

Content package for interactive whiteboards – The structure of the ear

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 ear”.

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 sounds in our environment through our sense of hearing. The importance of this sense becomes very clear in traffic, for example, because we usually hear approaching cars before we see them. Many students like to listen to loud music through headphones. But continuous noise permanently damages our sense of hearing. Protecting one’s ears and keeping them healthy are therefore part of the curriculum starting from elementary school.

The structure and function of the ears are covered in-depth in biology class starting in grades 6 to 8. A further emphasis is added: the processing of acoustic information in the brain. The topic overlaps with physics (topic: acoustics) starting in grade 7.

The media of the content package provide a suitable way of acquainting students with the structure of the ear and the hearing process. The media can be used in biology and physics classes at secondary schools. 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 ear” contains 18 individual media.

- **Six images:** One photo of an ear and five unlabeled graphics relating to the individual areas of the ear and to the entire ear
- **Two interactive graphics:** “The structure of the ear,” “Hear, recognize and understand speech”
- **Four text documents:** “The entire hearing process,” “The structure and function of the ear,” “The ear and its importance,” and “Hear, recognize and understand speech”
- **Two interactive exercises** on the structure of the ear: Labeling of the individual parts and matching with the areas
- **One worksheet:** “The structure and function of the middle ear” (and answer sheet)
- **One link list:** “The structure of the ear”
- **One guideline** for the interactive whiteboard content

1.3 Background information for teachers

Depending on the focus of the class, the media can be related in various ways in terms of content and can be used in line with any teaching concept.

The following recommendation on working through the topic consists of the basics and the opportunities for further study:

- Introduction/motivation: Sense organ ear
- Teaching phase: The parts of the ear

- Practical work phase: The hearing process
Sound path – processing of information
- Further study phase
Theory – exercises – worksheets

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

2 Introduction/motivation: Sense organ ear

The photo of an ear is suitable for an introduction to the topic. Teachers can conduct a brainstorming session with students on the subject of the sense of hearing and write the keywords into the medium by hand. This type of introduction is suitable for all grade levels.

Medium



“Sense organ ear”

3 Teaching phase: The parts of the ear

The basics

The ear consists of three areas: inner ear, middle ear, and outer ear. The interactive graphic shows a cross-section of the entire ear, which can be used to work through the individual areas. Teachers may choose between a simple and a complex labeling mode in advance. The simple labeling mode is intended for teaching the basics, since it shows only the most elementary terms. The ear graphic itself can be labeled using the specified labeling mechanism or by hand. In addition, teachers also have the option of highlighting an individual area of the ear as well as the brain and labeling only the highlighted area.

Medium



“The structure of the ear”

Alternatively to the interactive graphic, teachers can label the two unlabeled cross-sections of the entire ear (with and without the brain) by hand as desired. Interactive elements are not available in this case.

Media



“Entire ear with brain – unlabeled”



“Entire ear section – unlabeled”

For further study:

For this purpose, teachers may choose the complex labeling mode for the interactive graphic. This mode provides more detailed labeling.

Medium



“The structure of the ear”

As when teaching the basics, teachers can also use the graphics relating to the entire ear.

Media



“Entire ear with brain – unlabeled”



“Entire ear section – unlabeled”

A comprehensive information sheet describes the functions of the individual parts of the ear as well as the senses of hearing and balance. Teachers can use it to support their lesson or hand it out to the students as in-depth information.

Medium



“Structure and function of the ear”

4 Practical work phase: The hearing process

4.1 Sound path

An information sheet provides an overview of the hearing process and the stages of sound in the ear:

Medium



“The entire hearing process”

4.2 Processing of information

In this simulation, the students will learn about the sound path (in this case, the spoken word) through the ear to the brain. The simulation stops at certain points, where teachers can call up an explanation of the respective step as needed.

Medium



“Hear, recognize, and understand speech (interactive)”

For this simulation, there is an information sheet of the same name with additional information that teachers can distribute to the students as a supplement.

Medium



“Hear, recognize, understand – example: speech (M/HS)”

5 Further study phase

5.1 Theory

An information sheet deals with the individual hearing functions, for example, communication, sound perception, speech acquisition, and orientation. The medium can be handed out to students in conjunction with the link list as homework, an inquiry task, or the basis for a presentation.

Media



“The ear and its importance as a sense organ”



“Structure of the ear (link list, M/HS)”

5.2 Exercises

The two interactive exercises that can be worked through on the interactive whiteboard are suitable for testing 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. A simple (basic knowledge) and a complex variant may be selected in the two exercises. In a labeling task, the students should match the terms to the cross-section of the ear. In a matching exercise, the areas of the ear (outer, middle, and inner ear) are matched to the different parts of the ear. The exercises can be filled in by hand or by dragging and dropping.

Media



“The structure of the ear (labeling task)”



“The areas of the ear (matching exercise)”

5.3 Worksheets

A worksheet on the parts and functions of the middle ear is available. A corresponding answer sheet is also available.

Medium



“Structure and function of the middle ear (M/HS)” (with answer sheet)

Generally, all graphics that can be labeled and are listed in the “image” section are suitable for creating similar worksheets. However, the graphics can also be used as the basis for short tests that students can take by hand or on the interactive whiteboard.

Media



“Outer ear section – labeling arrows”



“Inner ear section – labeling arrows”



“Middle ear section – labeling arrows”



“Entire ear with brain – unlabeled”



“Entire ear section – unlabeled”

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