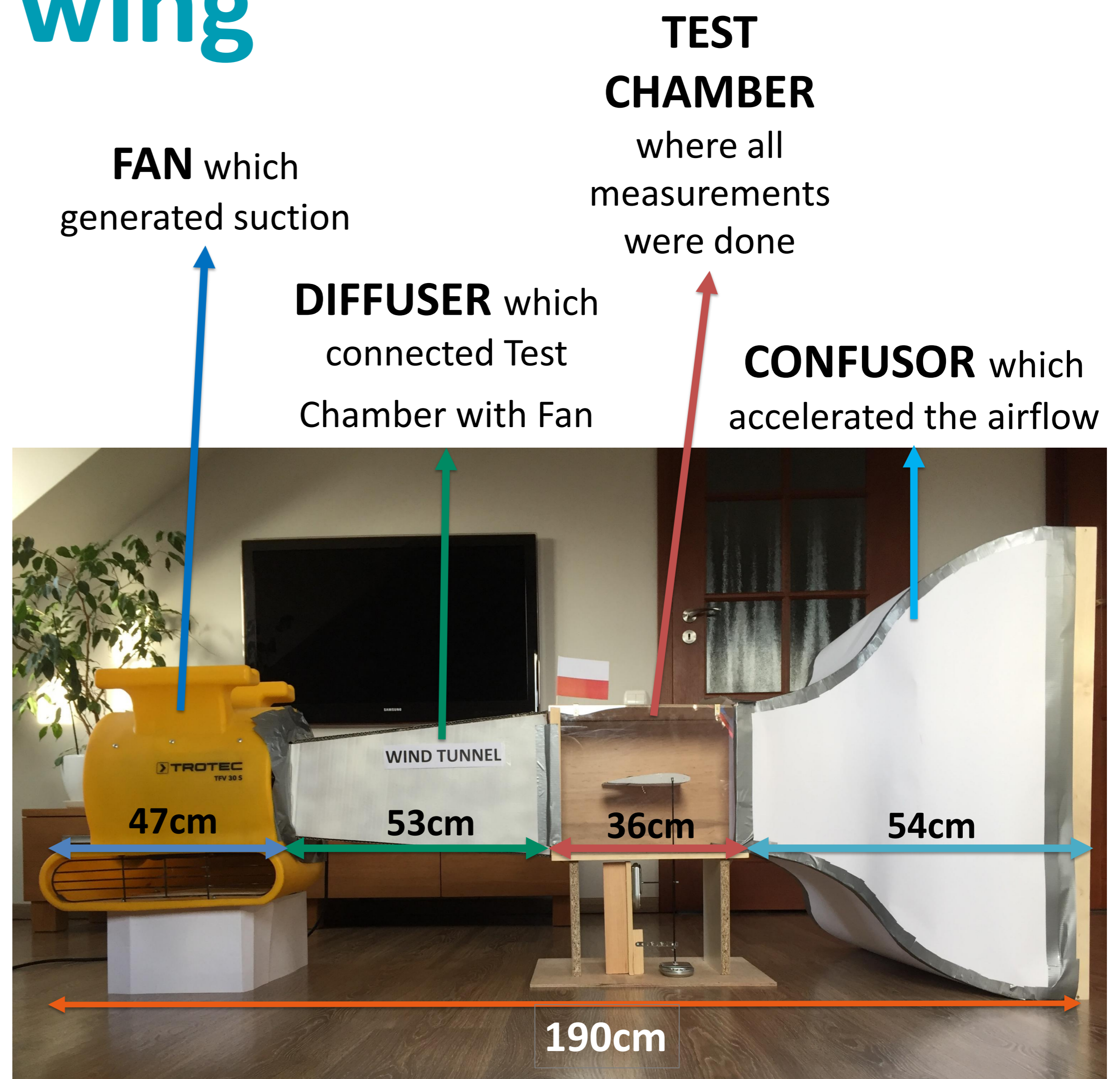# Safe flight – innovative modification of a wing

**Project created by: Bartosz Piechocki**
**Supervised by: MEng Elżbieta Nowak**

Nowadays the aviation industry is developing quickly and everybody wants to fly safer and cheaper. That is why I came up with the **idea of a wing modification**. A standard plane has gaps between a wing and an aileron or a flap, but my modification covers these gaps (see photo below). **The model of a wing was tested in the wind tunnel which I created** (see photo on the right). Below the photo of the wind tunnel there is a graph which shows the results of my research (**1500 measurements were made**). There can be clearly seen the improve in aerodynamic characteristics. **Modified wing increased lift and decreased drag of the wing** (the higher the line on the graph goes, the better).



**FAN** which generated suction

**TEST CHAMBER** where all measurements were done

**DIFFUSER** which connected Test Chamber with Fan

**CONFUSOR** which accelerated the airflow

47cm    53cm    36cm    54cm

190cm

**The idea for a wing modification**



Smooth transition between the wing and the flap/aileron



Polar curve of an airfoil; $v = 6\frac{m}{s}$

Lift coefficient [-]

Drag coefficient [-]

