Cognitive Load Theory - Session 1

How exactly *do* we get it through our thick skulls?

Bad news:

I’m going to annoy some of you.

Good news:

I don’t care if I annoy some of you.

What is learning?

Talk together with a partner and come up with a definition of learning.

Be specific!

One more question

How are attention and memory connected with learning?

Learning is a change in long-term memory. - Kirschner, Sweller and Clark

The process of developing sufficient surface knowledge to the move on to deeper understanding such that one can appropriately transfer this learning to new tasks and situations. - John Hattie

An increase, brought about by experience, in the capacities of an organism to react in valued ways in response to stimuli" Black & Wiliam

Learning is a multidimensional process that results in a relatively enduring change in a person or persons, and consequently how that person or persons will perceive the world and reciprocally respond to its affordances physically, psychologically, and socially. The process of learning has as its foundation the systemic, dynamic, and interactive relation between the nature of the learner and the object of the learning as ecologically situated in a given time and place as well as over time - Alexander, Schallert & Reynolds

Let’s keep it (overly) simple

Learning is a change in long-term memory.

Cognitive Load Theory

Much of this will make intuitive sense. But if we use it thoughtfully, and with intentionality, we can improve our students learning.

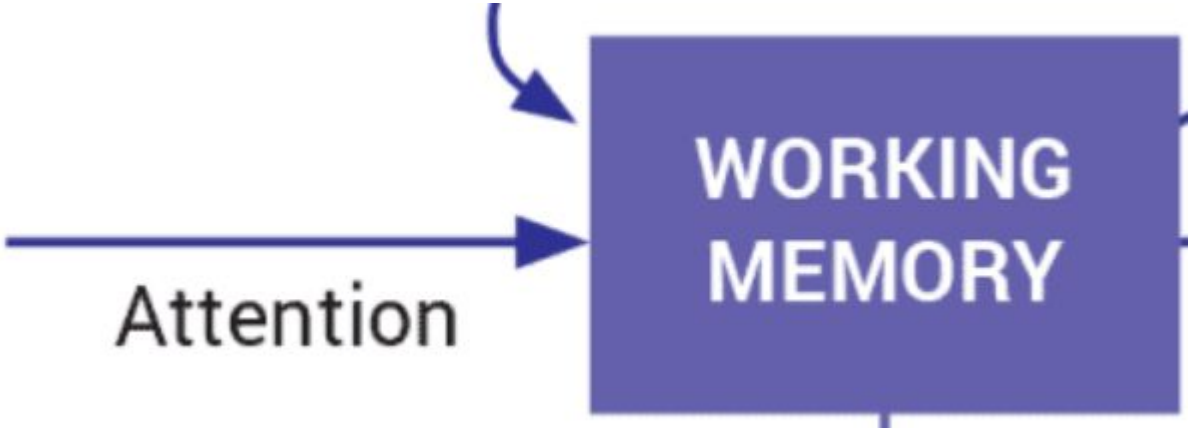
Cognitive Load Theory

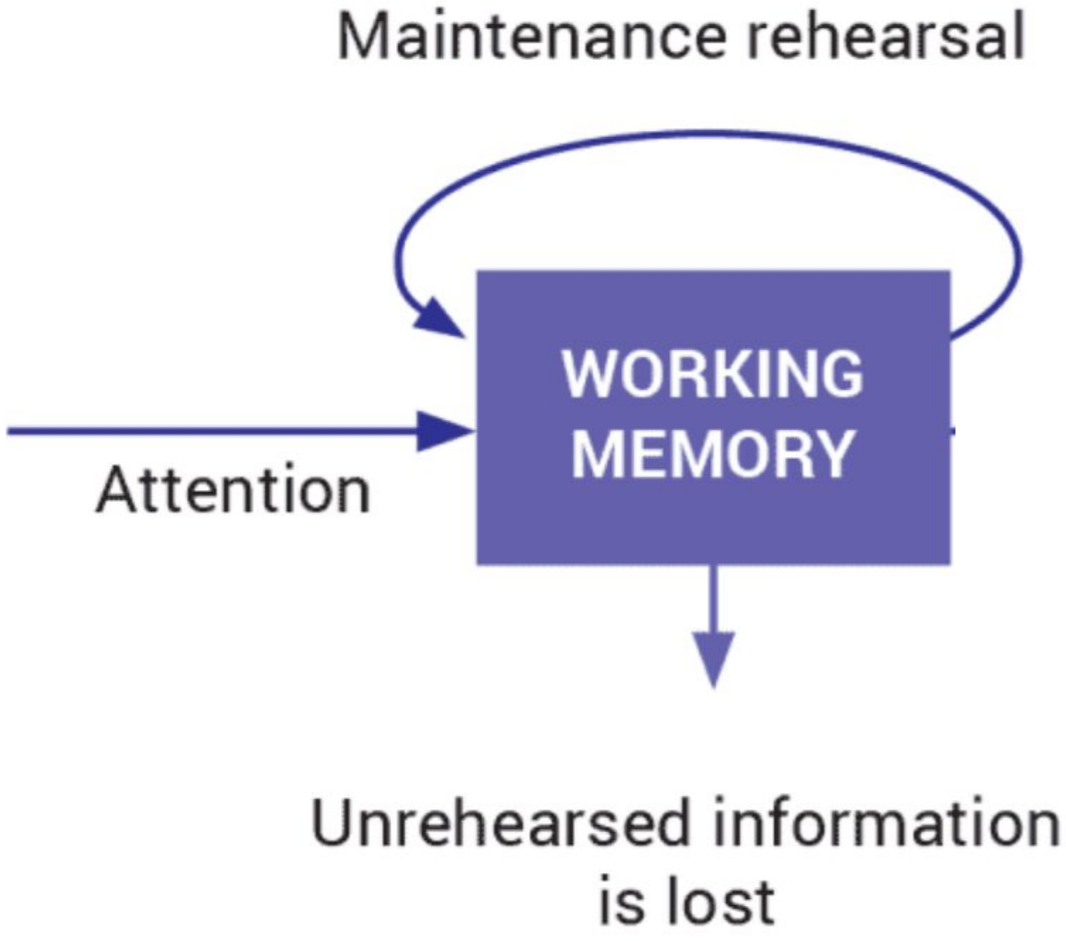
CLT is basically an idea of how our brains acquire and hold on to new learning. That means it’s all about memory.

Cognitive load theory

It starts with working memory. Working memory is small and short-term. It can hold 5-9 items for a few seconds to a minute or so.

