Theme 5 - Animations as an interaction and communication strategy

TeComp
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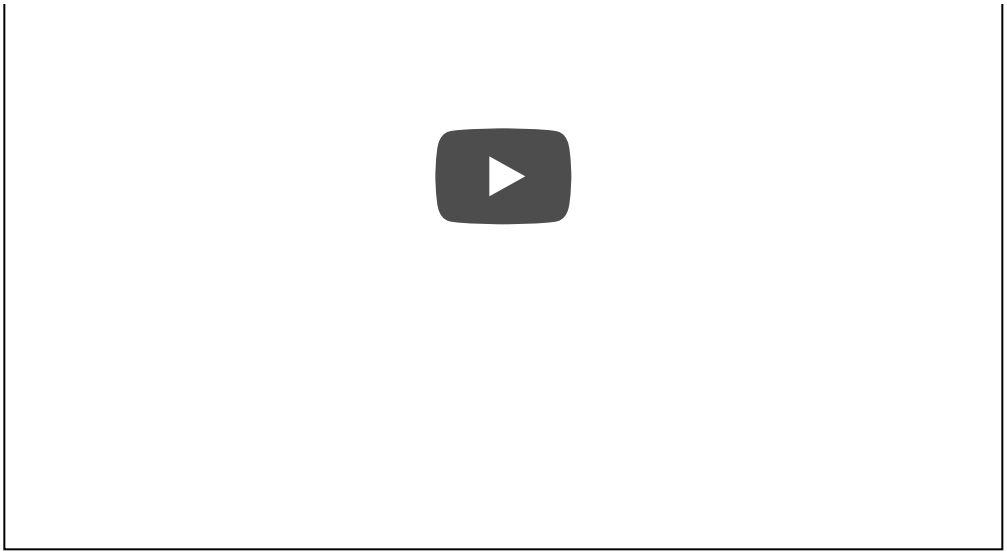
Structure of this theme

Kennisclip bij dit thema

In de volgende kennisclip grijpen we deels terug naar inzichten, aanpakken en voorbeelden die we reeds eerder in deze cursus hebben aangepakt. Animaties blijken op een andere manier de interactie en communicatie te ondersteunen. Je zal vaststellen dat het de cognitieve verwerking van leerinhouden kan bevorderen bij het bereiken van leerdoelen. Maar animaties spelen ook een rol bij het motiveren, engageren, betrekken van leerlingen in een leerproces. Bij het aanpakken van de opdracht bij dit thema kan je dus sterk verschillende keuzes maken bij het kiezen van je eigen uitwerking van een animatie.



