c-vid-project

Flipped Classroom

Cognitive architecture and information processing

Co-funded by the European Union

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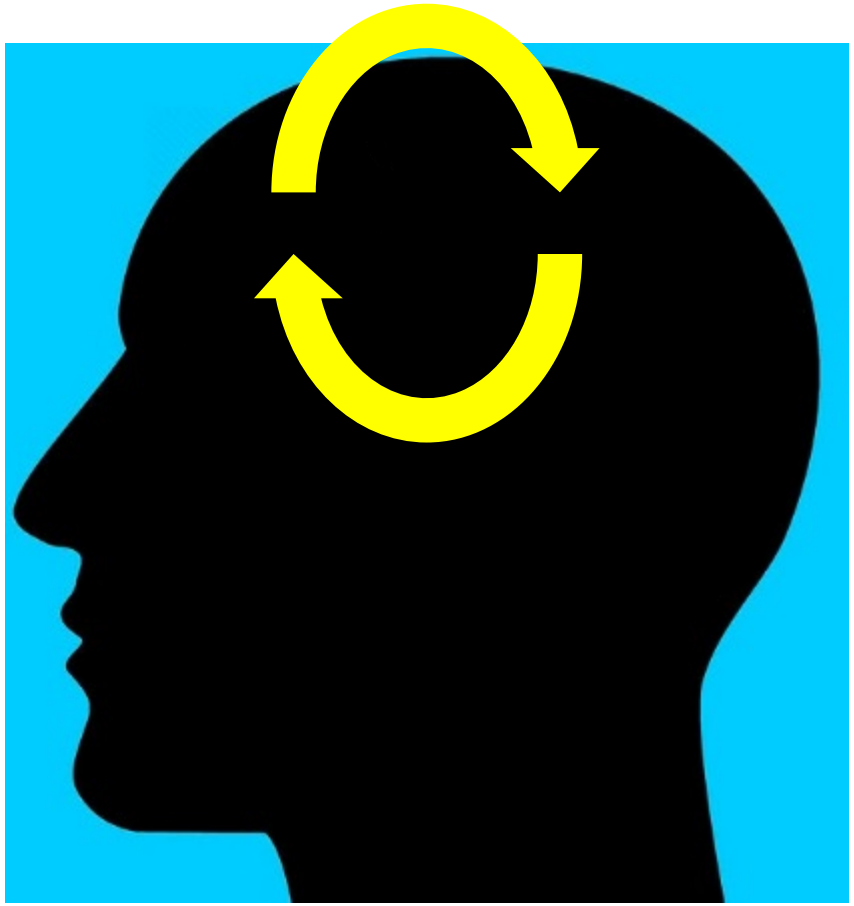
Cognitive theories: memory



Working memory has a limited duration and capacity

- Time span: in the range of seconds
- Memory span: "The Magical Number Seven, Plus or Minus Two".

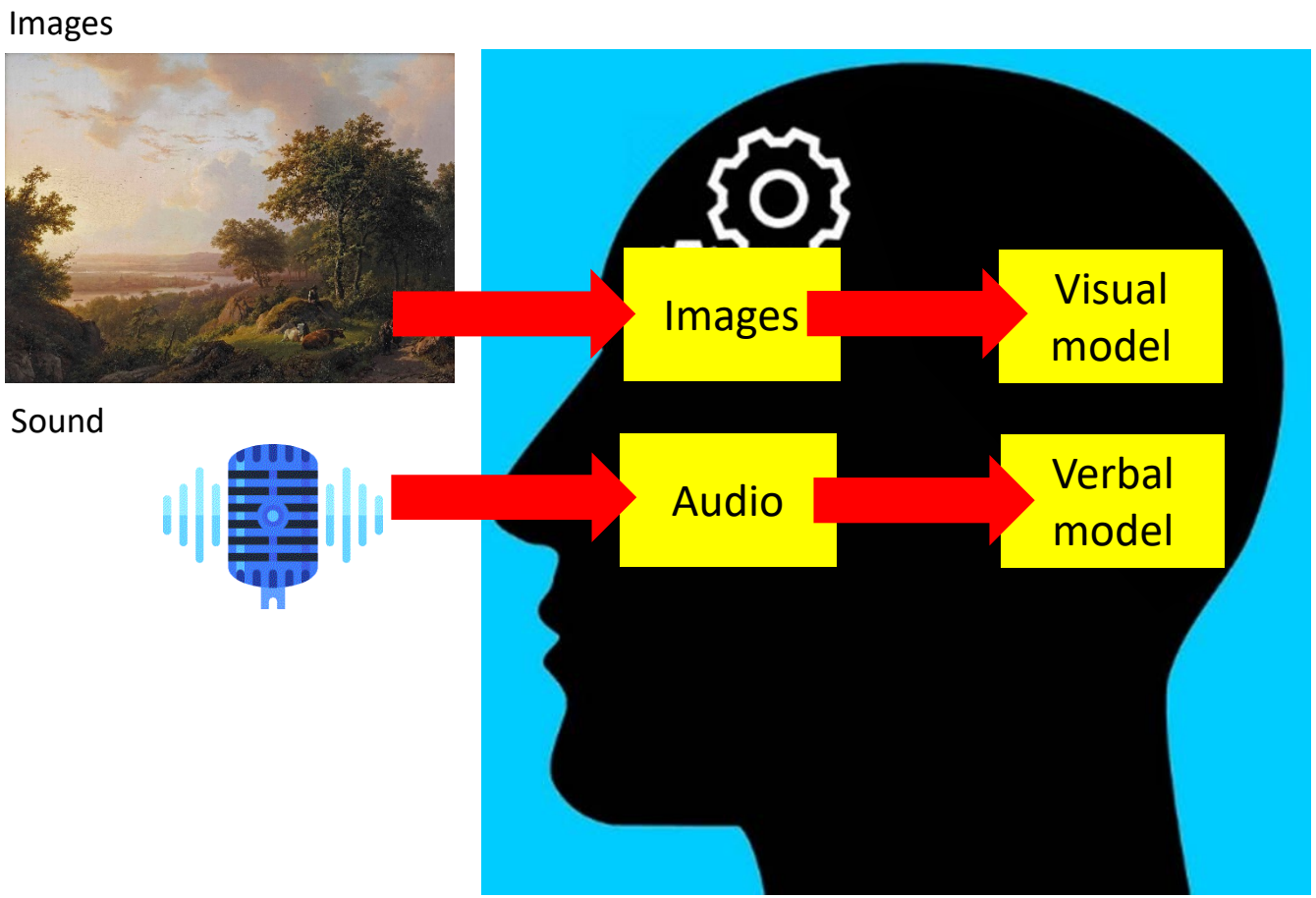
Long-term memory has 'unlimited' duration and capacity

- Memories fade however when no refreshment takes place

Connection:

- Synaptic consolidation: engrams or memory traces are fixed in long-term memory
- ‚Retrieval', the recall of memories in the working memory is necessary for the application of knowledge.

