DO YOU CREATE TRAINING OR LEARNING?

Mentor Conference

For current and future ITT and ECT mentors

Teaching School Hubs from across the East of England are delighted to welcome Deans for Impact to support our third annual mentor conference.

Deans for Impact

Deans for Impact works to ensure all children have a well-prepared teacher. Drawing on Deans for Impact's *The Science of Learning*, this online conference will give ITT and ECT mentors a summary of scientific understanding of how students learn and ideas on how to support their mentee.

Tuesday 6th February 2024

4:00 – 5:30pm

Alpha Teaching School Hub

Cambridgeshire & Peterborough Teaching School Hub

Chafford Hundred Teaching School Hub

Chiltern Teaching School

AlbanTSH Teaching School Hub

inspiration teaching school hub

JULIAN Teaching School Hub

Saffron Teaching School Hub

UNITY TEACHING SCHOOL HUB

East of England Regional Network for ITT

Housekeeping

Microphones – on mute, please

Recording the session – please turn your camera off if you do not want to appear

Chat function – please use as advised within the session

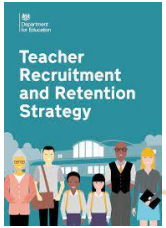
Be present – to get the most out of the session

Teaching School Hubs (TSHs)

Teaching School Hubs are designated **school-led centres of excellence** for **teaching** and **leadership training** and **development through all aspects of a teacher's career.**

The TSHs represented here today cover the **East of England.**

The DfE ‘Golden Thread’



Initial teacher training (ITT)

Early Career Framework (ECF)