Learning objectives

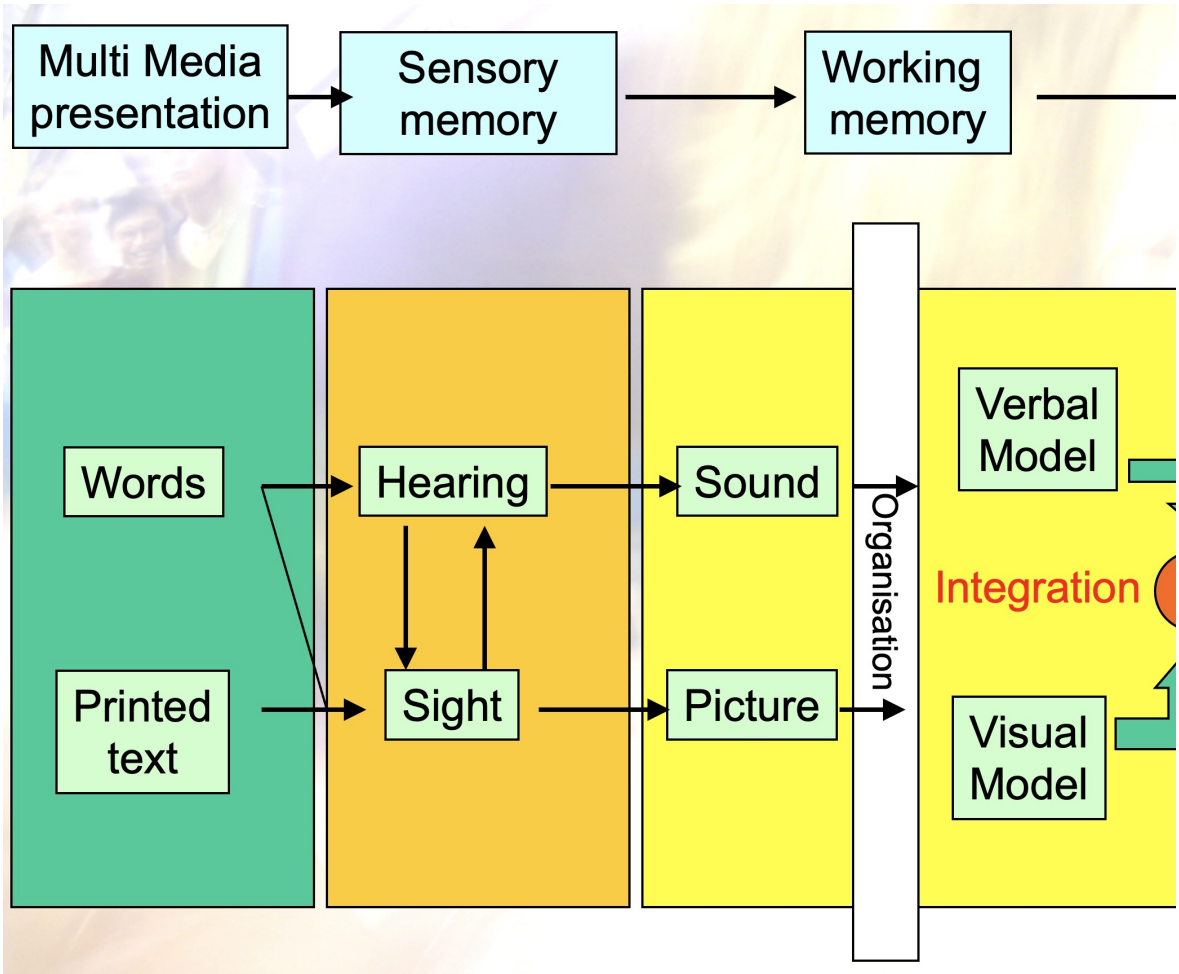
After studying this theme and carrying out the assignment, you wil master the following learning objectives:

- Using the benefits of animation as a basis for improving educational interaction and communication.
- Evaluate examples of animations for their potential effectiveness.
- Develop your own animation as a basis for interaction and communication with students for a chosen learning objective.

What do we mean with 'animations'?

We will start this submodule by exploring some examples where animations are used to support interaction and communication. You will immediately notice that the perspectives of the different examples differ greatly.

In a first example, we look at an animation that has been developed with a very easy and accessible tool that almost everyone knows: Powerpoint. Like many other presentation tools (see eg Zoho, Prezi, Sozi ..) you can add 'behavior' to the elements (also called objects) that you place on the screen. These objects can be shapes, texts (even the letters of your text), images ... which you can then make 'alive' via the 'animations' option from the menu bar. You will immediately notice that the animations really add something to the interaction and communication. A 'static' and non-animated representation of looks like this. The example tries to show how the theory about " dual channel assumptions" works that fits into the"Cognitive Theory of Multimedia Learning" of Mayer (2000):