- Standard wing, flat configuration
- Modified wing, flat configuration
- Standard wing, extended flap
- Modified wing, extended flap
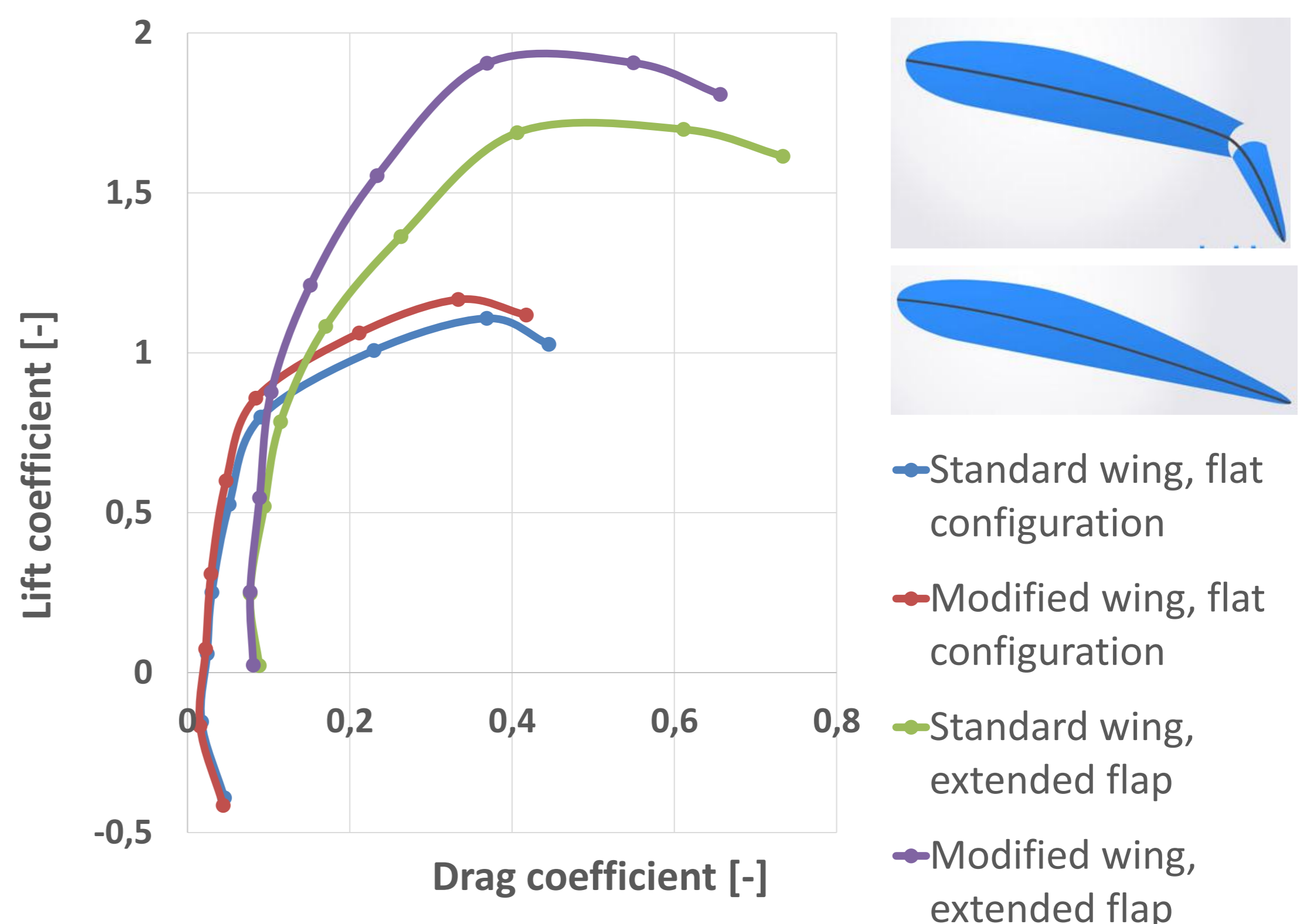
**Conclusion: Modified wing effectively improves aerodynamic characteristics. This solution decreases fuel consumption but most importantly, increases safety of a flight.**

# Digital Literacy and Science Education

Dobromiła Szczepaniak & Wojciech Gańcza
Science Club for Experimental Physics| High School No. 5| Wrocław | Poland

# Stroboscope

## and beyond...

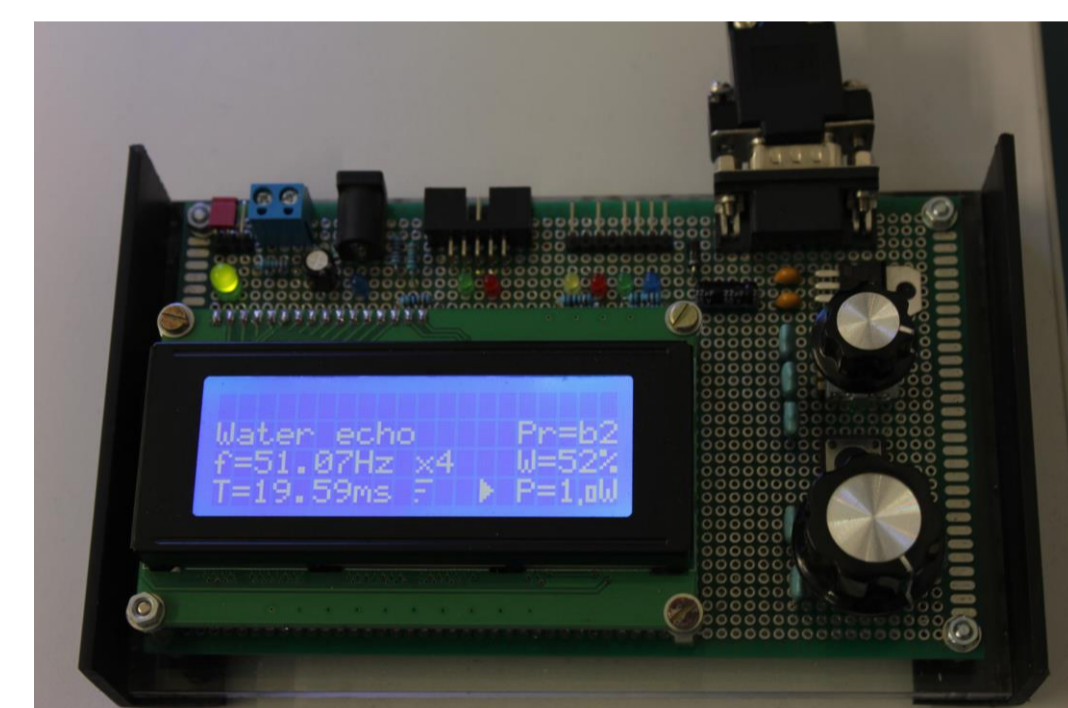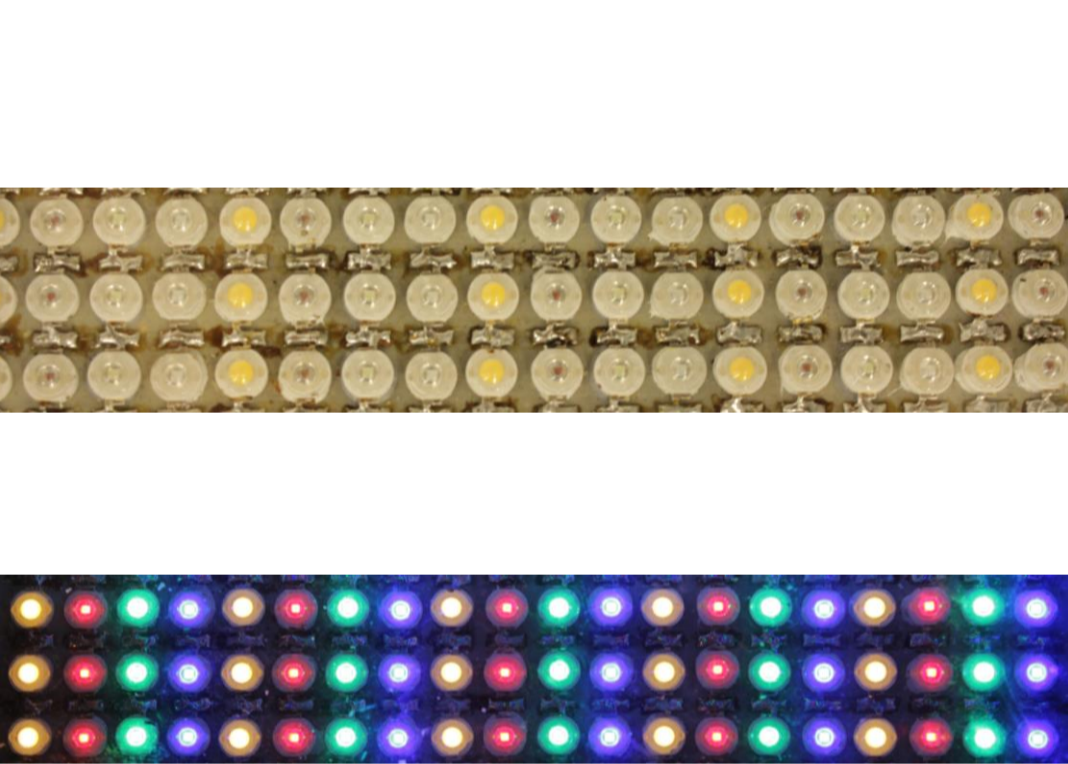Only in one of this pictures the fan does not rotate. It takes the stroboscope to make the illusion. Mind your fingers !