Cognitive theories: multimedia learning

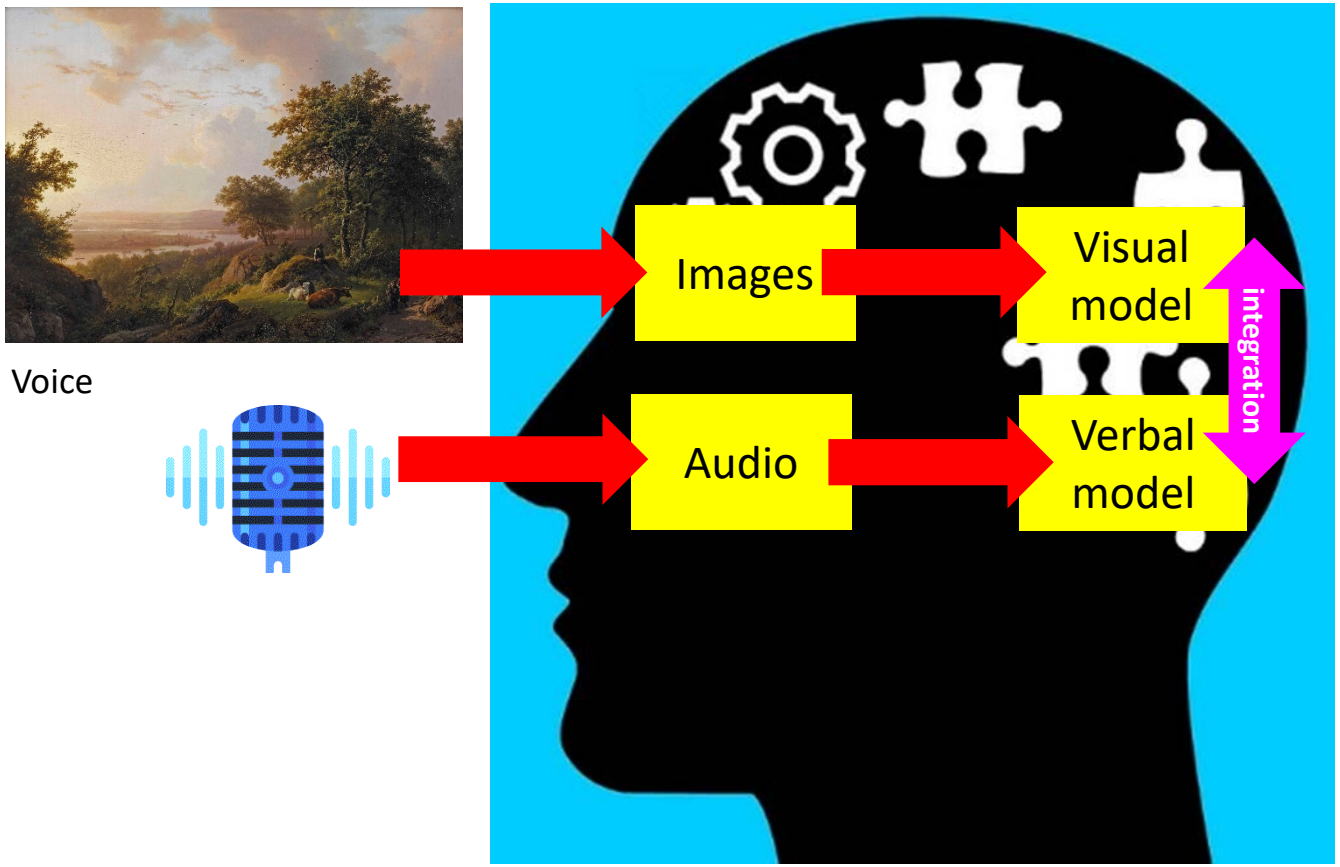


Multimedia information processing

- Dual channels: visual and auditory information are processed in separate systems
- Each channel has a limited capacity

Cognitive theories: multimedia learning

Images



Processing is an active process

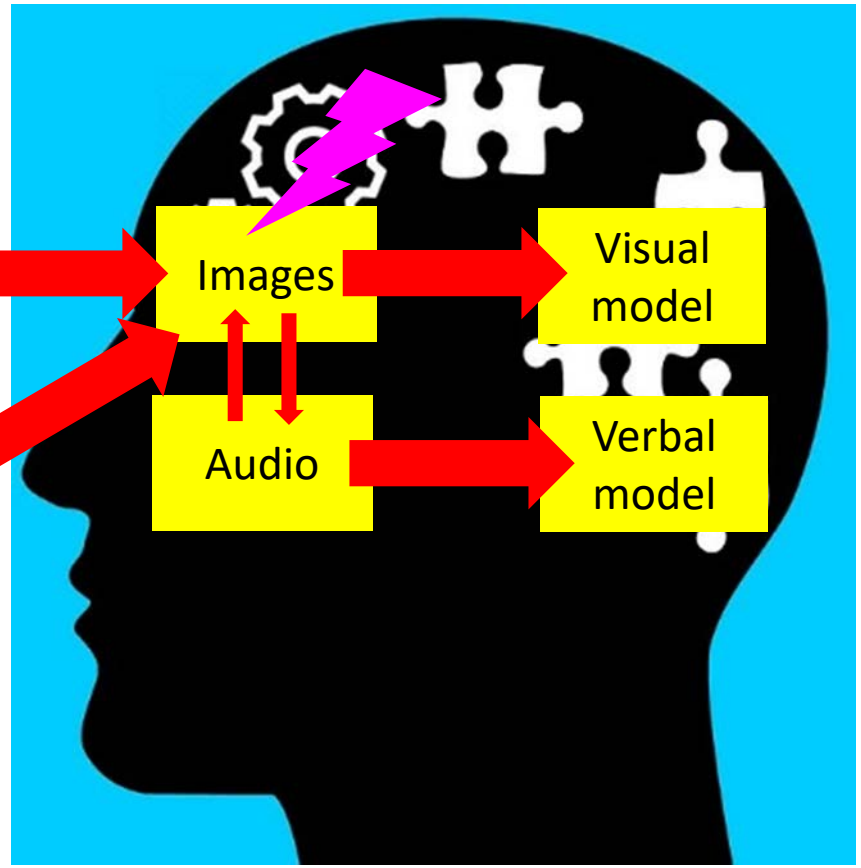
- Selection and organisation of incoming images and words
- Integration of pictorial and verbal representation with the help of prior knowledge

Cognitive Overload

Image

Words

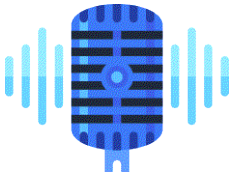
Text Text Text Text Text Text Text
Text Text Text Text Text Text Text
Text Text Text Text Text Text Text
Text Text Text Text Text Text Text
Text Text Text Text Text Text Text
Text Text Text Text Text