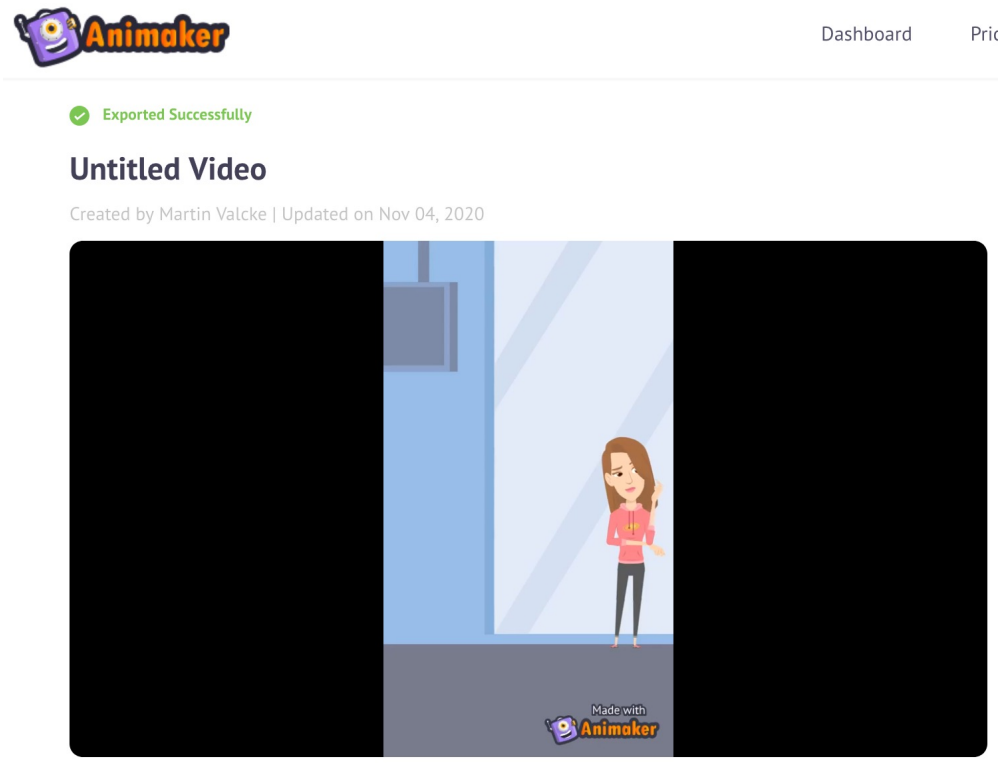
An animated version looks like this; click on the file name to download the ppt. Of course you will need the PPT software on your computer to activate the file. If you don't have the software installed, first dowload and install a free viewer (see e.g. https://www.microsoft.com/en-us/p/pptx-viewer/9np64t9094lb?activetab=pivot:overviewtab).

CTML_Animated.pptx

But it can be even better. In what follows we have used the ppt in a Camtasia knowledge clip, whereby we ourselves respect the dual channel theory and reinforce the knowledge processing with regard to the knowledge with an audio line:

You already know our second example. It is the knowledge clip that we used with the previous theme of collaborative learning (created with the Doodly app).

In a similar way, we worked out a third example, this time with Animaker, a tool for which you can use a free license (https://www.animaker.com/). Click on the following screenshot in which you see a section from the animation:



This third example is also very different from the first. When you compare the first and the next two examples, you will feel that the purpose and focus of the animation are different. Have a look at the key concepts in the following Wordle (created with the free software https://www.wordclouds.com/):

Which core concepts do you place with:

Example 1: .....?

Example 2: .....?

Example 3: .....?

The examples already suggest that the impact of animation can differ greatly. This has to do with the very different meanings that hide the concept of animations. Li and Elms (2019), for example, distinguish between the following approaches: Three-dimensional still backgrounds; "Concept cartoons" used in science education, referring to illustrative drawings similar to comic strips; Static graphics with simple movements; Black and white or grayscale illustrations of molecular movements, some with no sound effect;

Avatars (animated characters) that appear in educational videos. They emphasize - and we follow that reasoning - that animations: "animations to mean cartoon-style videos with a basic storyline, characters, and dialogues or voiceovers, in which the graphics move in synchrony with the accompanying voice acting and sound effects (eg a character's mouth opens when speaking). (ibid, p.4) "Although the latter does not always occur (mouth of figures moves in sync with audio line), the emphasis is mainly on a storyline, a dialogue with the viewer / listener and a good observable movement of elements on the screen.