Depending on frequency of the pulses the light of the stroboscope can create various images. The controller we constructed generates frequencies in the range from 1 - 800 Hz.
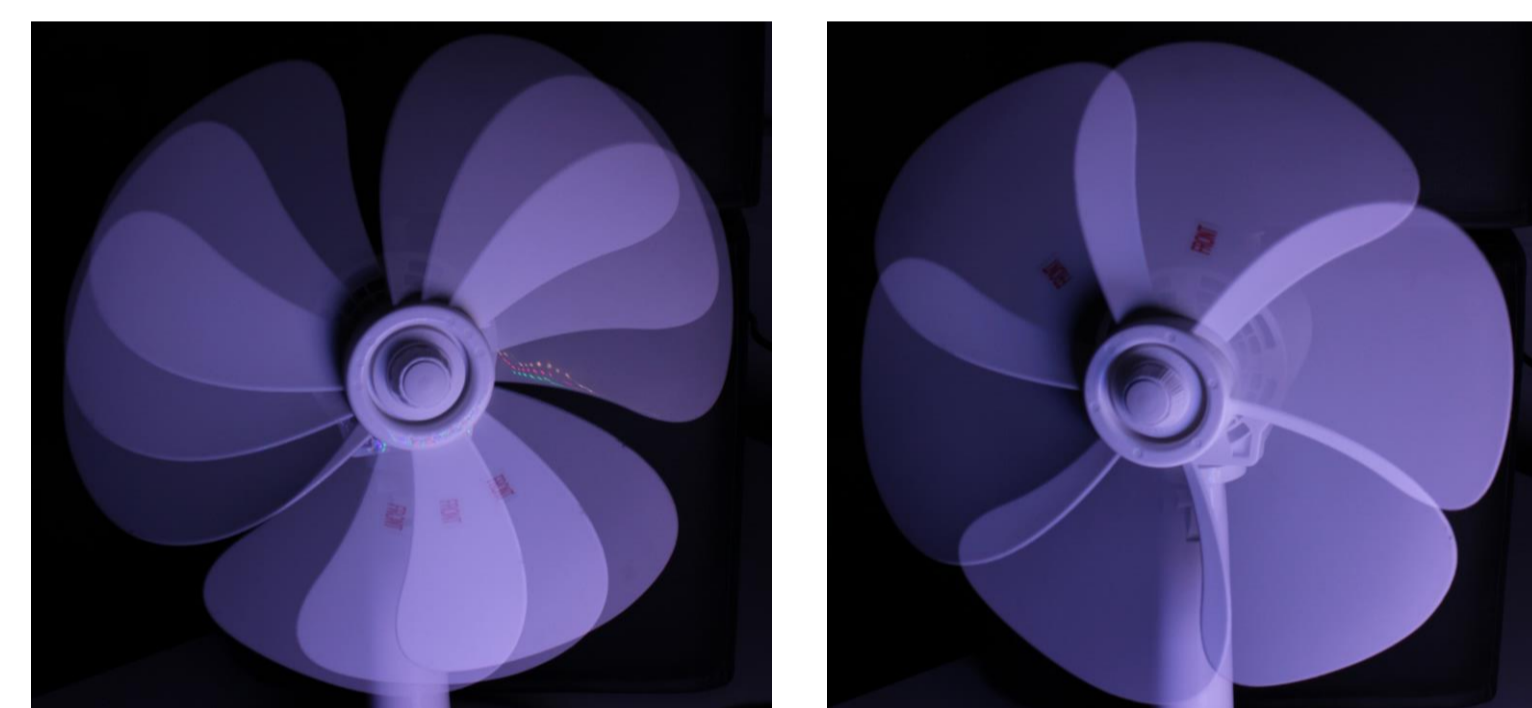
We used diodes of different colours and created the programs where the pulses of each colour are phase shifted. Hence the use of electronics resulted in beautiful