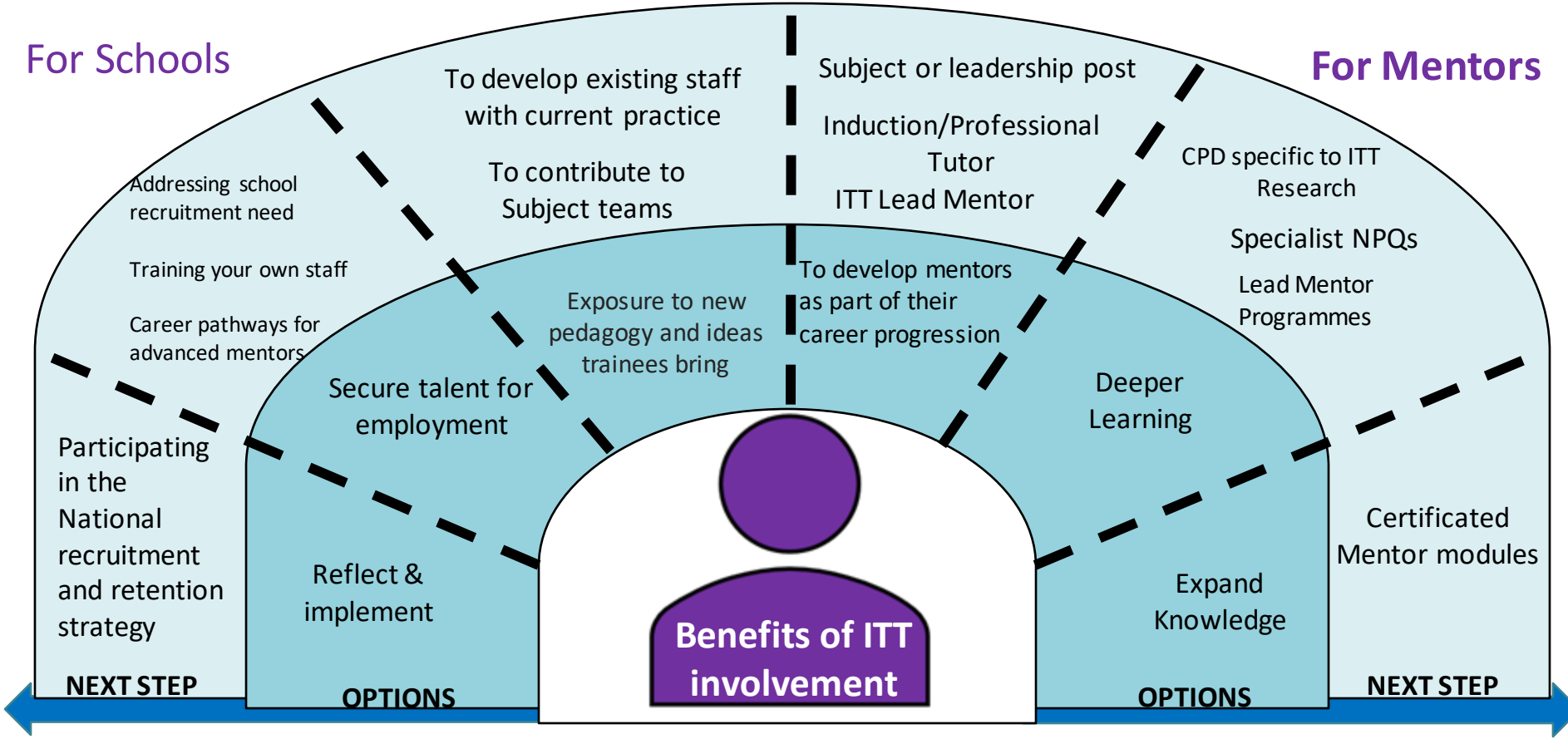
Specialist teacher NPQs

Leadership NPQs

Who?	Trainee Teacher	Early Career Teacher	Experienced teachers and middle leaders	Senior leaders, heads and exec. leaders
What?	Initial Teacher Training (ITT)	Early Career Support	Specialist development	Leadership development
	QTS awarded			
Basis	ITT Core Content Framework	Early Career Framework (ECF)	Specialist NPQs	Leadership NPQs

What impact can great mentors have on novice teachers?

- inspire future generations of teachers
- nurturing trainee talents and potential
- modelling/chunking a complex profession
- demonstrating belief to continuously improve
- consistency, continuity – *always being there*


For Schools
For Mentors
To develop existing staff with current practice
Subject or leadership post
Induction/Professional Tutor
ITT Lead Mentor
To contribute to Subject teams
Addressing school recruitment need
Training your own staff
Career pathways for advanced mentors
CPD specific to ITT Research
Specialist NPQs
Lead Mentor Programmes
To develop mentors as part of their career progression
Exposure to new pedagogy and ideas trainees bring
Secure talent for employment
Deeper Learning
Participating in the National recruitment and retention strategy
Reflect & implement
Expand Knowledge
Certificated Mentor modules
Benefits of ITT involvement
NEXT STEP
OPTIONS
OPTIONS
NEXT STEP

Deans for Impact

Managing the Learning Load: Understand Modelling and Think-Aloud

Deans for Impact

Key summary CCF reading

Deans for Impact (2015) The Science of Learning [Online] Accessible from: https://deansforimpact.org/resources/the-science-oflearning

TAKE-AWAY

The summary looks at six questions about learning, giving a quick summary of the science and some ideas about how they might apply in schools and classrooms.

1. How do students understand new ideas?

- The importance of prior knowledge and the bottle-neck of working memory

2. How do students learn and retain new information?

- Getting students to think about meaning and giving them sufficient practice through things like low-stakes quizzing

3. How do students solve problems?

- Automating the recall of key knowledge to reduce the load on working memory and giving specific feedback related to improvement

4. How does learning transfer to new situations?

- Ensuring background knowledge is sufficient and secure, and focusing students on the deep structure of similar problems

5. What motivates students to learn?

- Beliefs about intelligence, the care with which we must use praise or rewards, improving student judgements of learning, and reassurance about belonging

6. What are some common misconceptions about how students think and learn?

- Students don't have learning styles, popular neuromyths like left/right brained learners, there aren't 'stages' of development, there are differences between novices and experts, and other misconceptions and pseudoscientific ideas surrounding learning

This session will explore how we **scaffold learning** to **support all learners.**

Cognitive Science Principle

Learning can be **impeded** if students are confronted with **too much information** at once.

Teacher Action

Teachers **scaffold** student understanding through carefully designed instruction that includes **modelling and thinking aloud.**

Managing the Learning Load and Equitable Learning

We all know the feeling of trying to learn something and experiencing cognitive overload. Yet we want to provide all of our students with challenging learning experiences!