What goes into our working memory is what we pay attention to




Maintenance rehearsal
WORKING MEMORY
Attention
Unrehearsed information is lost

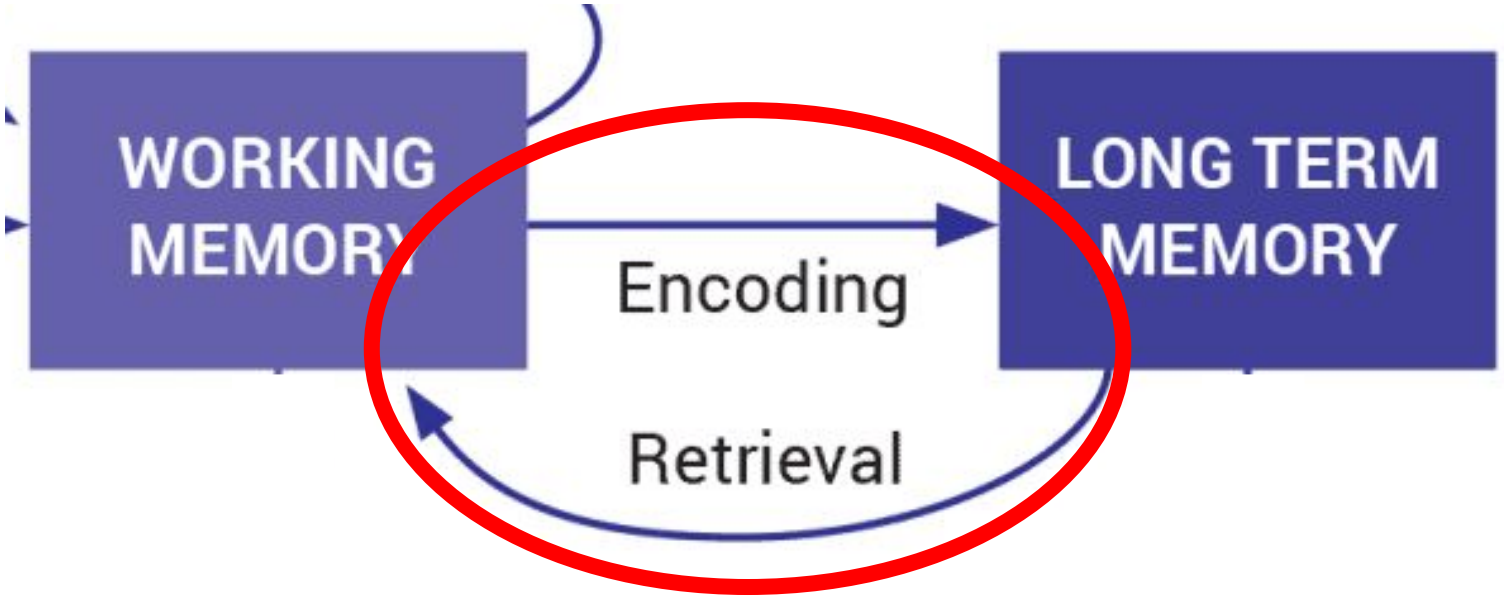
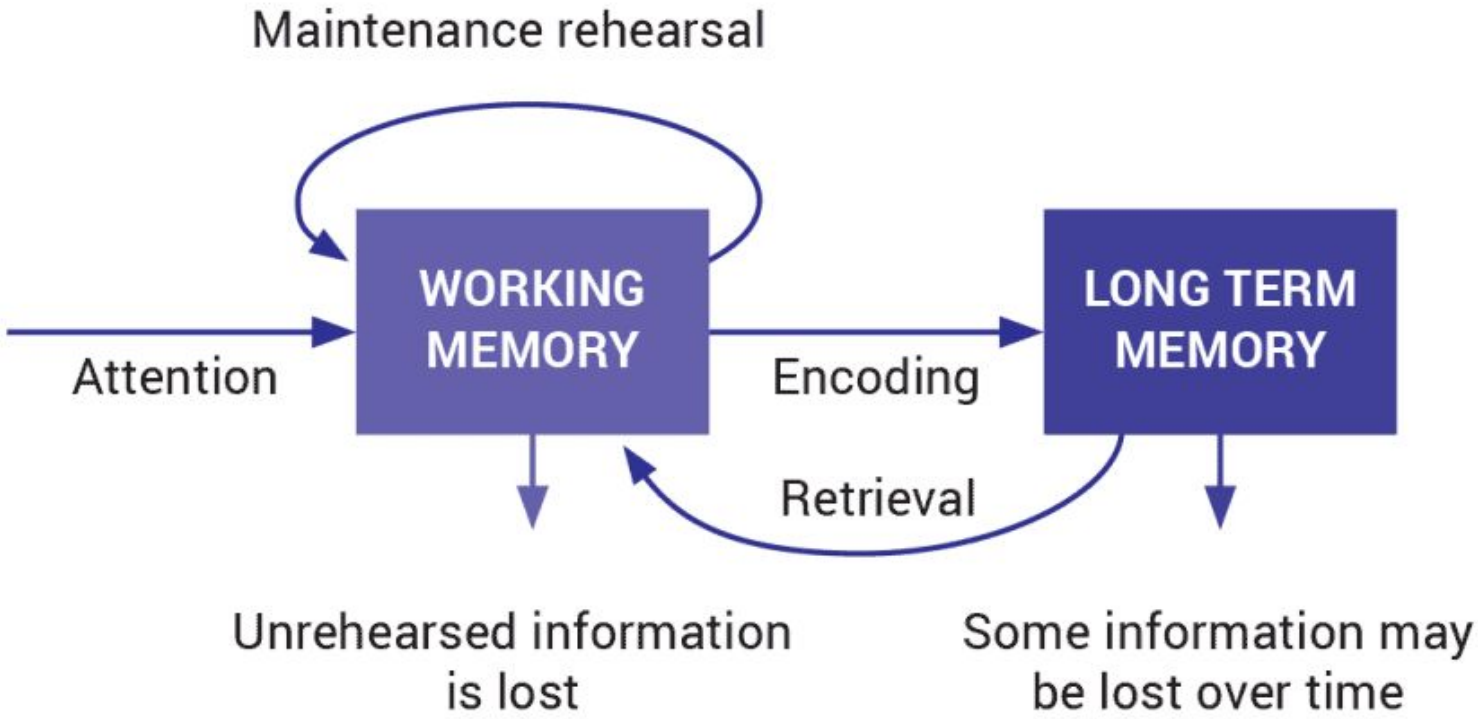