demonstration of concept how the light colours combine. The battery of 400 color LED diodes can give 1200 W in pulse which is sufficient to use in the lecture hall.
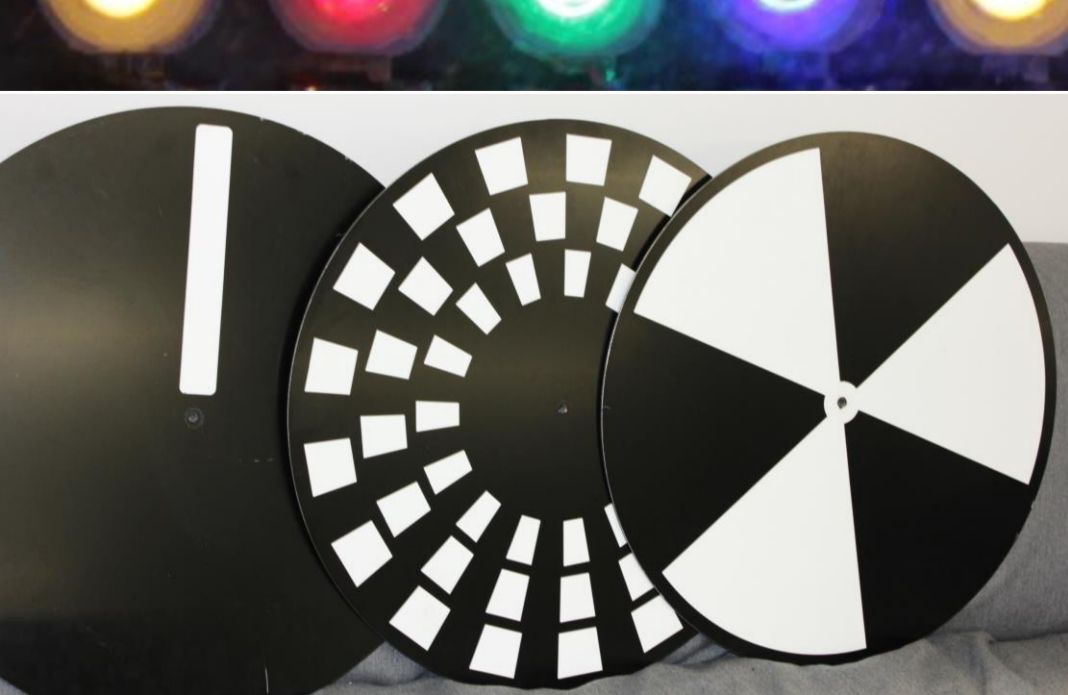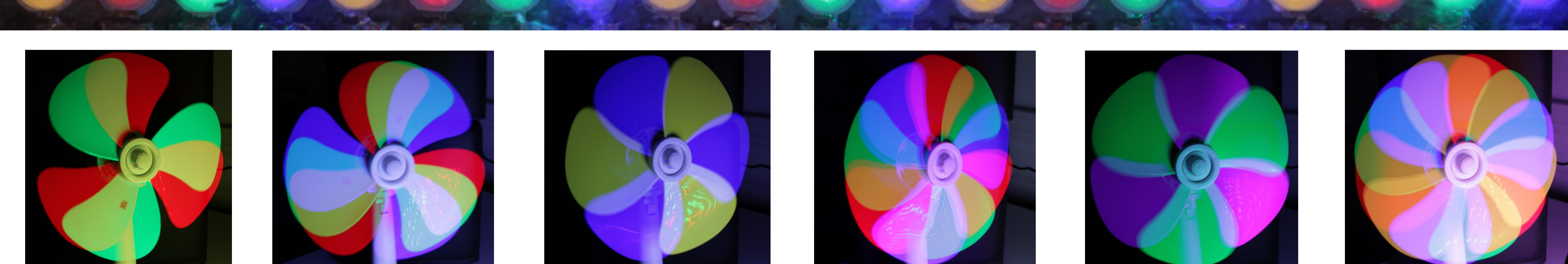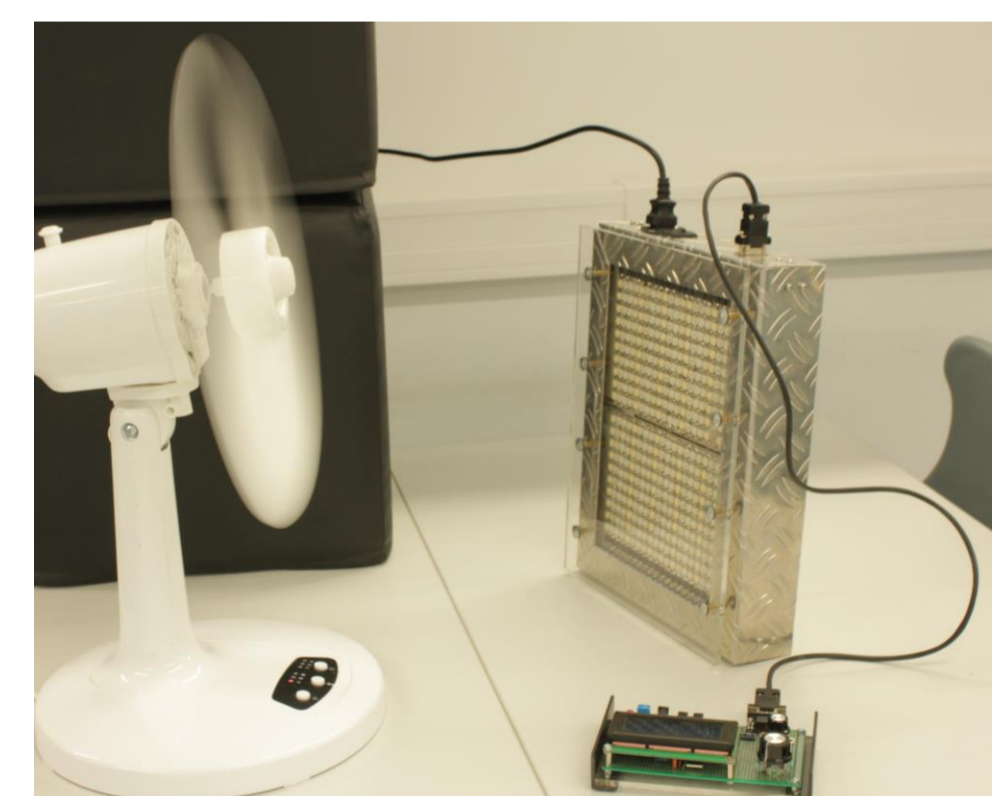
And what if, instead of fan, we use different discs? See for yourself 31 October to 3 November 2019 !