In this session, we will consider how to ensure that our **students get equitable opportunities to engage in deep thinking, without leaving students overwhelmed** or shut down. By **scaffolding effectively** and purposefully, we can provide instruction that mitigates the inequities of students' prior learning experiences and sets every student up for success.

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Andrea Pippin, Teaching Tolerance. Retrieved from: https://www.learningforjustice.org/magazine/fall-2019/advice-from-the-experts

Session Objectives

In this session, we will consider:

- cognitive load theory (CLT) and its implications for effective and equitable classroom instruction
- how intentional modelling, think-aloud and use of effective visuals can scaffold learning for all learners, from a cognitive perspective

Mentor Knowledge Survey

How confident are you in using Cognitive Science evidence insights when working with novice teachers?

Take a moment to complete the quick survey (link in the chat)

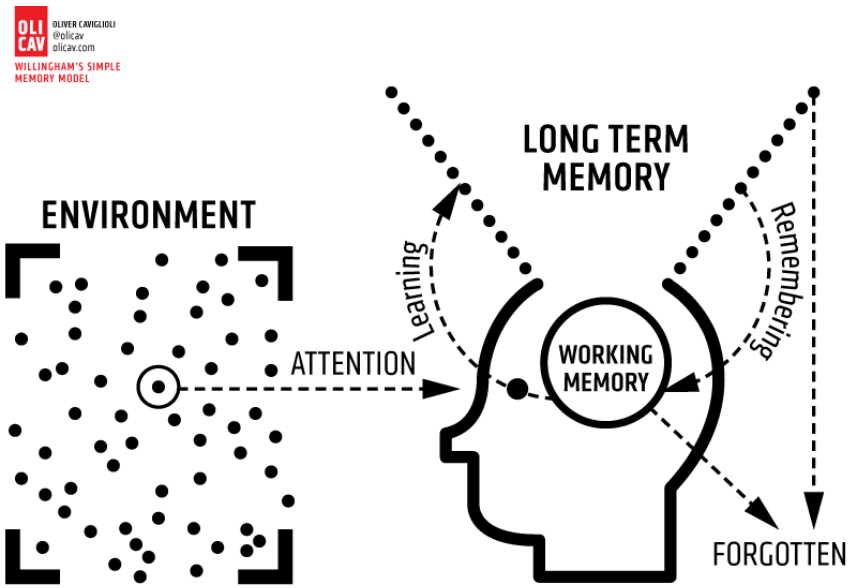
Session Structure

- **What is Cognitive Load Theory and why is it important?**
- Introduction to Modelling and Think-Alouds
- Dual Coding: How Visuals Scaffold Learning
- Closing: Summary and Exit Ticket

Retrieval Practice: Cognitive Load Theory

How are working memory and long term memory different?

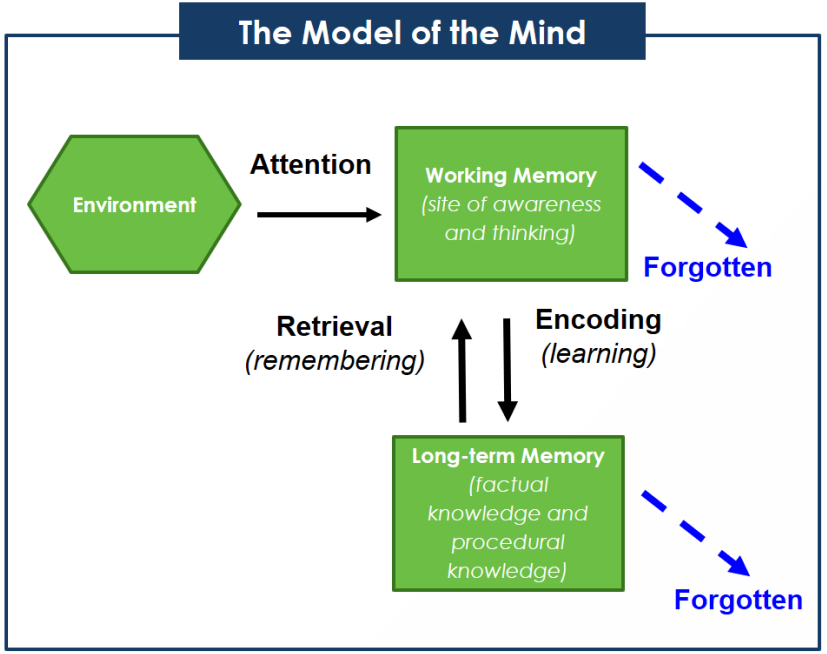
How does our knowledge stored in long term memory affect our working memory's ability to handle new information?



