

## LET'S HAVE FUN WITH SCIENCE!

### Out-of-school science activities for children

**Institute:** "Let's Play Science!" classes  
Szent-Györgyi Albert Agóra, Szeged, Hungary

**Address:** 6722 Szeged, Kálvária sgt. 23. [www.agoraszeged.hu](http://www.agoraszeged.hu)

**Teachers:** Katalin Papp, Fanni Flach, Milán Molnár

**Collaborator:** Erzsébet Korom  
MTA-SZTE Science Education Research Group, University of  
Szeged, Hungary

**Age group:** 6–10 years

"Let's Play Science!" classes started in 2010 at Szeged, with the aim of teaching science to 6-10 years old children in an out-of-school learning environment, the Szent-Györgyi Albert Agóra. The years of experience in methodology and pedagogy have helped to perfect our self-developed activities to serve the main goal of our classes: **develop scientific reasoning by learning through experience, experiments, using simple, everyday objects in a safe environment.**

Our programme involves three different activities:

- ✧ **classes** on a weekly basis (so far more than 150 occasions, sometimes divided into two groups based on ages, more than 400 participants altogether)
- ✧ **summer camps** (one week, often in two shifts, 50 participants in one year)
- ✧ **open lessons** for kindergarten and primary school children

Regarding our aims we seek to prevent science learning motivational problems articulated in the Rocard report (2007): "the crucial role of positive contacts with science at an early stage in the subsequent formation of attitudes towards science. However, the study also highlights that, while young children have a natural curiosity of these subjects, traditional formal science education can stifle this interest and therefore can have a negative impact on the development of attitudes towards learning science" (Rocard, Csermely, Jorde, Lenzen, Walberg-Herniksson, & Hemmo, 2007, p. 8).

The content and method of the lessons assist the improvement of the already existing favourable attitude of children and the development of scientific thinking skills by learning through experience and experiments. The programme is affiliated with the University of Szeged, more precisely the research work of the MTA-SZTE Science Education Research Group.

## Classes

The aim of “Let’s Play Science!” classes is to give children an opportunity to spend 90 minutes a week on learning science, scientific methods and collecting experience. The lessons are planned around topics in a pre-arranged system, but this order is a guidance rather than a strict rule.

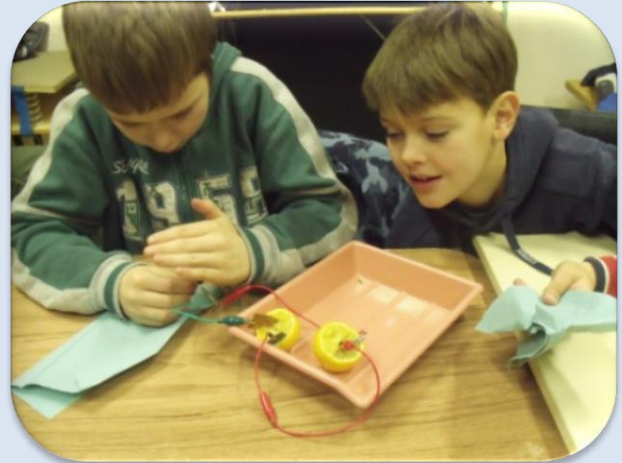


### Experimenting with electric circuits and the “scientific report”

The most important goal in the lessons is to support independent experimenting and to establish a free and safe environment for creativity and imagination. Children experiment without pre-planned experimental setups, but during the whole activity they are free to express their curiosity and try their productive ideas. One of our fundamental concepts says that no questions can be left unanswered! The question “what would happen if we did it in another way?” regularly pops up during experimenting and our answer is always the same (even if we know the exact answer): “Let’s try it!”. Time from these experiments must never be taken away – even if they look pointless to physics experts- because asking questions and searching for answers is the basis of scientific research.



Christmas circuit



Preparing a fruit battery

Some of the experiments are observed together with the whole group (measuring the volume of lungs, creating reusable paper), while others are done in groups or individually (observing the properties of water and circuits). For the building assignments something must be produced (musical instrument, Cartesian diver, rainbow watcher). One example of measurement tasks is the determination of the mass of a gummy bear or the mass of water vapor with a straw balance (this activity can be seen in the movie). The environment with safe, simple, everyday objects is partially ensured by the private toy collection of the leader of the classes and Siemens' explorer kit.