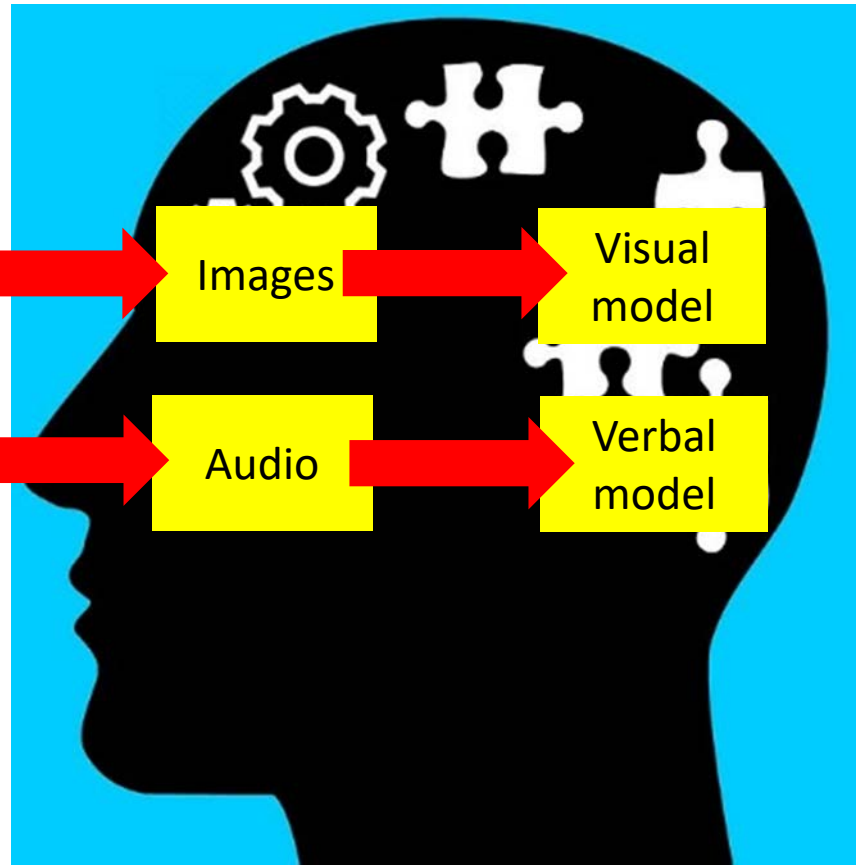


Cognitive Load

Images

Voice-over





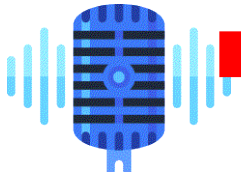
Reduce load by:

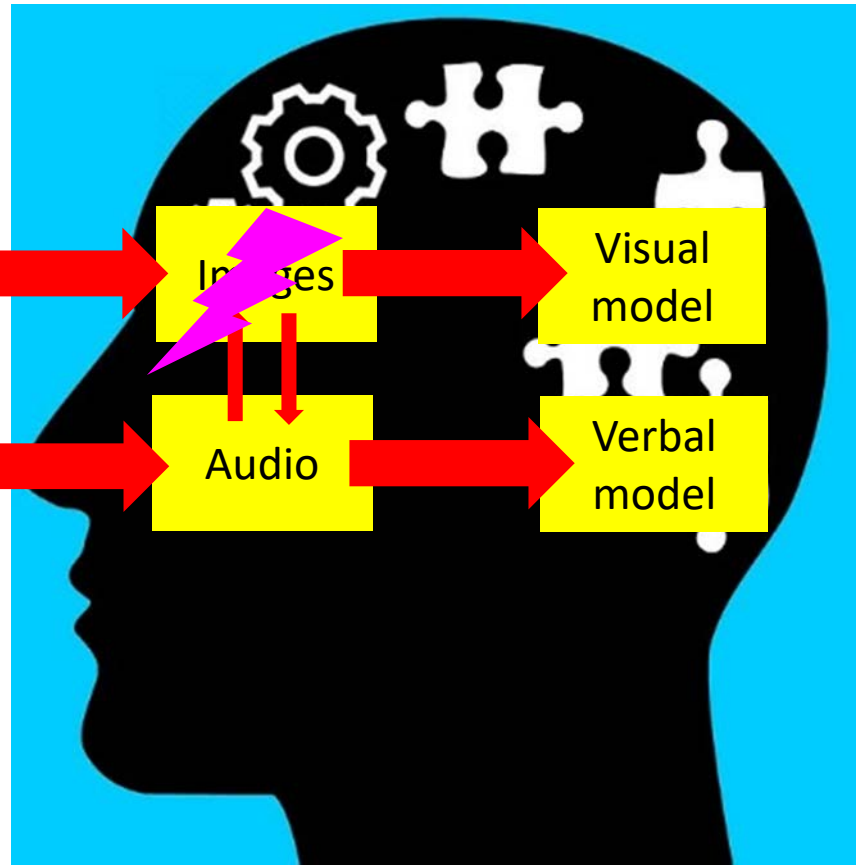
- ‘Off-Loading’: distribute info over both channels (modality effect)

Cognitive Overload

Video with wealth of information

Voice-over

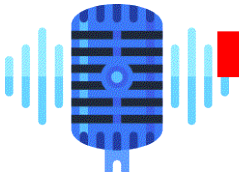


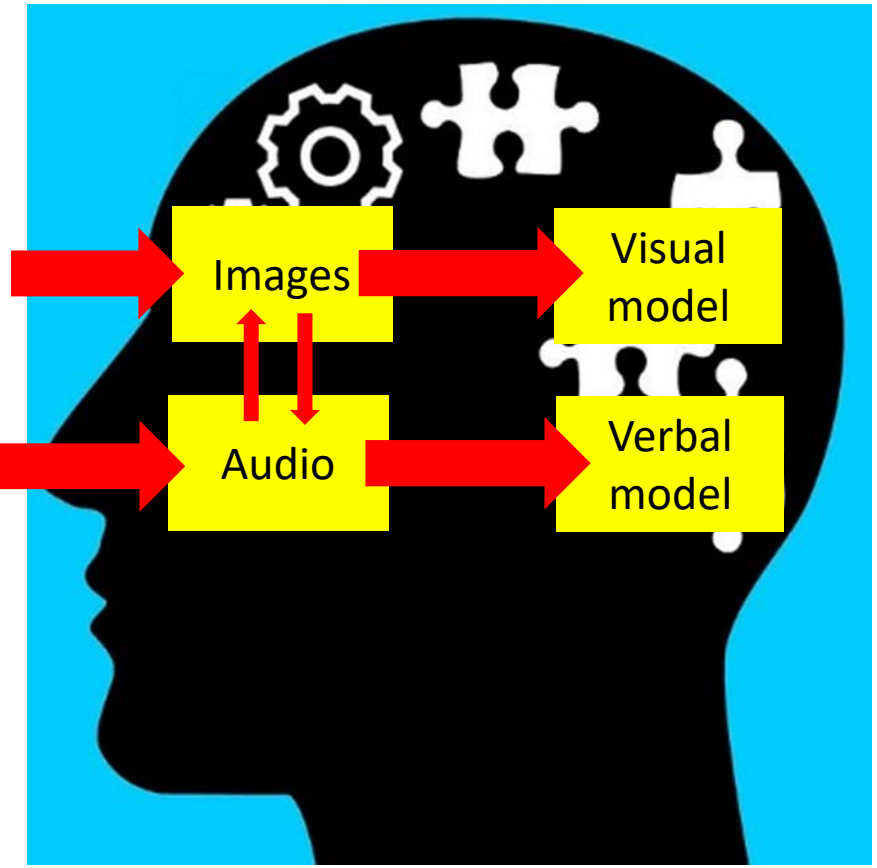


Cognitive Load

Video with wealth of information

Voice-over





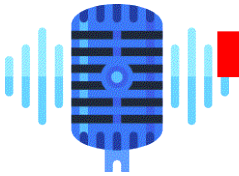
Reduce load by:

- ‘Segmenting’: short video segments, indexing, playback control
- ‘Signaling’: Emphasise important information with text (keywords), symbols (arrows) or change of colour or contrast.