Check Your Answer: How are working memory and long term memory different?

Working memory is extremely limited and can only handle small amounts (or elements) of new information at a time, while **long term memory is effectively infinite** and can store unlimited information.

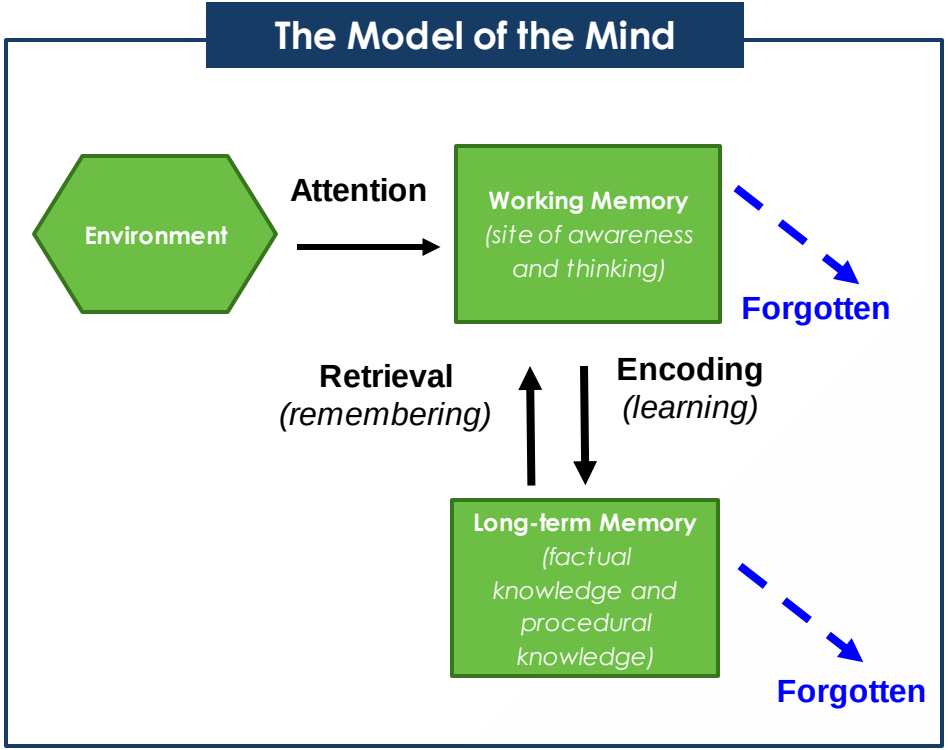
To deal with the fact that working memory easily becomes overwhelmed, teachers can employ strategies that free up students' working memory to concentrate on the parts of the task that matter for learning.



What is Cognitive Load Theory and why is it important?

We've learned about a basic **model of the mind**, and how understanding the learning process can support us in **making effective instructional decisions**.

Now we'll dive into **Cognitive Load Theory** and explore how this foundational concept can help us better **support all learners** in our classrooms.



Cognitive Load Theory and the Model of the Mind

This video by 3 Minute Ed Theory introduces **Cognitive Load Theory**. As you watch/listen, consider:

- **How are working memory and long term memory different?**
- **How does our knowledge stored in long term memory affect our working memory's ability to handle new information?**

(Video: 0:00 - 1:52)

Cognitive Load Theory 2 - Working and Long Term memory - by *3 Minute Ed Theory* retrieved from *https://www.youtube.com/watch?v=ZcoGqi8aiuk*

How can teachers manage cognitive load for students?

