Education and Culture
Lifelong learning programme
COMENIUS

Background

General didactic background

This sequence deals with cooling as negative change in temperature, which is a familiar concept to students of various ages. However, mathematical approach used here gives a new point of view to the students.

The emphasis of science concepts may vary depending on the age group and the level of openness of the task that the teacher chooses. Anyhow this sequence deals with energy removed from a system, which is called heat. This process happens solely due to temperature difference between the system and its environment. As this temperature difference varies, the rate of energy flow from the system to its environment changes too. The students get a possibility to do authentic hands-on activities. Science provides mathematical teaching with authentic data collected by the students themselves.

Mathematical concepts

This sequence is divided into three subsequences that are about identifying variables related to a given experimental setting, interpreting/drawing a graph, understanding the concept of a fair test, controlling one variable at a time and recognizing cause-effect relations.

Key concepts: Variable, change, rate of change, controlling variables, controlled variable, Dependent variable, fair test

The idea of teaching implementation

This sequence is divided into three different subsequences. They may be all used as a step by step process from structured lab instruction and simpler mathematics into more open and demanding thinking. The subsequences contain:

I Getting familiar with cooling

Ready-made experimental setting / observing the cooling of 100 g of hot water
→ Interpreting graph, recognizing variables, change, rate of change

II More about cooling

Ready-made experimental setting / comparing the cooling of different masses of water
→ Explaining causality, variable, controlled variable, dependent variable, fair test

III Investigating cooling

Given equipment / finding out one more factor that affects the rate of cooling
→ Fair test, variable, explaining causality, variable, controlled variable, dependent variable

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