**Inês Madaleno | Externato Cooperativo da Benedita| Benedita | Portugal**
**Samuel Branco |**

# Atmosphere Control of a House

## What our project is about:

The project consists in the prototype of a house, whose **atmosphere is controlled automatically**.

## Learning Objectives:

- Studying the Arduíno board and sensors for collecting information, controlling and executing actions;
- Knowing the language of programming needed;
- Searching for solutions to the challenges using tecnological resources.



## Subjects: Physics, Maths, Science, Electronics, Electricity, Programming, Robotics
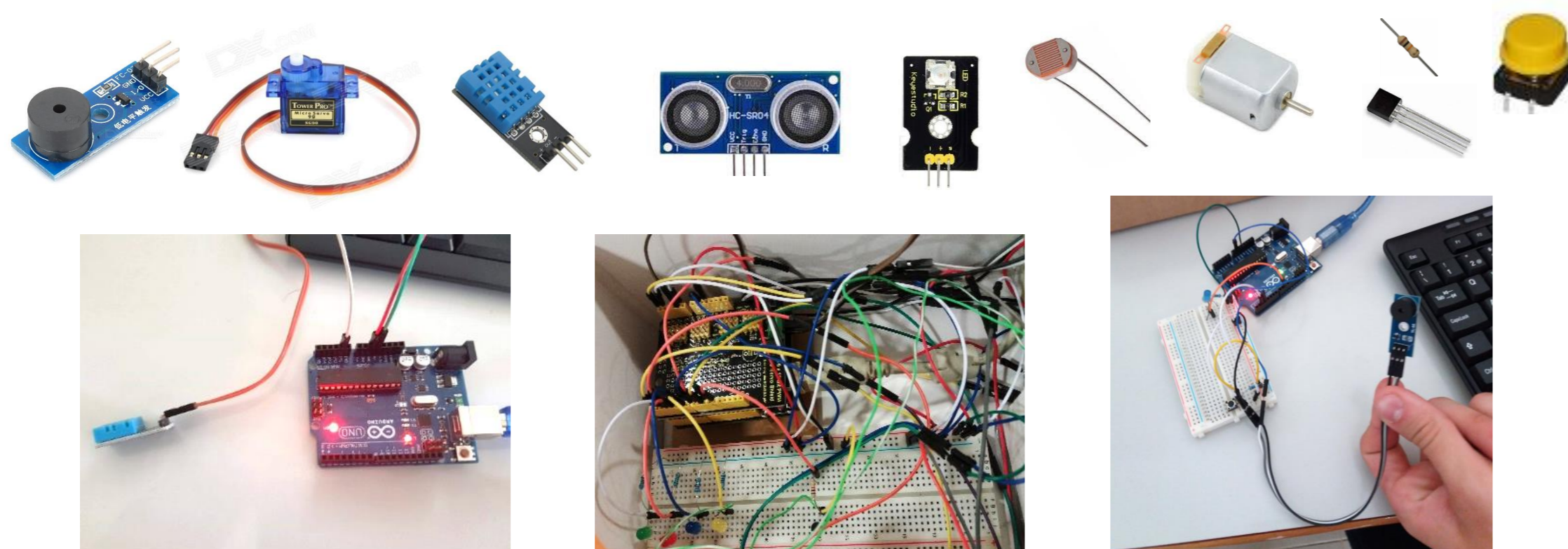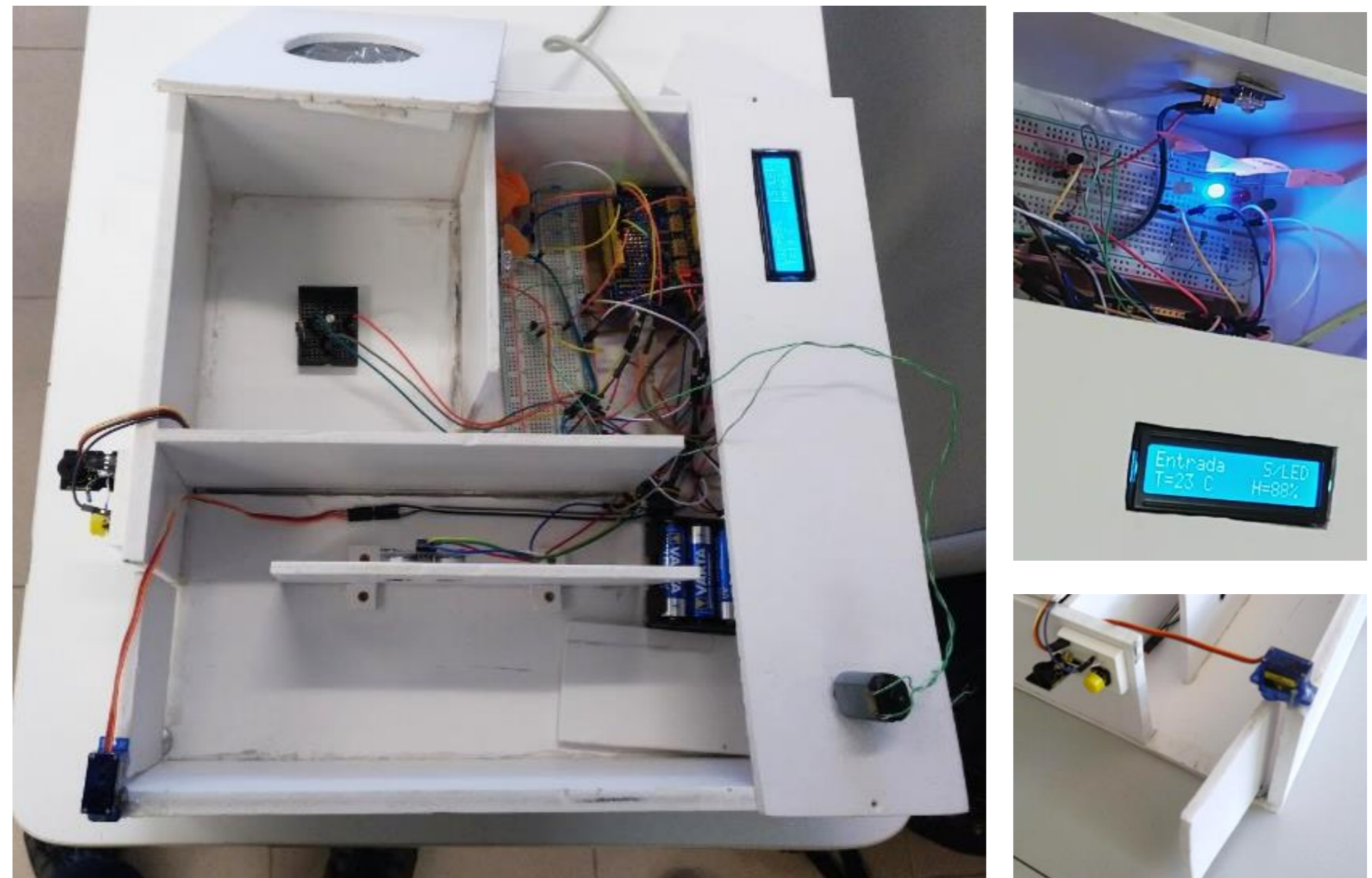


## Materials used in this project:

**Arduíno** board, **sensors** (motors, ultrasonic, temperature and humidity, light) and other **electronic components** (buttons, wires, leds, resistor, buzzer).

## How it works, how others could do it too:

The project was divided into topics which were distributed to several groups of students.

The project is properly documented in a strategy level, either at the level of construction or at the level of its programming.

The other teachers will be able to reproduce the various sections, improve and take ideas to other similar projects.

The necessary resources are low cost and accessible.



```
//controlo de entradas
long duration, distance;
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin, HIGH);
distance = (duration/2) / 29.1;
if (distance < 6) {
    lcd.setCursor(0,0);
    lcd.print ("Entrada");
    digitalWrite(ledEntrada,HIGH);
    tone(buzzer, 1000);
    delay (1800);
    noTone(buzzer);
    delay(100);
}
else {
    digitalWrite(ledEntrada,LOW);
    lcd.setCursor(0,0);
    lcd.print ("         ");
}
```

These **teaching-learning methodologies**:
- allows the students to **learn by doing**, making them **responsible** for their own learning;
- promotes **team work**, **problem-solving**, critical and creative **thinking**, scientific and technological **knowledge**.

