

Content package for interactive whiteboards – The structure of the eye

This guideline provides an overview of the content and didactic context of the media in the content package for interactive whiteboards entitled “The structure of the eye.”

General information on the use and teaching concept of the content packages for interactive whiteboards is provided in the teaching method “Working with a content package for interactive whiteboards,” which is also included in the media package.

1 Introduction to teaching this topic

1.1 Motivation for the topic

We perceive a large part of our environment with the sense organ called the eye. Everything visible is immediately detected by the eye and then processed in the brain. Most people consider their sense of sight the most important sense. The resulting interest in this sense organ is a good reason for selecting this introduction to the topic of receiving and processing information.

The topic of the eye is an established part of the biology curriculum at lower to intermediate grades. The focus is on the structure and function of the eye. The teaching of correlations in the human body, like the interaction between eye and brain in the reception and processing of information, also provides important basic scientific understanding. The subject can also be covered on an interdisciplinary basis in physics courses (optics).

The media in the content package for interactive whiteboards provide a suitable way of acquainting students with the structure of the eye and the physical processes involved in seeing. The media can be used in biology and physics classes starting from grade 7. The content package is designed for a period of about two lessons.

1.2 Media selection

The content package for interactive whiteboards entitled “The structure of the eye” contains 18 media.

- **One photo:** Sense organ eye
- **Four interactive graphics:** Outer structure of the eye (front view), Inner structure of the eye (longitudinal section), Structure of the retina, Pupillary light reflex
- **Three simulations:** Accommodation of the eye, Seeing process, Near- and farsightedness and their correction
- **Two information sheets:** Seeing and recognizing, Protective mechanisms of the eye
- **Five interactive exercises:** Structure of the eye – layers (matching exercise), Parts of the eye (puzzle), The structure of the eye: cloze test and matching exercise, Protective mechanisms of the eye
- **One worksheet:** Structure of the eye (with answer sheet)
- **Guideline** for the interactive whiteboard content for teachers

The media package contains also three films: The eye, Image in the eye, Visual defects.

1.3 Background information for teachers

The media can be combined in various ways in terms of content and teaching method, depending on the focus of the class.

It is recommended that teachers work through the topic in the following steps:

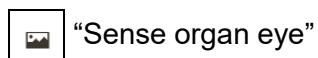
- **Introduction/motivation: Sense organ eye**
- **Teaching phase: The parts of the eye**
- **Practical work phase: Physical processes involved in seeing**
Seeing process – Accommodation – Near- and farsightedness and their correction
- **Further study phase**
Theory – exercises – worksheet

Note: The button for calling up each medium is also indicated in the following list of media.

2 Introduction/motivation: Sense organ eye

The photo of an eye can be shown as an introduction to the topic. Teachers can brainstorm with the students on the subject of the sense of sight and write the compiled keywords into the medium by hand.

Medium



3 Teaching phase: The parts of the eye

The eye consists of a gelatinous sphere that is embedded in a cavity in the skull for effective protection against external influences. With the aid of the front view of the eye and the longitudinal section through the eye, students will become acquainted with the individual parts of the eye. The interactive graphic on the retina offers a view at the cellular level. These three media can be used with the aid of the specified labeling mechanism or can be labeled by hand with the pen.

Media

-  "Structure of the eye (front view)"
-  "Structure of the eye (longitudinal section)"
-  "Structure of the retina"

The film “The eye” summarizes the structure of the eye. It shows how the pupil changes in the presence of bright light.

Medium



Because the eye is a very important and sensitive sense organ, it has a number of protective mechanisms. The most important of these mechanisms are presented in an information sheet.

Medium



"Protective mechanisms of the eye"

4 Practical work phase: Physical processes involved in seeing

4.1 Seeing process

Light impinges on the cornea where it is refracted, then passes through the pupil and the lens, and at the same time it becomes focused. The light then passes through the transparent vitreous body and is collected at the retina at the back of the eye. The light signals are now transmitted to the brain in the form of information via the optic nerve. The brain then creates a composite image out of all these individual pieces of information.

The medium "Seeing process" explains the process of seeing step by step. At each stage of the simulation, the teacher can display a short explanation.

The second medium shows how the eye perceives things and how what we see is projected onto the retina. Another film explains what a visual defect is and how it can be corrected.

Media



"Seeing process"



"Image in the eye"



"Visual defects"

4.2 Accommodation

The term "accommodation" is used to refer to the adaptation of the eye for seeing objects in focus close up and far away. The lens is the only part of the dioptric apparatus that can change its refractive power. The closer an object moves toward the eye, the more the ciliary muscle of the eye contracts and causes the lens to "round." If you look at an object farther away, the ciliary muscle relaxes and the lens becomes flatter.

Students will become acquainted with the physical process of focused vision through a simulation. The steps can be played individually and a brief explanation can be called up for each step.

Medium



"Accommodation of the eye"

If the eye does not accommodate properly, visual defects occur. A simulation shows how near- and farsightedness come about and how they can be corrected. The processes are developed step by step and explained individually. In contrast to the "Seeing process" medium, which shows a single beam path, here two parallel beam paths are shown.

Medium



"Near- and farsightedness and their correction"

4.3 Pupillary light reflex

The pupil supports the eye in adjusting the lighting conditions: If surroundings suddenly become bright, the pupil immediately becomes smaller and reduces the amount of light entering the eye so that the visual sensory cells are not overstimulated and pain signals do not reach the brain. In darkness, the pupil dilates so that the small amount of available light can reach the eye and a visual impression can be formed even in dim light. Regulation of the pupil by muscle activity in the iris is called "adaptation."

Adaptation occurs as a reflex and is wired in the brain. Therefore, by testing the pupillary light reflex, it's possible to find out whether certain regions of the brain have been damaged, for example, when a person is unconscious.

The students will learn about the pupillary light reflex and the associated physiological reactions in a simulation. The pupillary light reflex is shown both as a schematic longitudinal section and as a real-life view.

Medium



"Pupillary light reflex"

5 Further study phase

5.1 Theory

This information sheet has been designed for further study of the topic. It can be given to students as homework, or it can be used as the basis for a presentation.

Medium



"Seeing and recognizing"

5.2 Exercises

The two interactive exercises are used to test students' level of knowledge. They can be used at the end of the lesson as an aid to memorization of the material that has just been learned, or for review at the beginning of the next lesson.

Students can work through the exercises themselves on the interactive whiteboard.

The matching exercises "Structure of the eye" and "Protective mechanisms of the eye" can be filled in either manually or in the form of a drag-and-drop exercise.

Media



"Structure of the eye – layers (matching exercise)"



"Protective mechanisms of the eye"

The object of the puzzle is to put the individual parts of the eye together correctly in the specified sequence.

Medium



"The parts of the eye"

5.3 Worksheet

The printable worksheet on the structure of the eye offers a number of possible applications. It can serve as the basis for an exercise on a test, be worked through as a group, or be given to students as homework. There is an answer sheet for this worksheet for teachers.

As an alternative to the printable worksheet, there are two interactive worksheets.

Media



“Structure of the eye” (with answer sheet)



“Structure of the eye (matching exercise)”



“Structure of the eye (cloze test)”

Note: The media in the content package for interactive whiteboards entitled “The structure of the eye” also exist as individual media in the associated media package on the Siemens Stiftung Media Portal.