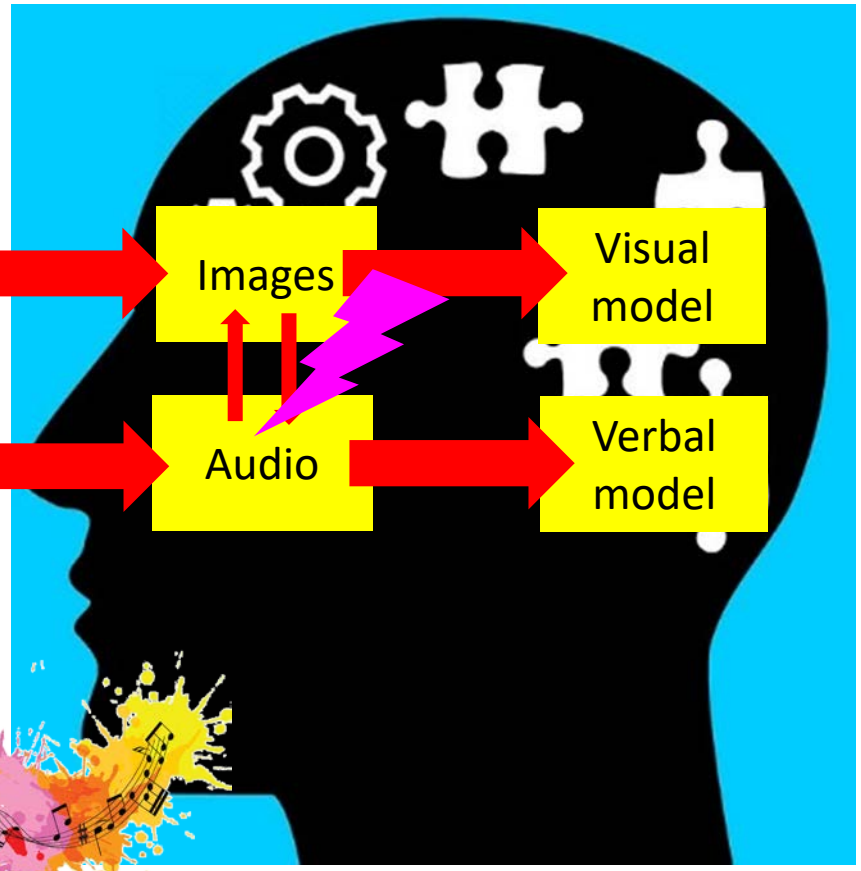
Cognitive Overload

Video with wealth of information

Voice-over



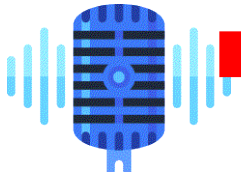
Background music

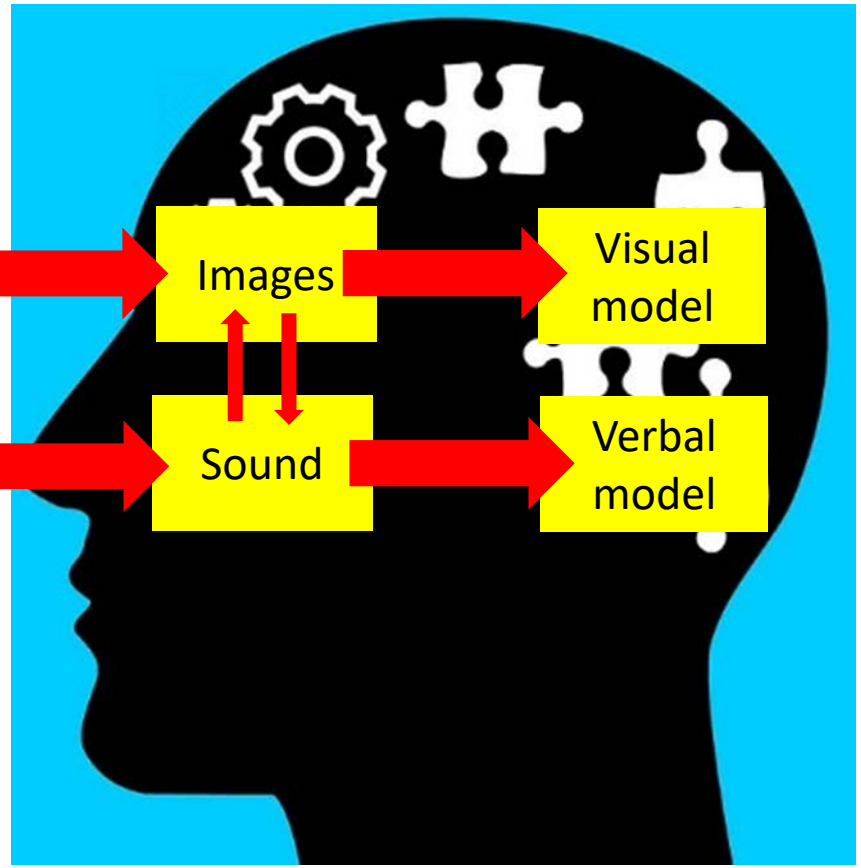


Cognitive Load

Video with wealth of information

Voice-over





Reduce load by:

- ‘Weeding’: leave unnecessary information out, adapt information precisely to the user group

Literatur

- Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational Psychologist, 38*(1), 43-52.

c-vid-project

Flipped Classroom

Essential ingredients: groupwork

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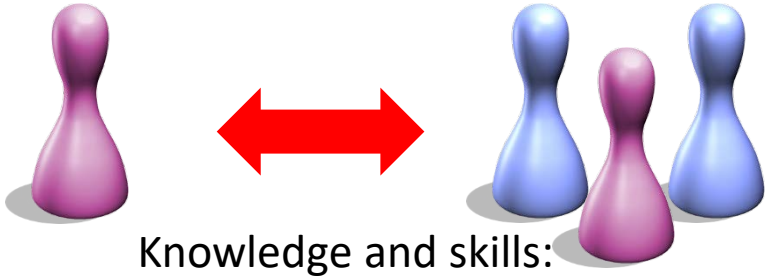
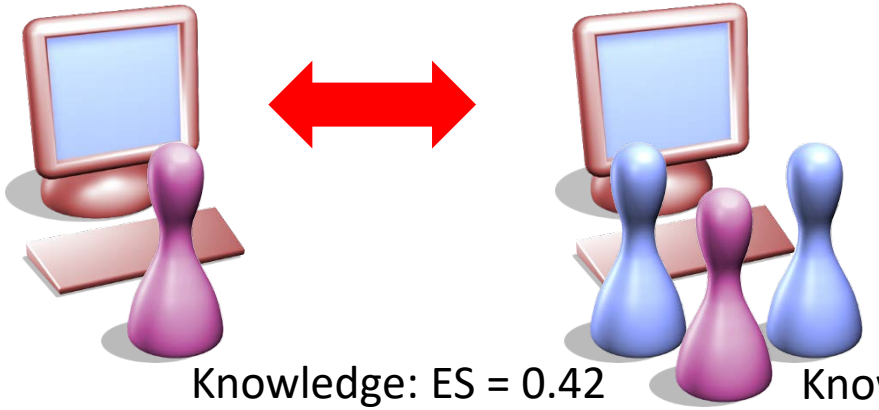
Collaborative Learning