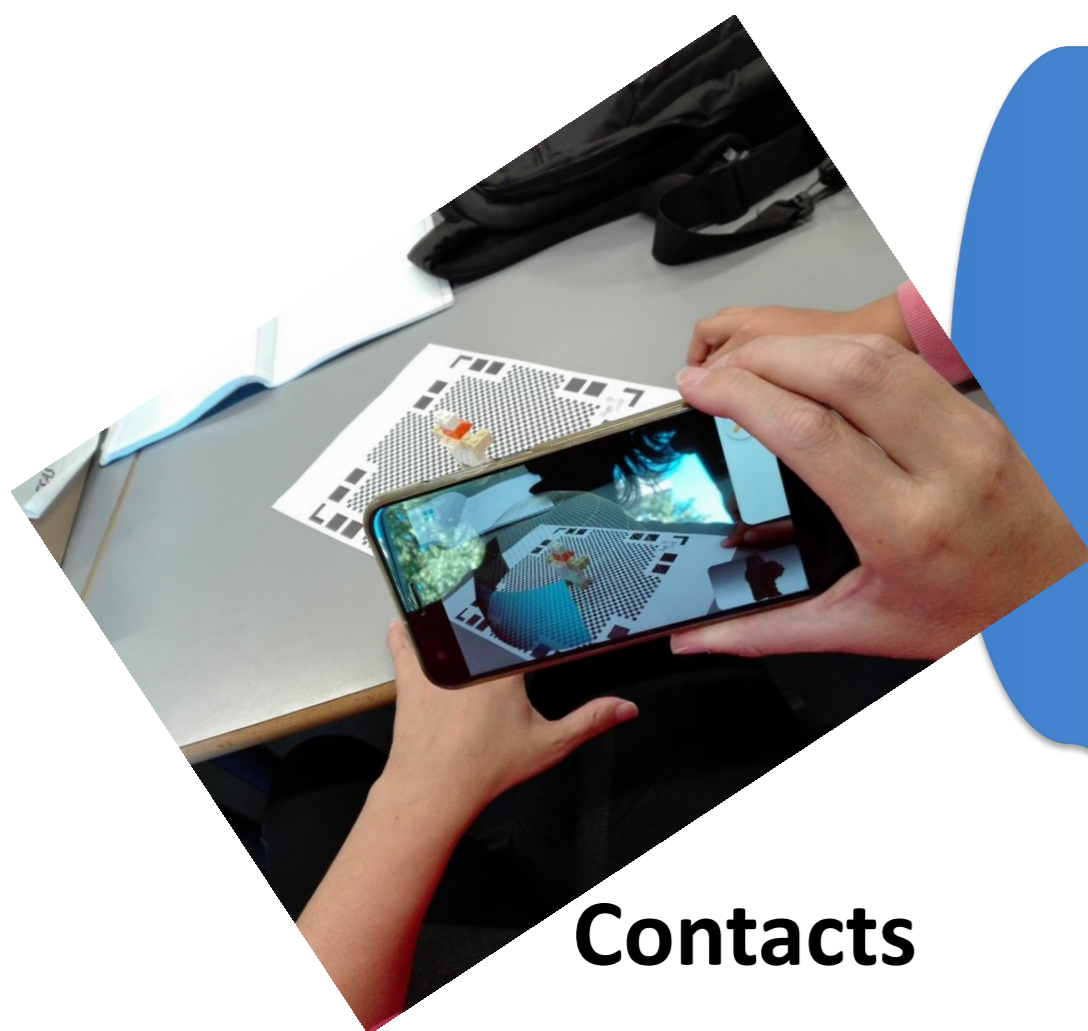**AE de Alberto Sampaio AE Trigal de Santa Maria| BRAGA | PORTUGAL**
**Liliana Fernandes, Jorge Reis**

# Braga Through a Digital Lens

## STEAM and History

This project will lead students to produce an historical script of Braga, including historical references of its most important monuments. This script, produced by the Robotics Club's students, using videos produced using Stop-motion, will be accessible to tourists, national and foreign, trough QR Codes, strategically allocated along a previously drawn route. This project will contribute to ease the access to local history to town visitors, contributing thus, in an ecological way, to tourism development. Special features concerning special needs will be accounted for, in order to open this project to disabled tourists.



### Materials used in this project:

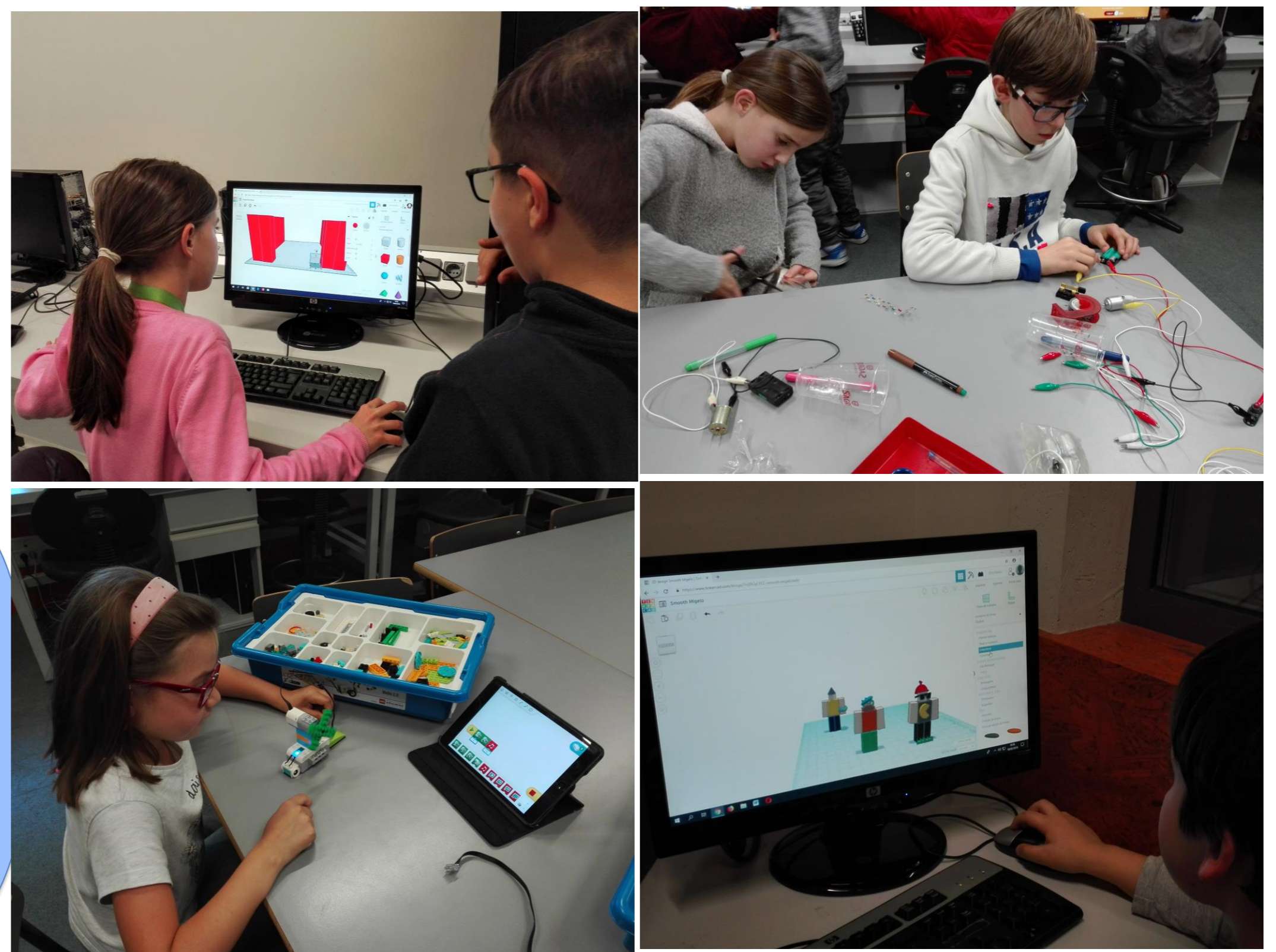**Contacts**

Low cost materials
Raw materials
Ink; Glue; Clay
Camera + Pc/Tablet
WeeeMake Robot
Drones + Camera
3D Printer

Our project will allow everyone to have access to local history, 24/7, for free and in an ecological way. Other teachers can implement the hole project, adapted to local history, by doing historical research; stop-motion pictures; coding Drones and Robots.