WORKING MEMORY
LONG TERM MEMORY
Encoding
Retrieval

FIGURE 1: Basic diagram of the human memory as relevant to education



Pair-Share

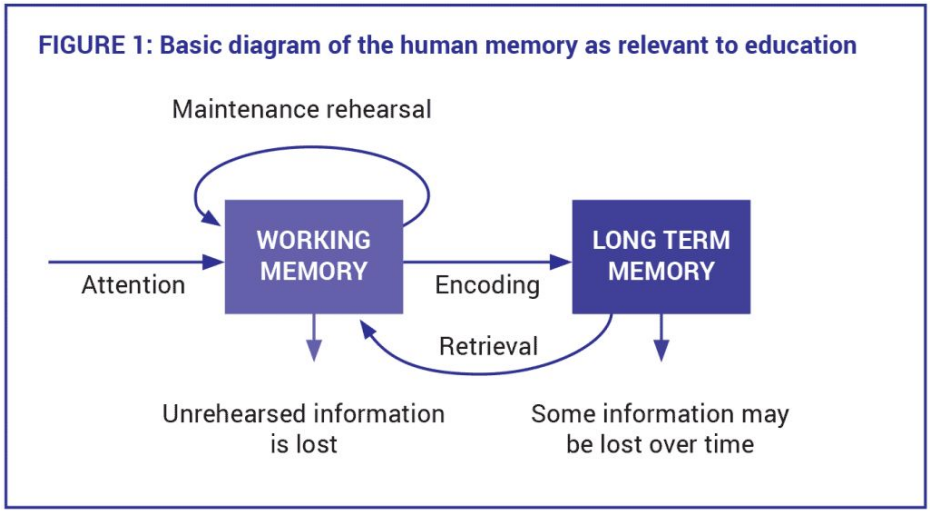
You will see instructions in a few seconds. Read the instructions. **After** you read the instructions:

- Give a thumbs-up if you understand what to do
- Give a thumbs-sideways if you're not sure what to do.

Please wait for my count to begin speaking with your neighbor.

INSTRUCTIONS: Turn to a neighbor. Take turns summarizing the diagram of cognitive load theory that we just saw. First one person gives their summary, then the next person.

A SUMMARY IS NOT "UH, YEAH, WHAT YOU JUST SAID."



Checking in

When I presented this diagram of cognitive load theory, I started with a one little part.

Why did I not start by showing the whole diagram all at once?

Types of cognitive loads

Extraneous

Intrinsic

Germane

Extraneous

Extraneous cognitive load refers to anything that can attract attention or fill working memory, but is not helpful to learning.

Example of extraneous cognitive load

Checking in

Talk with your neighbor.
What are 5 aspects of the classroom environment that could add to a student's extraneous cognitive load and distract them from your lesson?

Some possible examples of extraneous cognitive load

Classroom temperature

Outside noise

Students talking nearby

Busy decorations

Text and talk at the same time

Devices

Construction

Uncomfortable furniture

Untidy desks

Movement in the room

Intrinsic

Intrinsic cognitive load refers to how challenging the information is that is going into learner's working memory. The higher the intrinsic load, the less the learner can hold in working memory at a time.

$2 + 7$

$8\frac{3}{4} + 17\frac{4}{5}$

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Checking in

Take one minute to think. What is something you might include in a lesson that would have a

- **low intrinsic load?**
- **moderate intrinsic load?**
- **heavy intrinsic load?**

Turn and share with your neighbor.

Germane

Germane cognitive load refers to how the new information in working memory connects to mental models, schemas, and/or frameworks that students already have in their long term memory due to previous learning.

Germane load

Last week the class learned about organs that fish have.

This week we will learn about organs that amphibians have. *Higher germane load, lower intrinsic load.*

This week we will learn about taxonomy of living creatures.
Lower germane load, higher intrinsic load.

Putting it into action

Think of an activity you have taught, will teach soon, or want to teach. How could you:

Lower the extraneous load?

Anticipate the intrinsic load?

Raise the germane load?