Research about educational animaties

The impact of animations is complex. The three examples just suggested that the potential can differ greatly. This is also very clear from scientific research. The differences in impact also explain why researchers sometimes resort to very different theories and assumptions to explain effects.

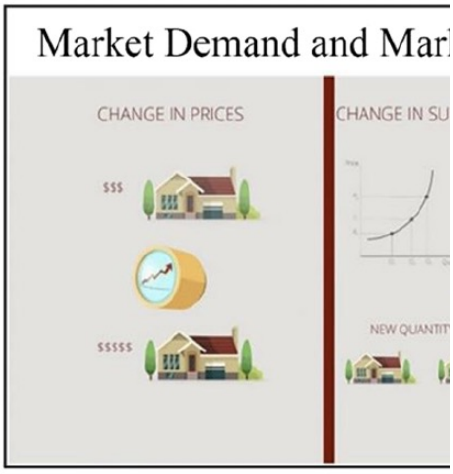
Theories that view animations as enhancing social interaction, for example, fall back on Dewey's early theory (1916) on the pragmatic aspects of learning, in which learning is inherently linked to being connected with someone else. When someone addresses you in an animation, a feeling arises of 'being socially involved in and with' the learning and instruction process. This 'involvement' also ties in with contemporary theories of motivation that emphasize, among other things, that students (and in fact everyone) are looking for ways to reinforce the need for "involvement". The animations give you the

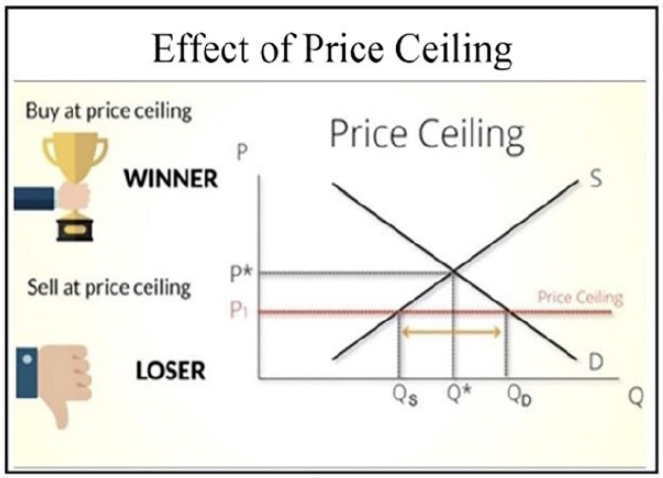
feeling of being more involved in the process and that gives a boost to motivation.

A second set of theories emphasizes the fact that animations support the cognitive processing of complex information and therefore the storage of that new information in memory. The dual channel theory just described is in line with this (see also CTML). The animations allow us to process more information, which is also more easily accessible to our memory. Researchers emphasize that the feeling that things are 'easier' arises because cognitive load is avoided. Compare e.g., the static image of the dual channel theory with the dynamic animation and you immediately understand what is meant. The experience of complexity when viewing the static picture is lost due to the experience of the step-by-step construction of the figure in the animated version; especially when an audio line is added.