**Anna Mišianiková | Faculty of Science, P. J. Šafárik University| Košice | Slovakia**

# Qualitative analysis of water samples for young scientists

Although water is present in huge quantity in earth, increasing population and urbanization deteriorate the quality of water.
Quality of water depends on large number of physico-chemical parameters.

**Qualitative analysis of water** is very important and **has great potential in biology education** and strengthening interdisciplinary relationships. The work of students with real biological samples has a significant motivational character, develops the skills of students' scientific work, including observation and deepens their interest in nature.



The project presents **ideas of research activities for qualitative analysis of surface and ground water samples** collected from different locations of Slovakia and also samples of **drinking water**. Students examine **the physico-chemical parameters of water samples** in combination with **monitoring of aquatic organisms** to determine the quality of water samples. Students evaluate samples in terms of **total hardness** and **level of nitrates** and **nitrites** using **litmus test kit** and **conductivity**, **dissolved oxygen** and **pH** by **digital technologies**, e.g. measurements with the help of sensors, tools to process and analyse data. Additionally, students identify bioindicator organisms in ground and surface water samples and estimate **water quality index** based on the presence and number of selected indicator aquatic organisms. They are assigned the task of determining the source of analysed water samples.

Water qualitative analysis activities help students to realize the importance of water quality, understand water parameters in relation to characteristics of water, and understand the relationships between organisms and the environment in context.
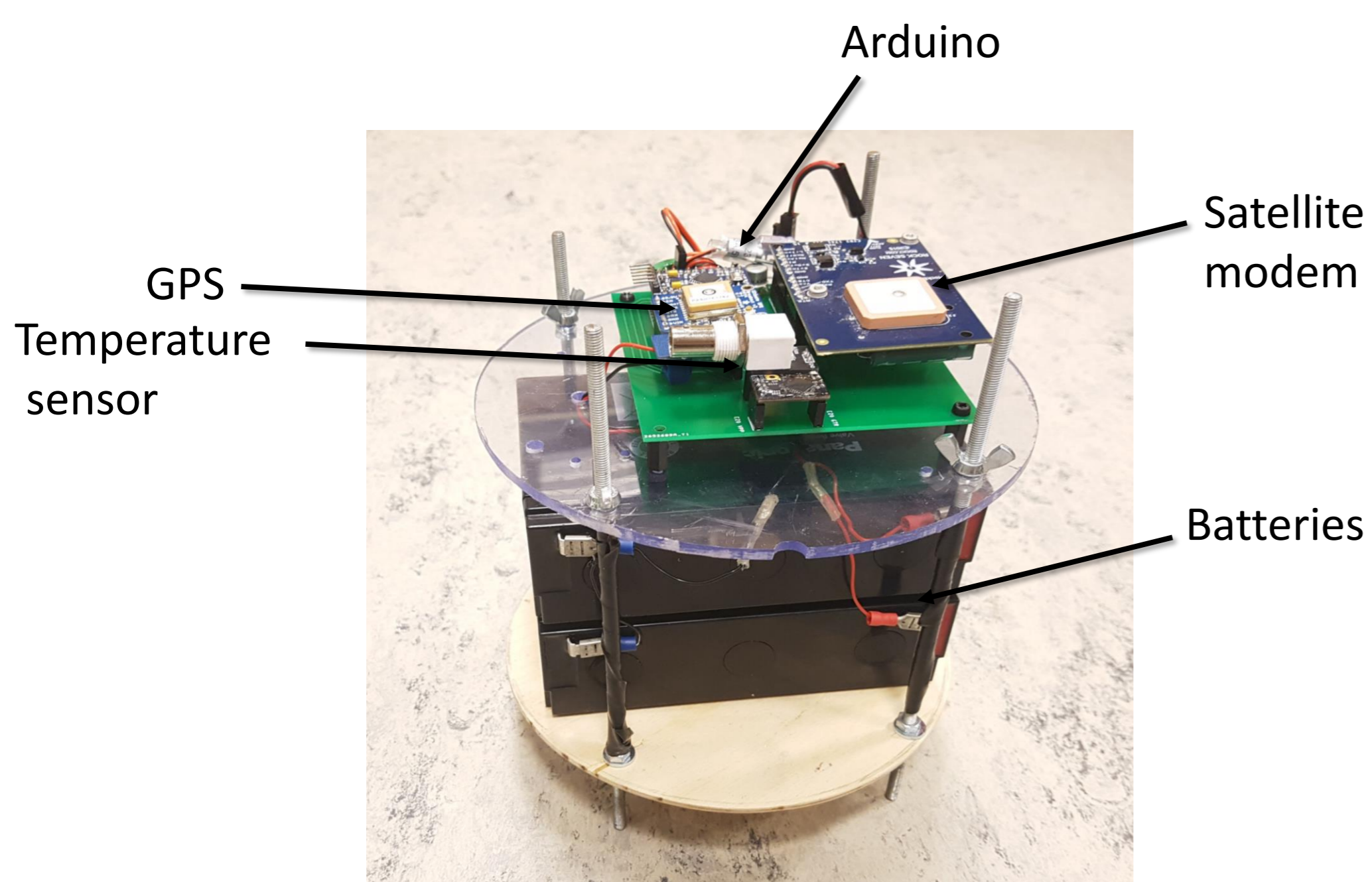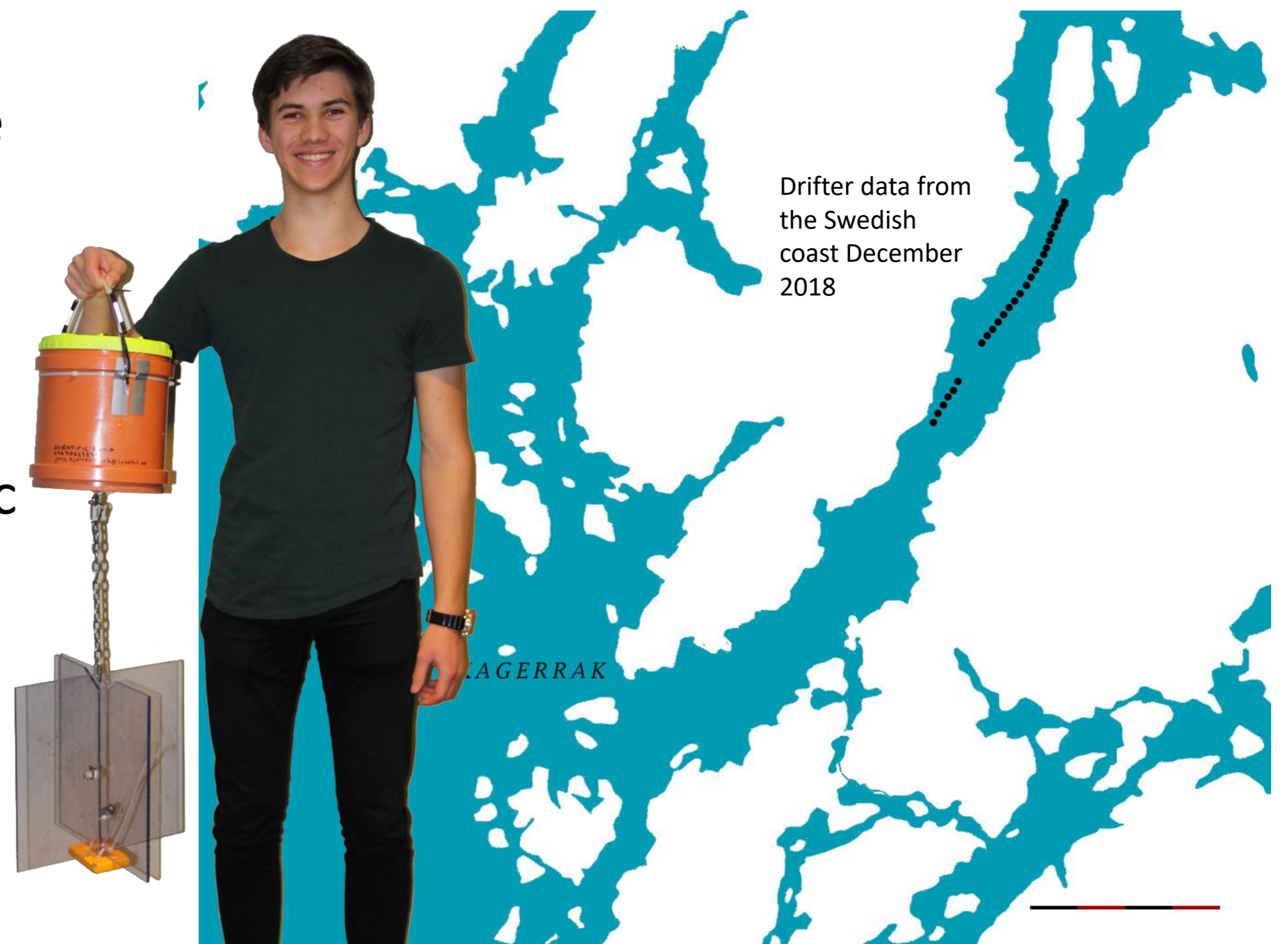Variable approaches can be used during regular biology lessons in various combinations and for different educational themes or can be implemented by other teachers in interesting school projects.