Observing potometer



A little chemistry





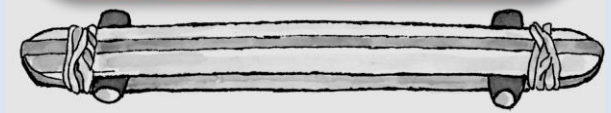
Setting up a straw-balance



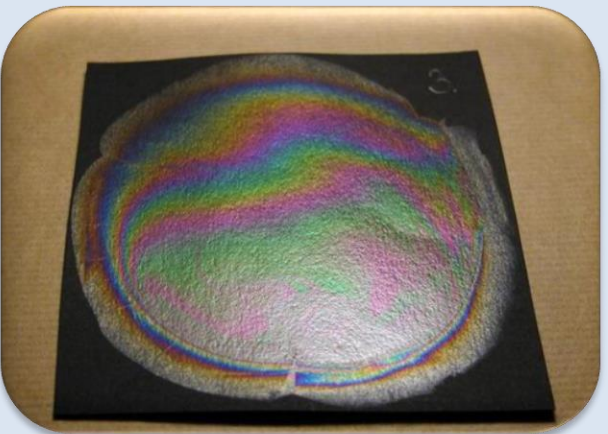
Measuring the mass of water vapor



Bubbletower



Sandwich horn



Nail polish rainbow





## Topics

- ✧ Materials around us (properties of water, floating, sinking, properties of fluids, density – Cartesian diver, preparing density meter)
- ✧ Surface tension of water, properties of thin films, nail-polish rainbow
- ✧ Properties of fluids, viscosity, preparing solutions, extraction of solutes, water cleaning
- ✧ Solid matter, observation of crystals, sublimation of iodine
- ✧ Sound, sound waves, production of sounds, detecting sounds
- ✧ Building a rocket
- ✧ Elasticity of solid matters, measurement of the extension of a gummy candy
- ✧ Rubbing experiments, creating an electroscope
- ✧ Closed electric circuits, conductors, insulators, examining electric black box
- ✧ Electric circuit in bear, rabbit and “bug sensor”
- ✧ Electric conduction in solutions, production of fruit battery
- ✧ Playing with light, reflection, refraction
- ✧ Magnification and creation of microscope
- ✧ Production of a rainbow-watcher
- ✧ Reusable paper, chemical reaction, red cabbage indicator
- ✧ Magnetic phenomena, electromagnet, creating an engine

## Summer camps

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Toy collection



Summer camp 2019

**The summer camps** very much resemble the classes, but the camp provides a larger time period, therefore it is easier to examine a single problem in more depth. The basic principles are the same, but the freedom of schedule ensures more space for individual ideas and creativity. The arrangement of activities is similar. Both in the classes and during the camps children have time at the beginning to play freely with the toys showing scientific principles and laws. This playtime helps to establish a pleasant atmosphere that will determine children's approach in the upcoming experiments. The toys are a great help in showing how science appears in everyday situations and simple objects. We are pleased to use cartoons as introductions to new topics. With a little search it is possible to find scientific cartoon contents that support the understanding of certain phenomena.



Bug sensors



## Open lessons

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Our open lessons differ largely from the activities presented so far. On these lessons one class visits us (or “Let’s Play Science!” goes to the school) and takes part in a previously discussed lesson. These events follow a precisely planned programme, where the understanding of a single phenomenon is built up step by step and observed through experiments. There is not much time for creativity, imagination and experimenting with new ideas. The atmosphere is also completely different with a group that meets the lecturer the first time. A great advantage of these open lessons is that a lot of children get to know about our classes. Although only a small part of the classes can be seen on these occasions, this shorter meeting can still give such an experience that will have a larger effect later. The teacher of the class might also make a good use of watching our open classes.



Balloons and electrostatics



## **Topics of the open classes**

### ***Magical straws***

Straws are ideal for demonstrating numerous natural phenomena. For example rubbing them makes electric charges, blowing them helps to observe fluid flow and also rockets and horn can be made from them.

### ***Musical instruments from “nothing”***

A lot of everyday objects are suitable for making musical instruments. Plastic pipes, straws, bottles filled with water and stretched elastic bands are just a few examples of the many possibilities. Not only generating sound, but also playing melodies is possible with them.

### ***Secret of the submarines***

In the lessons about floating common items' (like wooden cubes) diving properties are examined and even a self-controlled diver is made.

### ***Water surface is tense!***

Unique properties of water are shown by objects placed on top of the water surface. The change by adding additives to the water is examined with eye-catching experiments.

### ***The secret of magnets***

The invisible “secret” of the magnets and the structure of the magnetic field can be observed through simple experiments (for example iron filings). Gaining experience with magnetic toys promotes learning about further properties.



## Reflection

Katalin Papp (University of Szeged, founder and director of “Let’s Play Science!”)



I have founded “Let’s Play Science!” out-of-school classes with the aim of complementing the curriculum, giving children an opportunity to learn scientific research methods, providing time for students to play and experiment safely and supporting the development of their personalities during the classes. I have been leading this activity for more than a decade now and based on my experiences I am convinced that we can enhance children’s natural inquiry, help them to acquire new knowledge and abilities and make them adore and respect nature. We truly believe that children will keep this attitude throughout their lives. I consider important that these classes are influential on teachers’ education too. An enthusiastic team have formed from teacher candidates and younger colleagues, who will continue my work and benefit in their own life from the experience.

## Bibliography

Molnár, M., & Papp, K. (2014). Természettudományos nevelés kisgyermekkorban - egy példa Szegedről [Science education in early childhood - an example from Szeged]. *Fizikai Szemle*, 64(3), 74–79. [http://fizikaiszemle.hu/archivum/fsz1403/MolnarM\\_PappK.pdf](http://fizikaiszemle.hu/archivum/fsz1403/MolnarM_PappK.pdf)

Rocard, M., Csermely, P., Jorde, D., Lenzen, D., Walberg-Herniksson, H., & Hemmo, V. (2007). Science education NOW: A Renewed Pedagogy for the Future of Europe. Brussels, Belgium: Office for Official Publications of the European Communities. [https://ec.europa.eu/research/science-society/document\\_library/pdf\\_06/report-rocard-on-science-education\\_en.pdf](https://ec.europa.eu/research/science-society/document_library/pdf_06/report-rocard-on-science-education_en.pdf)