

Cognitive Learning Theory Script

Slide 2:

- “What we see changes what we know. What we know changes what we see” – Jean Piaget
- Look at the image, do you see a duck or a rabbit? (Webb, 2020).

Slide 3: What is cognitive learning theory?

- Cognitive learning theory explains how internal mental processes influence learning.
- To conceptualize this concept let’s break apart cognitive learning theory as an equation to learning.
- Cognition by definition is “the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses.” (Oxford Dictionaries, n.d.)
- Learning by definition is “the acquisition of knowledge or skills through experience, study, or by being taught”. (Oxford Dictionaries, n.d.)
- When we put these two together cognition + learning = we get cognitive learning theory. You’ll notice some key words that stand out within these definitions. The first is acquisition/acquiring knowledge and experience.

Slide 4: How Does Learning Occur?

- To illustrate how learning occurs, take another look at the image, and keep it in mind as we explore the two major theories surrounding cognitive learning theory – Cognitive Information Processing Theory and Schemata Theory.
- Cognitive Information Processing Theory
 - Focuses on how our brains encode information into our memory.
 - For information processing to occur, we will need a sensory input or rather an external environmental stimulus. (Cognitive Information Processing Theory, n.d.)
 - Let’s think back to the image asking, “Do you see a duck or a rabbit?”. You may already have an answer, but let’s see how this may travel through our mental processing system.
 - Is it a rabbit?
 - Or is it a duck?
 - After the sensory input has entered our mind, it goes to Sensory Memory.
 - Sensory Memory holds information for a few seconds that activates our five senses: sight, hearing, touch/feel, taste, and smell.
 - The most prominent of the five senses is sight (what we see?) and sound (what we hear?)
 - It must be noted that if we do not attend (or give attention) to the information it will be lost and its path to Long Term Memory ceases abruptly here.
 - However, if the senses engage within sensory memory’s involvement, we will give attention.
 - Attention
 - There are a few factors that influence attention:

- Cognitive abilities
 - The Quantity, complexity, or difficulty
 - Selective Attention – the learner’s ability to select and process information while ignoring other competing stimuli; and
 - Attention Span – hyperactivity, focus, and age.
 - Once we have given attention to the information, it travels to our short-term memory. (Cognitive Information Processing Theory, n.d.; Lawless, 2019).
- Short Term Memory:
 - Is influenced by the quantity of information and age.
 - Here it is important to consider the rule of 7.
 - The rule of 7 states that our STM can hold 7 + or – 2 pieces of information at a time so that equates to about 5 to 9 pieces of information.
 - Luckily, there are some strategies to increase working memory capacity and reduce cognitive load.
 - 1) Chunking learning tasks – this implies learning tasks should be logically organized into smaller segments.
 - 2) Relating learning content to the learner’s prior knowledge and personal experiences.
 - 3) Layering new information by providing background knowledge, like pre-teaching, and connecting prior learning experiences to what will be learned next, which is similar to scaffolding.
 - 4) Rehearsal, Practice, and Repetition are critical at this stage to ensure transfer to Long Term Memory.
 - To prevent the loss of information and promote transfer, two processes are used: rehearsal and encoding.
 - Rehearsal entails two types:
 - Maintenance Rehearsal is the repetition of basic information to maintain Short Term Memory.
 - Elaborative rehearsal permits complex and meaningful information to reach Long Term Memory (also known as encoding). Elaborative encoding, as mentioned by research, is better for learning than repetition.
- Encoding
 - Is making connections between new information to existing concepts and information in memory to make the new information more meaningful and memorable.
 - Some instructional strategies to elicit and promote encoding are:
 - Organization
 - Grouping into categories
 - Outlines
 - Hierarchies, and
 - Concept Trees

- Using Mnemonics
 - Like PEM-DAS – Please excuse my dear aunt sally – to recall the order of operations for math. Notice the length is 6 characters long.
 - Imagery is making vivid visual mental images.
 - If information is not rehearsed, it will be lost within 15-30 seconds. However, if sufficient rehearsal is employed we will continue our journey to Long Term Memory.
- Long Term Memory is the final destination in cognitive information processing. It is the permanent storage space with unlimited capacity – like the Cloud.
 - Retrieval is the main component of Long Term Memory. It determines how we: understand the new input (information) or how we make a response.
 - When we make a response, it utilizes recall or recognition.
 - Recall has two forms: Free Recall and Cued Recall
 - In Free Recall, learners’ retrieve previously stored information without cues or hints, while cued recall provides a hint or cue to help learners recall/retrieve the information.
 - Recognition, on the other hand, utilizes a set of predetermined stimuli to help learners make a decision, such as a multiple-choice question.
- The second theory surrounding cognitive learning theory is Schema Theory.
 - Schema is a mental framework of past experiences and past knowledge that emphasizes on the mental connection’s learners make.
 - Schema is important because it helps integrate the new knowledge to our existing knowledge. If connections are not made, information will be lost.
 - Schema is like a puzzle in our brain. It uses the cognitive process of assimilation and accommodation.
 - Assimilation is making new information fit our existing schema. If the information does not fit into our existing schema, we have to make accommodations.
 - Thus, we have to experience the new learning, idea, or knowledge to accommodate it into our schema.
 - As with Cognitive Information Processing Theory, there are some instructional strategies to promote and support schema – imagery and concept mapping.
 - Imagery, as previously mentioned, creates vivid mental images. It allows a learner to see the image and its features in the mind. Another key concept of imagery is that it emphasizes on the learners’ prior knowledge to connect existing schema to the new information.
 - Concept mapping is a visual representation tool that uses dual coding. Dual coding theory indicates that encoded images coupled with text improves learning. (Cognitive Information Processing Theory, n.d.; Lawless, 2019).

