OVERVIEW

Cognitive Theory of Multimedia Learning

Description

Multimedia learning is defined as instruction through use of pictures and words. This definition is underpinned by three assumptions:

- Dual Channels: learners process visual and auditory information separately
- Limited Capacity: there is limited amount of information can be held in a channel at a time
- Active Processing: learners are not “empty vessels”—they are actively synthesizing information to store in long-term memory

In order to accommodate the above, the goal of the cognitive theory of multimedia learning is to design effective instruction that:

- Reduces learning that does not serve instructional goal
- Manages learning in working memory
- Fosters deep learning and understanding

Why is this important?

Instructional design research shows us that “people learn better from words and pictures than from words alone.” (Mayer, 2021, p. 4). Integrating words and visuals in a learning experience can foster meaningful learning, defined as good transfer and retention performance. However, the amount and types of information presented must be carefully balanced in order to manage cognitive load and promote transfer from short term to long term memory—if a learner is overtaxed cognitively or distracted by irrelevant tasks, transfer and performance decrease.

Implementation Examples

Video activities paired with questions	✓	
Instructional material aligned with learning objectives	✓	
Lecture slides with practice and reflection questions	✓	✓
Self-guided, interactive multimedia learning modules or tutorials	✓	

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Sources: Chandler and Sweller (1991), Mayer (2021), Mutlu-Bayraktar et al. (2019), Noetel et al. (2022), Sweller (2020)

Practical Applications

- ✓ Pair visuals with audio narration. If visuals are not an option, present key words instead.
- ✓ Do not have words from narration appear verbatim on screen. An exception: automatic captioning is effective for second language or high-jargon learning.
- ✓ Include signaling elements (i.e., highlights, arrows) to show where to focus attention
- ✓ Place related material close together in text (i.e., annotated map instead of a legend) to reduce extraneous cognitive load.
- ✓ In a single learning experience, segment instruction around 3-5 number of learning objectives. Remove information that does not relate to learning objectives.
- ✓ Aim for a single learning experience to last approximately 15 minutes at most, 5 or so minutes per segment at most; however, these lengths are highly variable based on the complexity of the information and the readiness of the learner.
- ✓ Give students autonomy to pause learning, choose when they are ready to move to the next step, or revisit past learning so they can manage their own cognitive load.
- ✓ Build in natural pauses in multimedia experiences for practice, feedback, and/or reflection.

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