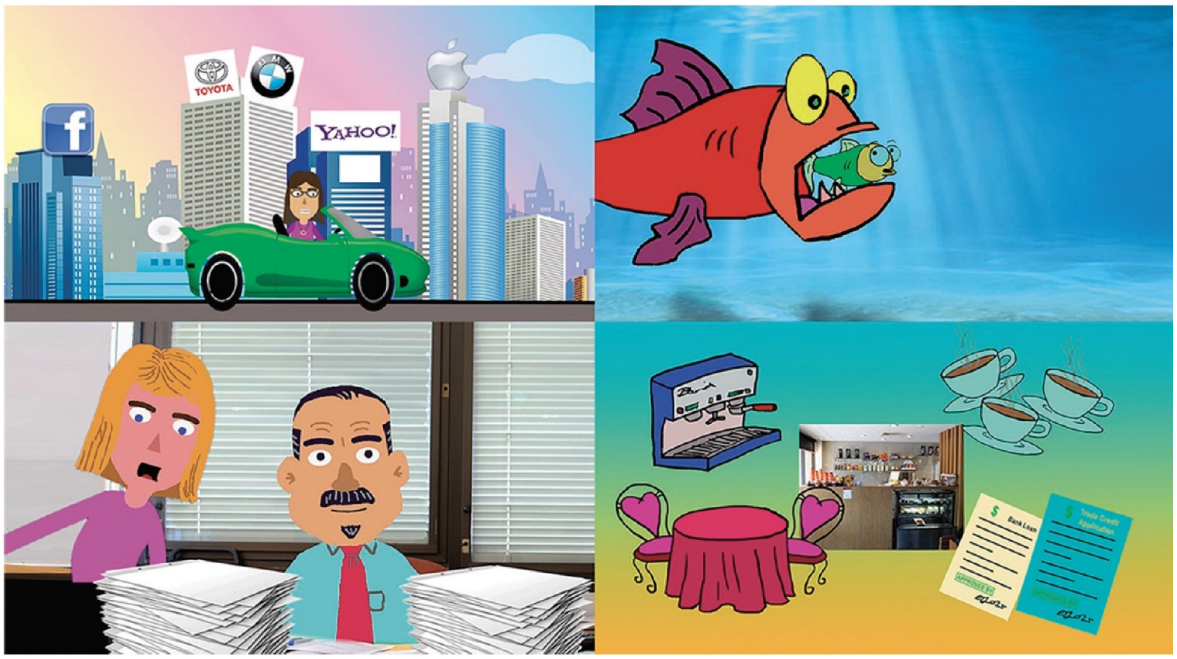
You will find both theoretical explanatory models in the studies we describe below. A meta-analysis of animation research concludes that in almost all studies there is a positive effect through the use of animations (Berney & Bétrancourt, 2016). It is striking in their analysis that the effects can mainly be seen when processing complex concepts and mechanisms and that the effects lead to a better understanding and application of the newly acquired conceptual knowledge (do you recognize the concepts from Bloom's taxonomy?).

A first cluster of studies emphasizes the animation of the knowledge elements that are addressed in the educational interaction with students. For example, the animations in the research of Shiu and colleagues (2020) emphasize links between, for example, supply and demand in a economics, the elasticity of supply and demand, the effects of capping prices ... These are all mechanisms whereby the relationship between the 'value' of one variable on another variable is visualized with an animation (ibid, p. 2002):





Liu and Elms (2019) investigated the use of animations in an accounting course. In doing so, they developed cartoon-like animations (see example below (ibid, p. 8):



The researchers had both major goals in mind that were described above in the context of the theoretical basis: on the one hand to increase attention, interest and motivation and on the other hand, a better understanding of complex concepts. Firstly, the research showed that greater interest and stronger attention / motivation is associated with three characteristics of the animation: (1) the use of figures in the animation (depicted persons, puppets, animals ...) ,; the use of a voice that acts in interaction with the viewer and (3) the proper selection of visual cues. The learning effect could be traced back to (1) the simpler construction, presentation and description of the learning content, and (2) the visual support of complex concepts and mechanisms.

Wang and colleagues (including Richard Mayer referred to earlier) compared animations with moving versus non-moving main characters (pedagogical agents). The subject matter was the transmission of signals in nerves. You can recognize the synapses in the following figure (ibid, p. 254):