**Pernilla Wegén & Jens Bjelvenmark| Gullmarsgymnasiet | Lysekil | Sweden**

# Dynamene - school work for real
## – scientific research equipment built by high school students

With a hands-on approach to the STEM subjects we inspire young people to become the scientists of tomorrow. We develop research equipment together with our students and challenge their creativity and curiosity.

Our students have built a drifter – a scientific instrument that measures properties of the ocean. It is gently drifting with the ocean currents while logging time and position with a GPS and measuring water temperature. This information is sent back via either Iridium satellite or GSM.



Drifter data from the Swedish coast December 2018

SKAGERRAK



Arduino

GPS Temperature sensor

Satellite modem

Batteries



Working principles of the drifter

Lat: 58,7456
Long: 12,2386
Time: 11:36
Temp: +3,0°C

Lat: 58,2356
Long: 11,2386
Time: 11:06
Temp: +3,2°C

Lat: 58,3326
Long: 11,5492
Time: 11:21
Temp: +3,1°C

A drifter is a scientific instrument that measures properties of the ocean. It is gently drifting with the ocean currents while logging time and position with a GPS and measuring water temperature. This information is sent back via either satellite or GSM.

Our students come to realise that scientific instruments are no magic boxes. They understand that the instruments are based on simple scientific principles that they understand and can work from.

*www.sciencemakers.se*

**Liudmyla Gryzun, Valentyna Pikalova | Bogodukhiv Gymnasium №1 |Kharkiv | Ukraine**

# Choreographic Visualization of the Search Algorithms

**Project description**. Search algorithms as classical Informatics problems make a basis for schoolchildren's digital literacy today. *The aim* of the project is **to promote trainees' interest** to the search algorithms learning and **to facilitate their mastering via author's technique** based on the cognitive visualization and dance activity as a focus for interdisciplinary creativity.

**The project novelty** comes from the fact, that the trainees' work upon it includes **polysensory information processing, integration of analytical and creative practices** which facilitate the algorithms understanding, increase trainees' knowledge flexibility and cognitive eagerness.

## The TECHNIQUE as a SET of TASKS

### Task 1.
Get Familiar with the Algorithms



### Task 2.
Need for Visualization
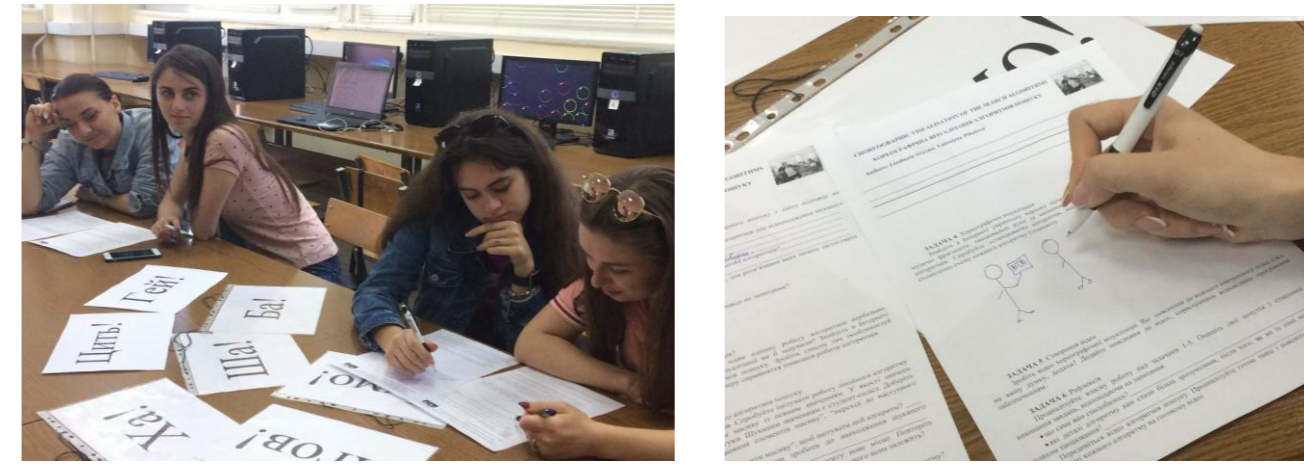


### Task 3.
Bodily-Kinesthetic Imitation of the Algorithms



### Task 4.
Choreographic Visualization of the Algorithms



### Task 5.
Making Video



### Task 6.
Watching & Analyzing Video



Conclusion: the results of the project (the technique of the algorithms learning and the set of video choreographic miniatures, visualizing various search algorithms in arrays) can be implemented by other teachers in their classes.