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STEAMTeach

Science | Technology | Engineering | Arts | Mathematics

COOPERATIVE LEARNING: WATER

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PROJECT

PROJECT ACRONYM	STEAMTeach
PROJECT TITLE	STEAM Education for Teaching Professionalism
PROJECT REFERENCE	2020-1-ES01-KA201-082102
START DATE	1st October 2020
KEY ACTION	Cooperation for innovation and the exchange of good practices
ACTION TYPE	Strategic Partnerships for school education

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Cooperative Learning: Water

Author	Dr. KOPASZ Katalin
STEAM areas	Physics, earth science, chemistry, design, technology
Cross-cultural connections	Water is essential for life (biology, physics, chemistry; history & society). Scarcity of freshwater is a key global issue.

Summary

Subject	Science
Topic	Water
Age of students	Age 10-18 years
Project time	4 x 45 minutes
Number of participants	Max. 30 students
Online teaching material	Materials are listed under each station offering specific examples of possible activities.
Offline teaching material	Materials are listed under each station offering specific examples of possible activities.
21st-century competences	• Innovation • Creativity • Problem-solving • Analytical thinking • Active learning • Critical thinking • ICT • Cooperative skills
Learning objectives	• Acquiring discipline-related knowledge • Assisting the formation of learning communities

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- Developing manual skills
- Developing abstract thinking skills

Project Plan

	Procedure	Time
 Discussion questions	• Is the pencil broken? • Can we walk on water? • Can we blow out a candle with bubbles? • Why are films of oil coloured? • How can we colour a white flower? • What does pH5.5 mean? • What is corrosion? • What is hard water? • Can we make puddle water drinkable? • Tap water or mineral water? • Still waters run deep – The role of water in erosion. • Water scarcity – How can we help?	45 minutes
 Brainstorming	Forming groups, assigning topics, collecting the ideas of the students	
 Prepare	Collecting necessary tools for individual experiments, arranging experiments, preparing descriptions and manuals.	2 x 45 minutes
 Demonstrate	Each group prepares a station of an interactive exhibition. There should be descriptions and interactive elements at each station (if possible).	
 Predict	Becoming familiar with the versatility and interesting properties of water and its scarcity, students are becoming more eco-conscious.	

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 Explore	Each group prepares its own station as part of an interactive exhibition in a cooperative way. Once they have finished, each station is visited by the members of the other groups to try the exhibits and learn about the results.	
 Record	Students easily acquire knowledge while attending the exhibition and playing at the stations.	45 minutes
 Reflect	Why do hypotheses and experiences agree/disagree?	45 minutes
 Presentation	Students make an interactive science fair. Everyone can look at and test the exhibits.	
Product	Experimental sets	
 Re-design	Experiments and/or descriptions may be modified after the first tests.	

Stations

Below there are some ideas on how/what to prepare for the stations below. Each of the events will result in a novel collection of experiments.

Optical illusions with water (refraction)

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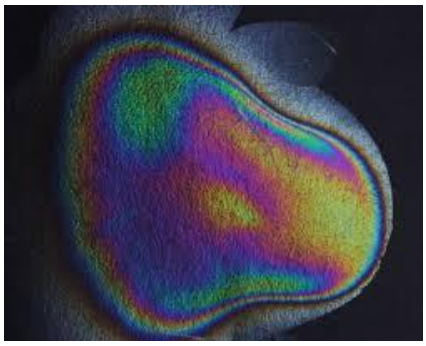
	Find interesting optical phenomena connected to water, e.g. 'broken pencil' Online materials: https://metaphysicsofphysics.com/episode-sixteen-optical-illusions-proof-of-the-validity-of-the-senses/2/ https://www.youtube.com/watch?v=G303o8pJzls
Thin film interference	Why are films of oil coloured? It is due to the phenomenon of thin-film interference. Find an explanation! Create a model with the help of nail polish and paper sheets.  Thin film interference with nail polish: https://www.nisenet.org/sites/default/files/catalog/uploads/MaterialsFilm_guide_5oct14.pdf Background: https://en.wikipedia.org/wiki/Thin-film_interference https://www.youtube.com/watch?v=4I34jA1fDp4
Surface tension of water	Upside down bottle or Can you carry water in a sieve?

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https://blog.doublehelix.csiro.au/upside-down-bottle/

Curvature pressure: Can we blow out a candle with bubbles?

Capillarity and flowers: Colour changing flower experiment:

https://taminglittlemonsters.com/color-changing-flower-experiment-for-kids/

Acids and bases:	The Red Cabbage pH Test: https://scienceexplorers.com/teaching-children-about-acids-and-bases/
Is water hard?	Hard water experiment: https://layers-of-learning.com/hard-water-experiment/
Water cleaning	Make a water filter: https://kids.nationalgeographic.com/books/article/water-wonders https://raisinglifelonglearners.com/sand-filter-activity/ https://study.com/academy/lesson/water-filtration-science-project.html
Still waters run deep – The role of water in erosion Weathering, Erosion, and Deposition	Weathering, Erosion, and Deposition: https://www.youtube.com/watch?v=-MFLgtti51I
Water scarcity	The water crisis - Lesson Plans for All Grades: https://thewaterproject.org/resources/lesson-plans/ Note: the topic may be assigned to several stations. For the Hungarian version: http://edu.u-szeged.hu/ttkcs/kezikonyvek (Komplex, p. 132.)
Tap water or bottled water	Are there significant differences between the tap and bottled water? https://www.education.com/science-fair/article/bottled-water-impurities/
Research into a nail - Corrosion	What Is Corrosion? https://studynlearn.com/blog/what-is-corrosion/ https://www.youtube.com/watch?v=Y0s44Wcrwak
Experiences	• Preparation of stations in a cooperative way is an important experience.

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- Acquiring knowledge is an important learning step, just as creating didactic and well-usable station elements

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