- We can **eliminate the distractions** that unnecessarily tax working memory. This doesn't mean making a lesson boring but it does mean removing overwhelming visuals, unrelated tangents, or irrelevant questions during instruction.
- We can **break up the new ideas** into manageable, meaningful chunks and give opportunities for students to process and encode them.
- We can support students in unpacking a **model**. This can include unpacking mathematical representations or strategies for organising evidence in writing, so students can think more deeply about how or why they work -- rather than guessing at the core parts or which steps to take.

How can knowledge of cognitive load theory to support all learners?

Students in your class have specific needs for which you'll need to tailor instruction. For instance, learning a non-native language already requires emergent multilingual students to fill working memory with translation processes, so additional distractions only further tax that working memory capacity. Students with learning disabilities also lose out when they do not have a clear sense of what information is most important to focus on.

Your knowledge of cognitive load theory can help ensure that every student in your room can access the tasks in your materials and has the working memory available to process the most important information.

Taking a Step Back: Cognitive Load and Effortful Thinking

Sometimes people think managing cognitive load means we aren't challenging learners to engage in effortful thinking.

But actually, **Cognitive Load Theory helps us ensure that we don't overwhelm learners' working memories, allowing them to engage in effortful thinking about the ideas that matter most!** You might think about this as the difference between productive and unproductive struggle.

When students have opportunities to unpack a mathematical representation or think about steps or strategies for writing, their teacher is chunking out the material so students don't have to unpack and apply it simultaneously. Debriefs that include think-aloud and unpacking models give students space to answer deep processing questions about the key features of the strategy or representation, how they work, and why each is important.

Desk, By Vashti Harrison, retrieved from https://www.kid-lit-art.vashtiharrison.com/

Reflect on Your Thinking:

Take a moment to reflect on and revise what you retrieved about WM/LTM in this section.

What do you need to add or change in your original responses?

What important ideas are you thinking about differently?

Cognitive Perspective by Oliver Caviglioli. From Dr Yana Weinstein and Dr Megan Sumeracki's 2018 book Understanding How We Learn, published by David Fulton/Routledge. Retrieved from olicav.com.

What does this mean in practice?

We've seen how managing cognitive load is one powerful way to support all students - and students with disabilities and emergent multilingual learners in particular.

Now we ask: How can we **plan daily lessons** that manage cognitive load effectively -- so that all learners can think deeply about the most important new concepts? **What does this look like in practice?**

Session Structure

- What is Cognitive Load Theory and why is it important?
- **Introduction to Modelling and Think-Alouds**
- Dual Coding: How Visuals Scaffold Learning
- Closing: Module Summary and Exit Ticket

Intro to Modelling and Think-Aloud

Often, when we hear about scaffolding, we hear about complicated, time-consuming processes like creating multiple versions of student facing work for different learners, or elaborate lesson plans with several stations.

For pre-reading, you read the work of researcher Barak Rosenshine, whose work finds that high-quality **modeling** is a type of **scaffolded support that consistently leads to the most effective, equitable learning.**

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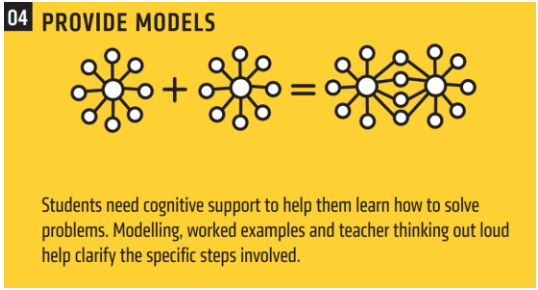
Pause to Process: Modelling

Rosenshine highlights about two evidence-based practices:

- Presenting new material in small steps with student practice after each
- Providing models

How does each support student learning? *Use the terms long-term memory, working memory and cognitive load in your answer.*



Check Your Answer: How do these practices support learning for all learners?

Presenting New Material in Small Steps:

By presenting new content in “bite-size” chunks, and providing opportunities to practice, we manage **cognitive load**, since only one new chunk of information is introduced to working memory at a time.