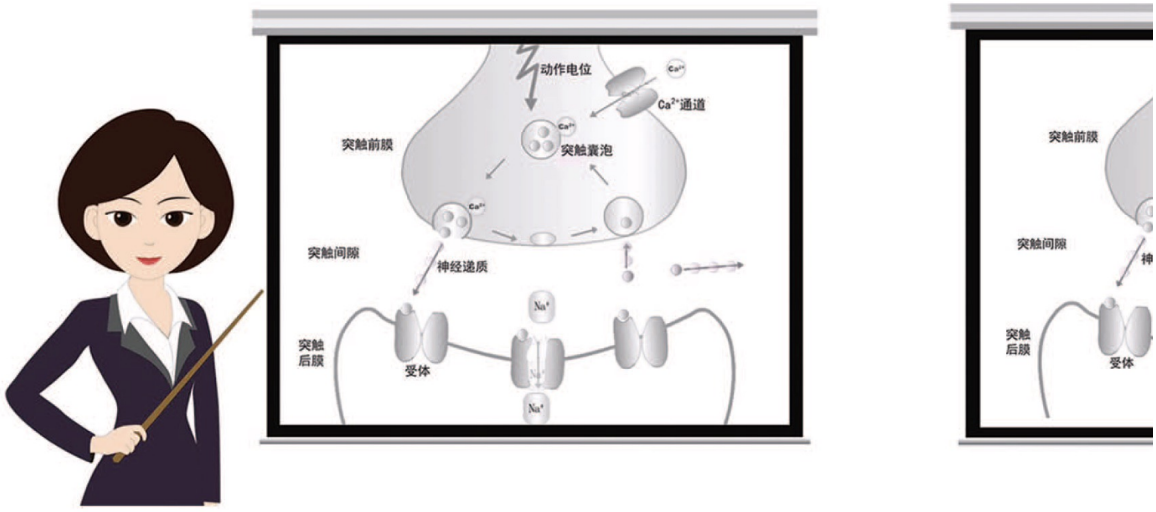
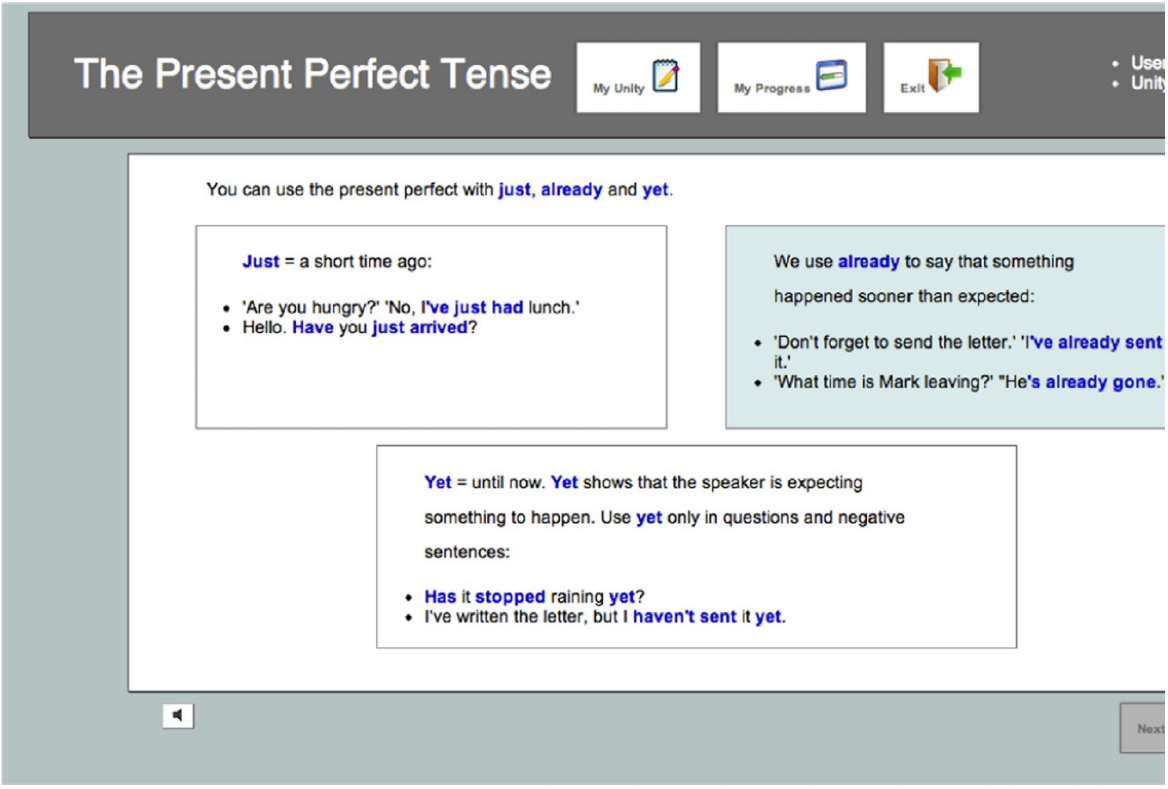