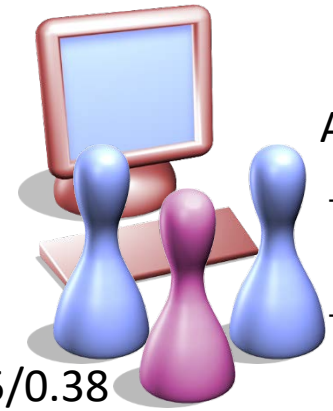
Knowledge and skills:
ES = 0.54

- Meta-Analysis Kyndt (2013): 65 empirical studies
- Meta-Analysis Wang (2018): 425 empirical studies

Knowledge: ES = 0.45
Skills: ES = 0.53



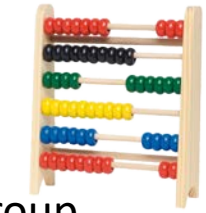
Knowledge: ES = 0.42
Skills: ES = 0.64



Knowledge: ES = 0.55/0.38
Skills: ES = 0.79/0.65

Additional support:

- IT-instruments: z.B. Group Awareness Tool
- Didactics: Instruction and guidance



Blended Learning in Higher Education

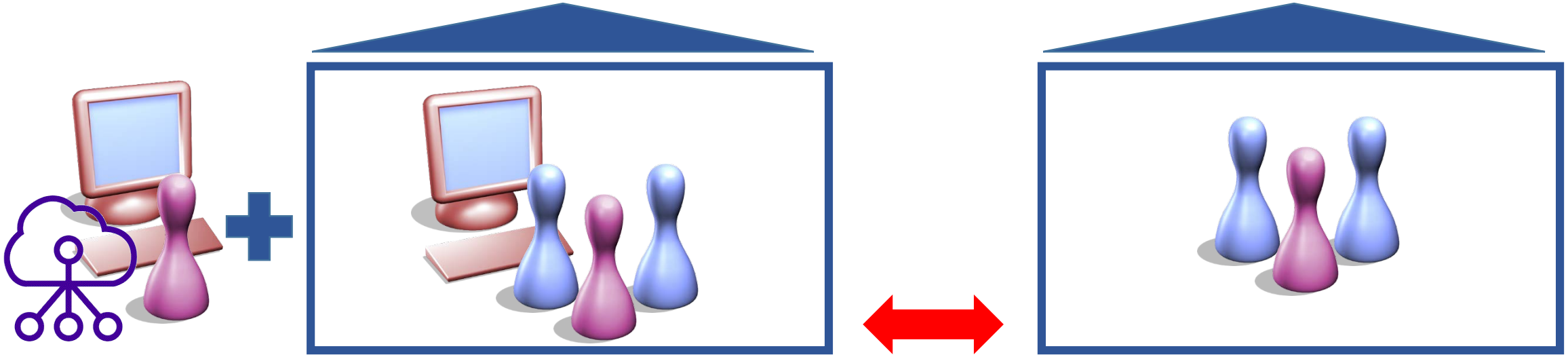
- Combination of ‚Computer-based Distributed Learning‘ outside the classroom and ‚Face-to-Face‘ teaching inside the classroom

Out-of-Class

In-Class >= 50%

Blended Learning in higher education

- Meta-Analyse Bernard (2014): 117 Effect Sizes



Blended Learning

F2F teaching

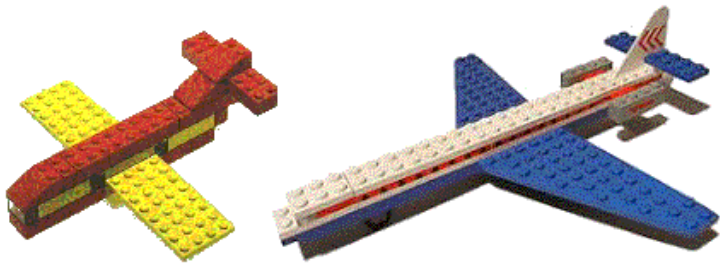
Knowledge and skills:
ES = 0.33 with large heterogeneity

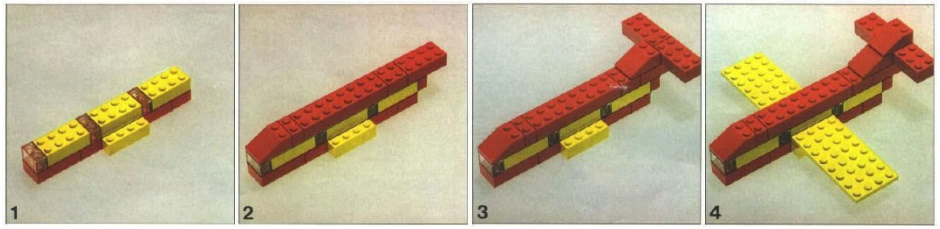
Moderators:

- Interaction
- Cognitive support with IT

Feedback

- Effect size of feedback on academic performance is twice as large as the average effect size across all education factors (Hattie, 2007);
- Effektives Feedback:
  - relates to the task and not to the person
  - not threatening to self-esteem and is presented in a positive way ('positive framing')
  - says something about the discrepancy between the performance shown and the goal set (negative feedback)
  - gives information about how the task can be done more effectively or efficiently
  - relates to goals





Effective teaching formats for academic performance

Meta-analysis (Schneider, 2017): Effect-sizes for 105 variables in higher education.

- The most effective instructional variables (43) are the categories:

1. ‚Social interaction‘ e.g.:
   - Encourage questions of participants and discussion; ES = 0.77
   - Asking open questions; ES = 0.73
   - Small group work (2-10 people, individual accountability and interdependence); ES = 0.51
2. ‚Stimulating meaningful learning‘ e.g.:.
   - Careful preparation of teachers; ES = 1.39
   - Formulate clear goals and expectations for courses; ES = 0.75
   - Enable intellectual challenge and stimulate independent thinking ES = 0.52

Groupwork

Disadvantages:

- Due to differences in performance level, not all students have an equal learning gain
- No guarantee that each student is individually well prepared for the team task
- Insufficient staffing to have each small group supervised by a teacher

Team-based learning

Key features:

- Individual preparation
- Entrance test for individuals and teams
- Decision-making tasks on complex authentic problems

5) Team Application

3) Team RAT

4) Instructor Clarification Review

2) Individual Readiness Assurance Test (iRAT)

1) Individual Advance Assignment

Out-of-Class

In-Class

Literatur

- Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014). A meta-analysis of blended learning and technology use in higher education: from the general to the applied. *Journal of Computing in Higher Education, 26*(1), 87-122.
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c-vid-project