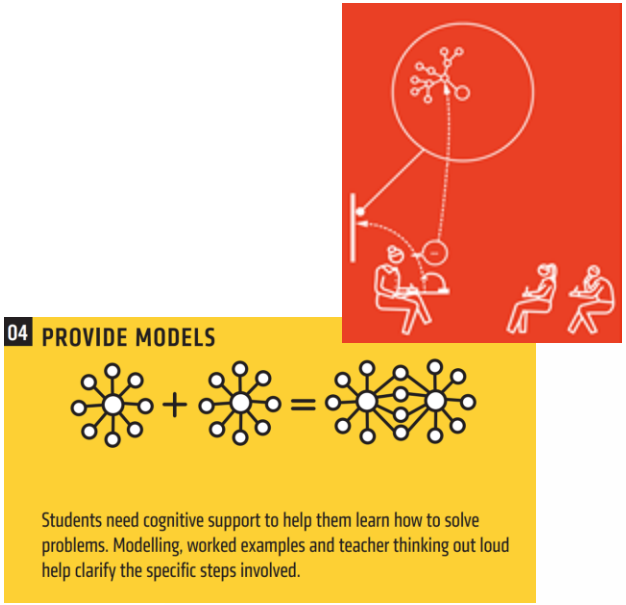
This frees up space in working memory for students to focus their thinking and engage in deeper processing about the most important aspects of the concept as they practice.

Check Your Answer: How do these scaffolds support learning for all learners?

Provide Models:

Providing a model of how to respond to a given prompt lightens the **cognitive load** since students don't need to think about how to respond to the prompt and figure out their ideas of what to write.

Such models free up working memory and provide a picture of where students need to end up - which means they can concentrate on getting there.



Modelling and Think-aloud

The terms **modelling** and **think-aloud** get used in ways that can make it hard to keep track of what they mean.

Modeling

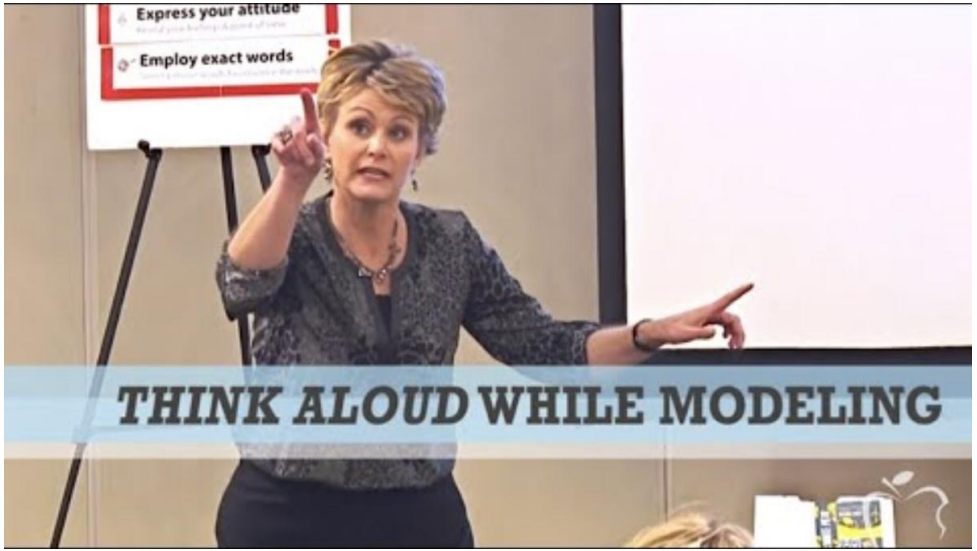
The act of explicitly naming and demonstrating the steps in a new process or task to support student learning.

Think-aloud

A modelling strategy that makes expert thinking visible by narrating the thought process as you go.

What's the difference between modelling and think-aloud?