Figure 1. Example frames from animations in Experiment 1. Left is pedagogical agent (PA) v is no PA version. See the online article for the color version of this figure.

The results were very clear. There was a significantly higher learning effect with the moving figures. In their research - partly based on eye movement research - it appeared that the moving main figure led to more and longer eye fixations and more active viewing of the relevant knowledge elements.

A third sample study looks at the use of animations in learning English as a Foreign Language (EFL). Carlotto used animations to

add conjugation of verbs; see image below (ibid, p. 20):



In the image you will find text and there is an audio explanation by a moving or non-moving figure (pedagogical agent). The researchers examined not only the effect on learning and motivation - which was positive - but also whether the degree of expressiveness of the animated figure made a difference. They could not prove this. However, moving the figure and an expressive voice turned out to make a difference.

Design guidelines to get successsful educational animations

In their research, Ayres and colleagues (2019) looked at the design features of animations that determined their effectiveness. The review study by Ayres and colleagues (2019) helps to put forward a series of design advice. The design guidelines also include advice to help mitigate the possible negative effects of animations, eg the animations can be too fast and complex for beginners in a knowledge area.

But the same researchers also emphasize that characteristics of the student can positively or negatively influence the effect of animations; For example, students with poor prior knowledge appear to benefit less from animations. Animations are therefore not a panache solution for insufficient prior knowledge. Pupils with a less well-developed spatial understanding (spatial ability) also appear to benefit less from animations. The latter leads some researchers to see gender as an important student characteristic. Girls are said to have less developed spatial awareness. But available research cannot prove this.

We derive a second source of design guidelines from the meta-analysis by Berney & Bétrancourt (2016).

Design guidelines:

1. Provide an integration of audio and video, image and sound. Moreno and Mayer (2000a) describe this as applying the modality principle: use two modalities, to promote cognitive processing.
2. "Integration" also means that sound and image are best synchronized. Moreno and Mayer (2000b) emphasize 'temporal contiguity' in this context, ie the appropriate matching of image and sound in an animation.
3. Take care that an animation can be stopped; so that there is control over the progress of the animation by the student. Animations sometimes go (too) fast and then lead to more confusion and / or only partially processed and stored new information.

4. Confusion or too slow processing can also be counteracted by properly splitting the animation into segments. Segmentation helps to reduce the number of new knowledge elements that a student must process simultaneously.
5. Animations also appear to work better when examples are given or worked examples. When the figures / people in the animation demonstrate something themselves, work out an example, this appears to have a strong learning effect.
6. Adding a movement to a figure (gesture) appears to have a strong learning effect. It emphasizes a certain concept, core idea, attracts attention ... Observing movements in others appears to cause a reinforcement of cognitive processing. Some researchers call this "embodiment" of knowledge.
7. Isattention paid to prior knowledge? We know from research that prior knowledge determines the extent to which we learn from animations (see eg Arslan-Ari, 2018). That is why it is best that an animation at least checks whether the prior knowledge is present or that the assumed prior knowledge is briefly cited / repeated.
8. A final design feature places the use of animations in a broader learning and instruction setting. Instead of viewing animations alone, embedding animations in a setting of collaborative learning (see previous theme) appears to offer an advantage. Viewing animations helps to share impressions, ideas, contacts, ... This allows students in a group to leave a richer experience base in building their knowledge.

Your 'animation' assignment

The assignment for this theme runs parallel to the approach of the previous assignments. You will quickly recognize this. You will of course start from the knowledge base that we discussed in this theme and you will certainly base yourself on the checklist that will be used in the feedback cycles for this assignment.

