

How Scientists Observe

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Subject: Why is observing so important in science? Introduction into the basic methods of scientific work, observation and description

Grade level: 7

Curriculum content: You will observe different experiments and reflect your observations

Kind of activity: Group work and working at stations

Anticipated time: 2 lessons

Objectives/Competences

The material describes the basic approach to scientific phenomena, questions and problems in the early stage of scientific (physics) education. The description provides a set of methods of scientific work with which students can explore the world of physics, discovering new facts and arranging them.

The first part of the material illustrates the didactical background for educating scientific methods. It deals with the problems concerning experimenting and modelling in everyday class and discusses a conception for learning scientific methods. The second and more comprehensive part shows the practical implementation of this conception. It contains texts for pupils, a choice of lessons and worksheets for an easy realisation.

Why is observing so important in science?

Introduction into the basic methods of scientific work, observation and description

Pupils are confronted with the very many phenomena of physics which they have to observe keenly by using all senses. This is the basic concept of scientific work.

Methodical focus

- teaching methods that establish scientific and autonomous work: Group work and working at stations
- teaching methods that encourage own thoughts about observations: group discussions with posters

Goal/aim skills

- pupils observe phenomena and describe them in their own words
- pupils observe phenomena and describe them goal-oriented guided by specific questions

Task description

see Students Material

Theme and content of the lesson	Students` activities	Experiments	Material	Didactical comment
<p>Observe and describe phenomena:</p> <p>Get to know various phenomena from different fields of the physical world (small experiments to introduce the areas of physics).</p> <p>Introducing observing and describing as basic scientific method</p>	<p>Students observe various scientific phenomena by doing small experiments (working at stations).</p> <p>Students associate observations to senses and write down their findings.</p>	<p>Stations: Knock Knock; Behind Gass; Warm or Cold?; Smells Cute!; Sweet, Sour or what?</p>	<p>“Observe and Describe”; Suggestions for Experiments; List of materials</p> <p>Poster “Observe”</p>	<p>Introducing observing as typical way of working scientifically is reflected</p>

Table 1 – Overview

Experiment	Utilities	Annotations
Behind Glass	DE: round shank with water SE: tumbler with water, objects	
Warm or Cold?	SE: metal plate or ceramics, Styrofoam DE: sensor or thermometer	Both SE and DE needed
Smells Cute!	SE: cans with different scents, for example: -vinegar -onion or garlic -coffee -oil for fragrance lamps	
Sweet or Sour or what?	SE: small labelled glasses Water with sweet, sour, salty or bitter water	Liquids should look similar. Don't use spoons twice, provide bin
Knock Knock!	SE: hose about 1m, metal spoon, 2 funnels	

SE: Students´experiment

DE: Demonstration experiment

Table 2 – Observer and Descirbe - Material list

Experiment	Utilities	Annotations
Into the water	3 tumblers with water; bouncy balls or Styrofoam; aluminium body; lump sugar	Use small tumbler or bigger bodies
Music Box	music box without coverage	Obtainable in almost every souvenir shop
Drop Experiment	plate; tennis ball; paper funnel; wooden or steel ball; small sandbag	Plate approx. DIN A4, slightly vaulted
Salty	2 tumblers; ice cubes; salt; spoons	Use smaller tumblers or Petri dishes

Table 3 – Ospecific Observations and Descrption - Material list