Flipped Classroom

Essential ingredients: individual selfstudy

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Learning activity

Michelene Chi (2009): Differentiating learning activities

Interactive	What is being discussed?
Constructive	What is produced?
Aktive	What are they doing?
Passive	

Individual self study

Out-of-Class=
individual selfstudy

In-Class = collaborative work in online seminar

Learning Management System

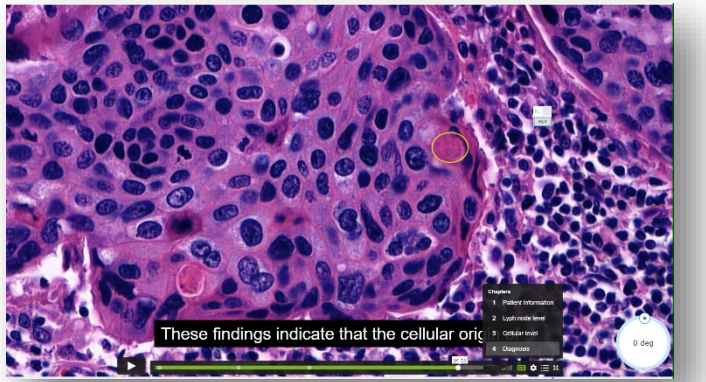
ILIAS®

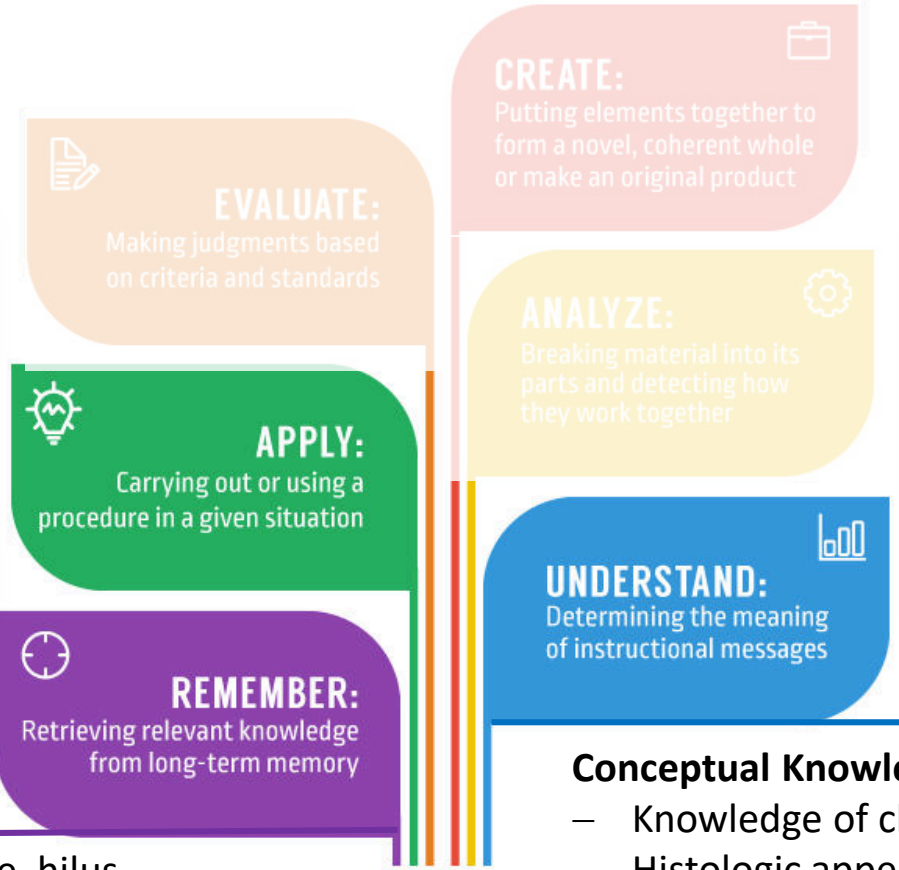
moodle

canvas

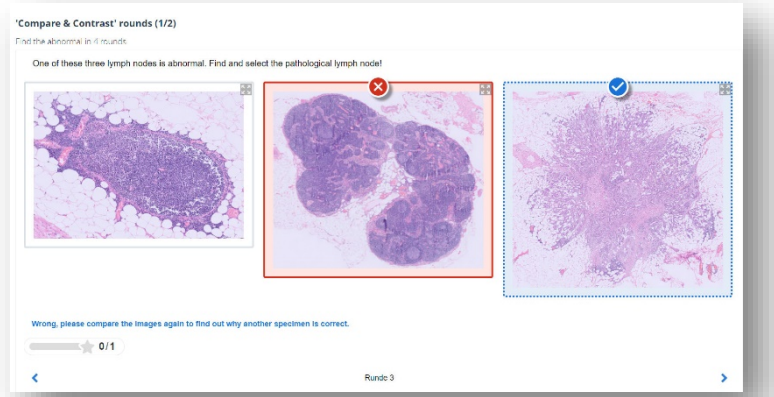
Individual self study

1) Virtual Slide Tours





2) Compare & Contrast Rounds



Factual Knowledge

- Knowledge of terminology: lymph follicle, hilus
- Knowledge of specific details and elements: status of follicles in relation to immunological status

Conceptual Knowledge

- Knowledge of classifications and categories: Histologic appearance of normal and pathological lymph node

THE 6 LEVELS OF BLOOM'S REVISED TAXONOMY

Individual self study

VQuest

Procedural Knowledge

- Knowledge of subject-specific skills and algorithms
- Knowledge of subject-specific techniques and methods