First, you will start again from the subjects or the subject for which you will be responsible when you receive a teaching assignment in secondary or higher education. Pay attention to the following components when working out your assignment. You will soon be uploading an animation in the safe of your group. This can be worked out with a tool of your choice. you can build on the examples you could explore in this theme.

There is a lot of free software available for creating animations. The learning curve with these tools is very short and you can produce fairly professional-looking animations after an hour.

1. Very clearly define the learning goal or goals that you want to achieve with the students with the animation. Naturally, this learning objective is in line with the subject / course unit for which you are or will be responsible in the context of your university program.
2. Work out a scenario or storyline for your animation. This is best done on paper with consecutive blocks, frames in which you place basic text, write comments underneath and draw elements from the animation. You can 'feed' the scenario by exploring the tool and checking what options the tool offers you in terms of text, speech bubbles, graphic elements (drawings, shapes, photos,), the possibilities to animate (across the screen). move, move, insert and exit, appear / disappear, enlarge / reduce ... In certain cases there are examples available in the tools that you can adapt to your own scenario.
3. Note the segmentation of the animation. That is why we emphasize in the scenario the successive screens, blocks, frames in which you supplement, enlarge, adjust, remove the animation / text ...

4. Work out an audio track that you can then use to enrich the animation. Sometimes you can add the audio in the animation tool itself; in other cases you combine it with a video editing tool (see previous topics in this course).
5. Check where you can definitely add gesture or a form of embodiment. Even in simple presentation software like Powerpoint you can do this by placing a second version over a first version of a figure and then showing those two consecutive figures and making them disappear. It sounds cumbersome, but you can compare it to flipping back and forth between successive photos you took with your mobile phone.
6. Review your result and adjust the timing, the sequence, check how the student can or cannot control the animation itself in terms of tempo, movement back and forth ...
7. Don't forget to refer to the wider setting in which students view and study the animation.

When you are done, upload the final result to your safe and name the file: Your_name_animation.xxx The suffix XXX refers to the type of file you are sending; eg a PPT file, an MP4, ... it can also be an online file on the Internet (see the examples in this topic). We repeat that it is best to use the Feedback_animations.docx checklist yourself - before uploading your final result - to assess the completeness of your work yourself.

A checklist to evaluate the assignment

The checklist for this theme is again directly derived from the design criteria we discussed earlier. The figure below gives you an initial

idea of the criteria used when giving / receiving feedback and feedback on the feedback.

Criterion	Feedback
	Colleague
Is there a concrete of a learning objective?	
Is attention paid to the presumed prior knowledge in order to be able to process the new learning content?	
Is there an integration of audio and video?	
Attention is paid to the synchronization of audio and video	
Is there control of the animation by the student?	
Is there attention for a good segmentation of the learning content to be processed?	
Are examples or example solutions incorporated in the animation?	
Is there attention for "gesture" or "embodiment"?	
Is a link made to the broader learning and instruction setting in which the animation will be or will be given a place?	
Add your own criterion here	
.....	

Click here to download the specific checklist to evaluate the animation assignments: Feedback_animations_EN.docx

Planning

Week xx till yy

Each individual participant develops his/her own task following the instructions.

The morning of xx, individual participants put their work in the locker of their group.. Please stick to the following labelling of the documents or files:

Nameparticipant_Questions.pdf

Week yy till zz

Between xx and yy , each participant gives feedback to their partner in the group and this on the base of the feedback form made available earlier in this theme (Feedback_animations_EN.docx).

Upload this filled out document in the locker of your group following this labeling format:

"Nameparticipantgiving feedback_nameparticipantgettingfeedback.doc

Prior to the next deadline of mm, each participant who received feedback, gives now feedback on their feedback on the base of the format. Use the following label for the file you will upload in your group locker:

"Nameparticipantgivingfeedbackonfeedback_nameparticipantthatgavefeedback.doc

Good luck with the task!

References

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