Slide 5: How can technology promote and support cognitive learning theory?

- There are a few technology tools that can promote and support cognitive learning theory:

- One is using an Intelligent Tutoring System. An intelligent tutoring system is a computer software program that mimics a human tutor's behavior and guidance. The Intelligent Tutoring System can interpret complex student responses and identify learning patterns. (Educause, 2013).
- Another technology tool to consider are electronic Mind Mapping tools. The four top tools listed by Top Tools for Learning in 2020 are:
 - MindMeister (which was utilized for this presentation),
 - Coggle,
 - Freemind, and
 - Ayoa (pronounced I-O) (Neumann& Kopcha, 2018).

Slide 6: Recap – How does learning occur?

- Cognitive Learning Theory explains how internal mental processes and external factors influence learning.
- There are two major theories surrounding Cognitive Learning Theory - Cognitive Information Processing Theory and Schema Theory.
 - Cognitive Information Processing Theory is a memory system that focuses on how learners process information into long term memory.
 - Schema Theory emphasizes on the mental connections learners make between their prior knowledge/experiences and new information.

Slide 7: Recap – What are instructional strategies and implications?

- Instructional Strategies and Implications. Instruction should:
 - Incorporate sensory inputs – sight, sound, touch, taste, and smell – to activate our sensory memory.
 - Consider the rule of 7 when designing and delivering new learning content.
 - Some Instructional Strategies to promote and support transfer to long term memory are:
 - Chunking reduces cognitive load and increases transfer.
 - Activating prior knowledge
 - Layering
 - Rehearsal and Repetition encoding strategies such as organization, mind maps, mnemonics, and imagery help make connections to learners prior knowledge to acquire new knowledge into long term memory.
 - Help learners retrieve and recall new learning by using cueing strategies and multiple choice questions.

Slide 8: What technology tools promote and support cognitive learning theory?

- Technology tools that promote and support mental processes.
 - Intelligent Tutoring Systems
 - Mindmapping technology tools such as MindMeister, Coggle, and Freemind assist in promoting and supporting new knowledge to acquire new knowledge.

Slide 9: Can you identify the instructional strategies utilized?

Slide 10: How will you recall the new image into memory – Is it a duck or a rabbit?

Slide 11: References

- Czarnec, J. & Hill, M. G. (2018). Schemata and instructional strategies (2018). (PDF) Retrieved from <https://evolution.com/programming/teaching-and-learning/schemata-and-instructional-strategies/>
- Cognitive Information Processing theory. Retrieved from http://www.expertlearners.com/cip_theory.php
- Educause. (2013, July). 7 things you should know about intelligent tutoring systems. *Educause Learning Initiative*.
- Lawless, C. (2019). What is information processing theory?: Using it in your corporate training. Retrieved from <learnupon.com/blog/what-is-information-processing-theory/>
- Oxford Dictionaries. (n.d.). Cognition. In Oxford Dictionaries.com dictionary. Retrieved November 10, 2020, from <http://lexico.com/en/definition/cognition>
- Oxford Dictionaries. (n.d.). Learning. In Oxford Dictionaries.com dictionary. Retrieved November 10, 2020, from <http://lexico.com/en/definition/learning>
- Neumann, K.L. & Kopcha, T.J. The use of schema theory in learning, design, and technology. *TechTrends* 62, 429–431 (2018). <https://doi-org.ezproxy.bgsu.edu/10.1007/s11528-018-0319-0>
- Top Tools for Learning 2020. (2020, September 1). Top 200 tools for learning. <https://www.toptools4learning.com>
- Webb, D. (2020). *Optical illusions*. All-about-psychology.com. <https://www.all-about-psychology.com/optical-illusions.html>
- Cognitive Learning Theory Screencast <https://screencast-o-matic.com/watch/cYXI35MJZW>