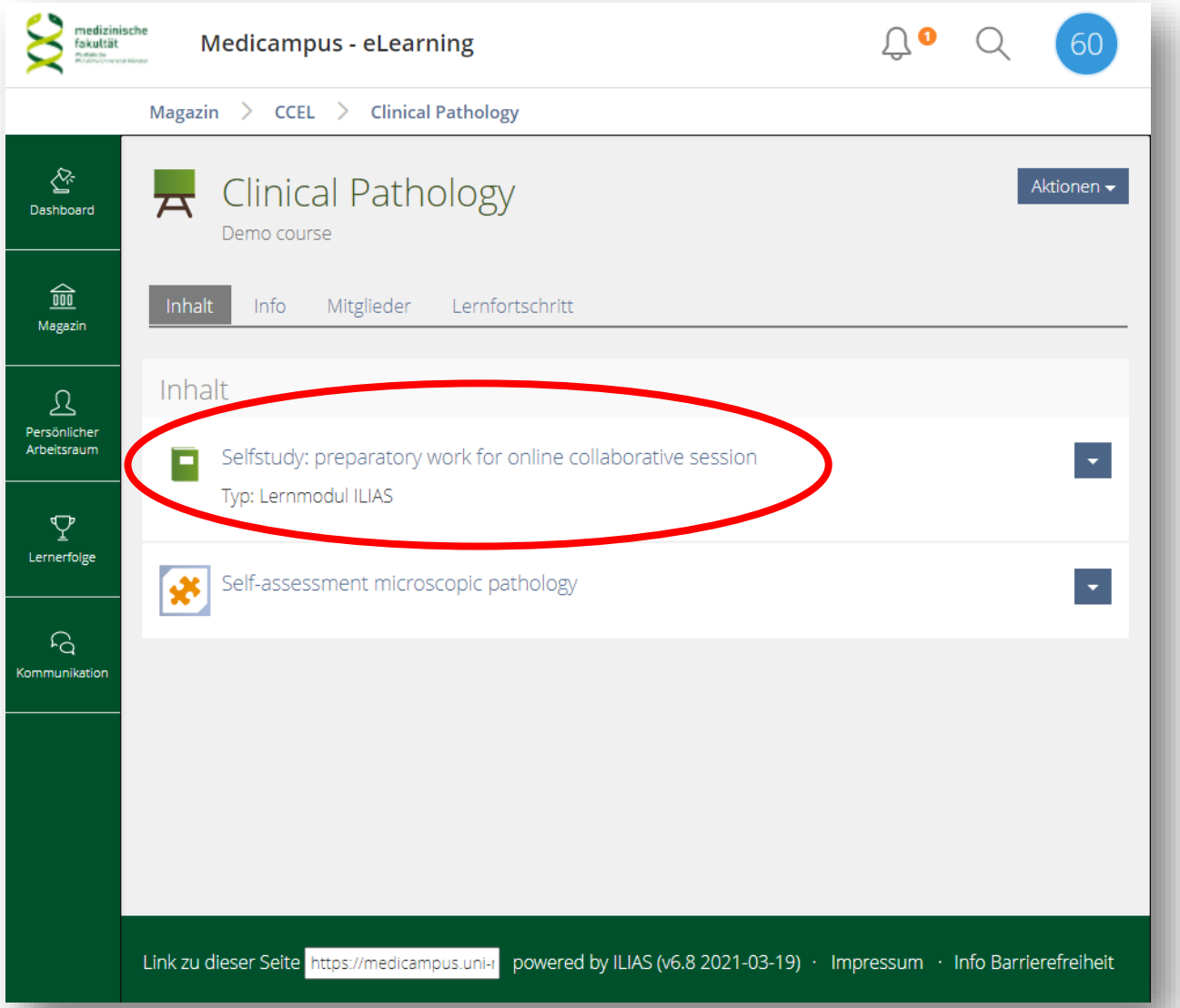
THE 6 LEVELS OF BLOOM'S REVISED TAXONOMY

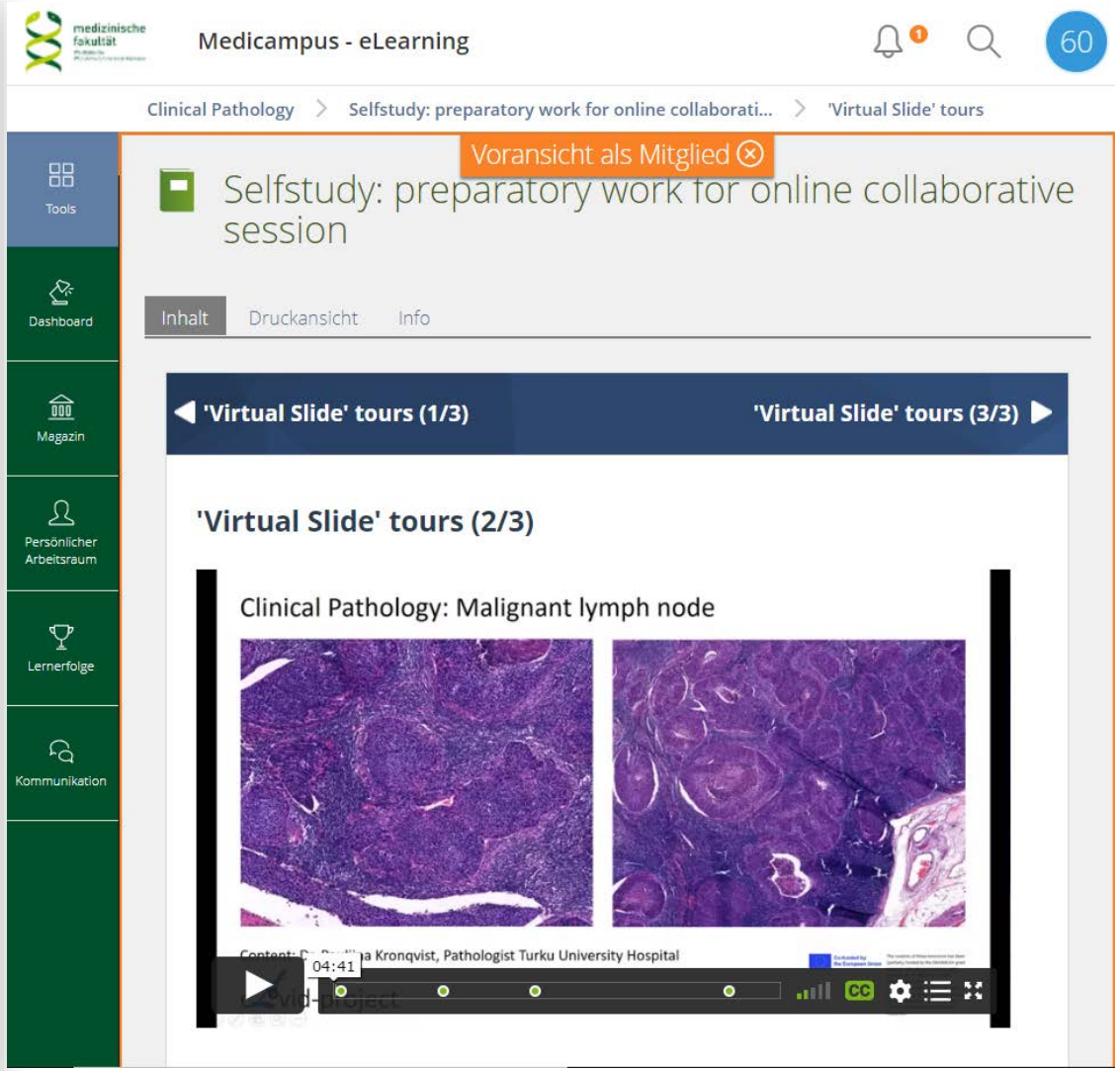
Online Seminar

Friday 10.45: Brainstorm

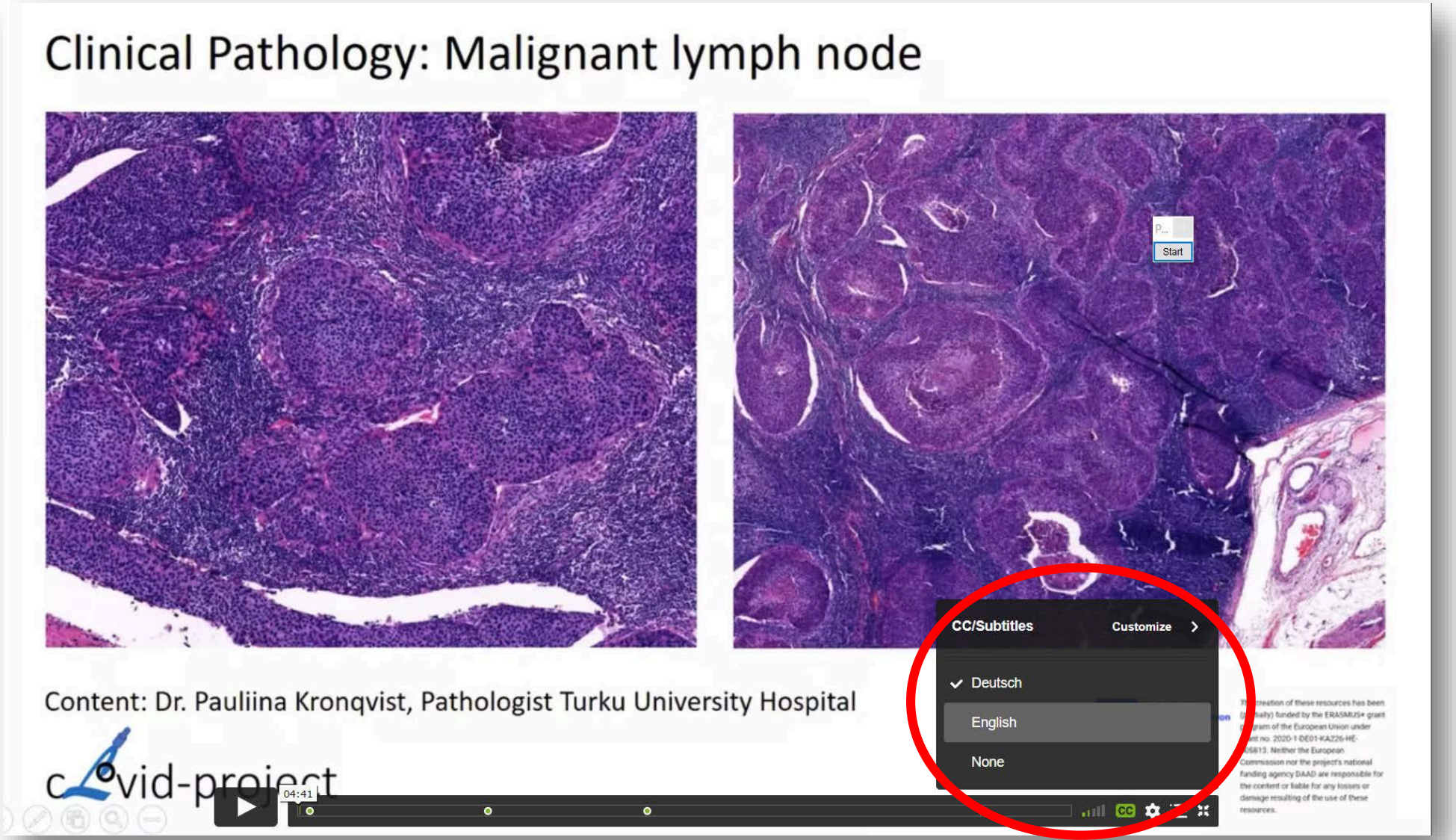
Learning Management System

1) Streaming Videos ‚Virtual Slide Tours‘





Virtual Slide Tours



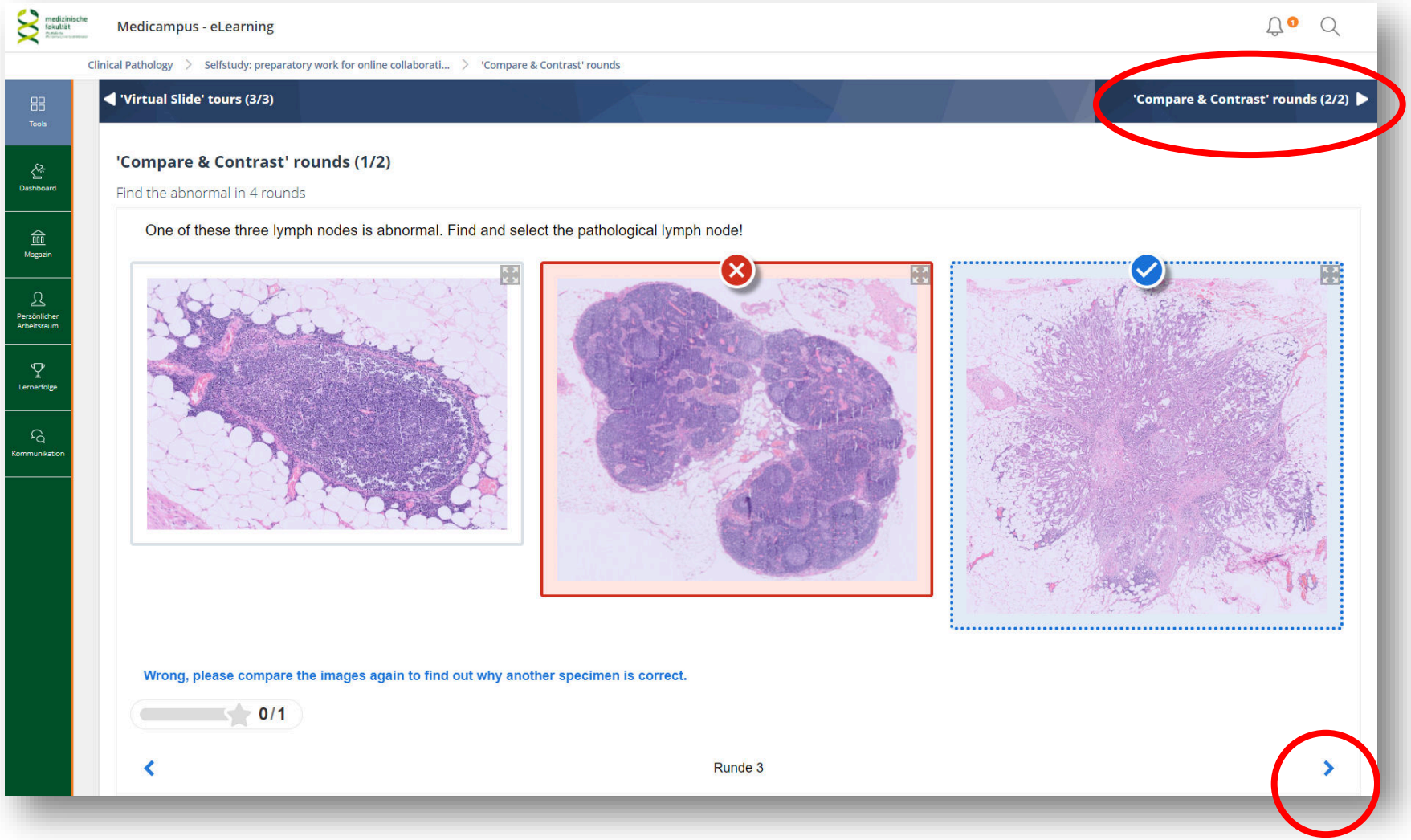
- Streaming video
- English voice-over
- Subtitles

Virtual Slide Tours

- Chapters

Learning Management System

2) H5P elements: ‚Compare & Contrast Rounds‘



Next series

Next round