Think-aloud is a part of modelling. In a model, we name the steps of a process and show learners how to do them. Without a think-aloud during the model, however, a learner might not understand why we do each step the way we do. A think-aloud is a way to help the learner understand the thinking behind each step: why we do it, or the nuanced details of how. This short video from Smekens Education can help clarify the difference.(Video: 0:00 - 2:09)



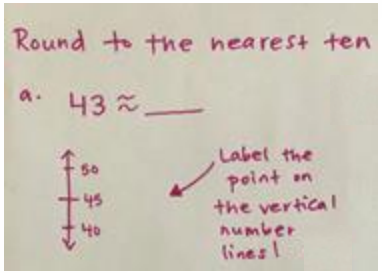
Go beyond a model: reveal a Think Aloud- by Smekens Education retrieved from https://www.youtube.com/watch?v=UmhLgsBD1-I

What do Modelling and Think-aloud sound like?

On the next few slides, you'll see an example of Modeling and Think-aloud.

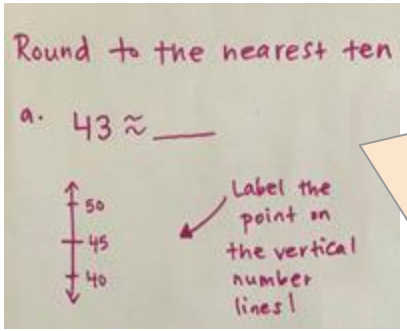
In the example, you'll note how the teacher **'thinks aloud'** to help students understand the thought processes an expert uses to navigate that skill.

Modelling with Think-aloud Example: Maths



Imagine a lesson on rounding. A teacher wants students to be able to solve problems like the one at left. They can **model by solving problems like it live, naming and demonstrating each step, with "think-alouds" that make their thought process visible**:

Modelling with Think-aloud Example: Maths



First, I determine which place I need to round to. This problem says round to the nearest ten.

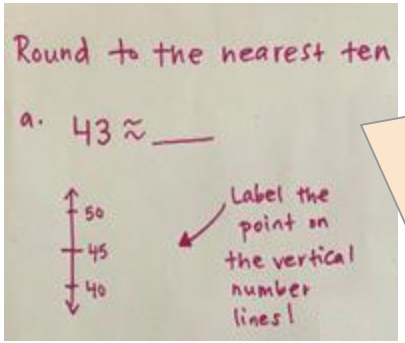
Next, I draw a number line from the tens I have to one more ten, with a midpoint of 5 in the next smaller place: 40, 45, 50.

Now, I look at the next smaller unit, since I'm rounding to the tens I'll look at the ones, to see if I should round down or up. I have 3 ones. Is 43 closer to 40 or to 50?

Hmm, I'm thinking, where would 43 go on my vertical number line? It's closer to 40 so I will round down!

Turn and tell your partner, how did the number line help us determine whether to round up or down?

Modelling with Think-aloud Example: Maths



First, I determine which place I need to round to. This problem says round to the nearest ten.

Next, I draw a number line from the tens I have to one more ten, with a midpoint of 5 in the next smaller place: 40, 45, 50.

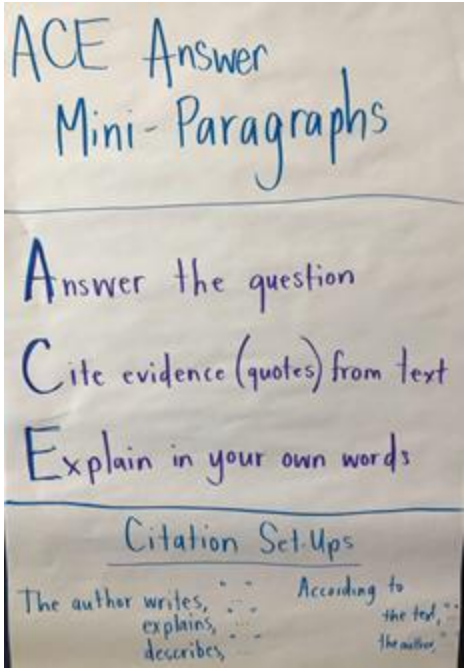
Now, I look at the next smaller unit, since I'm rounding to the tens I'll look at the ones, to see if I should round down or up. I have 3 ones. Is 43 closer to 40 or to 50?

Hmm, I'm thinking, where would 43 go on my vertical number line? It's closer to 40 so I will round down!

Turn and tell your partner, how did the number line help us determine whether to round up or down?

This think-aloud helps learners see how an expert might approach this key step.

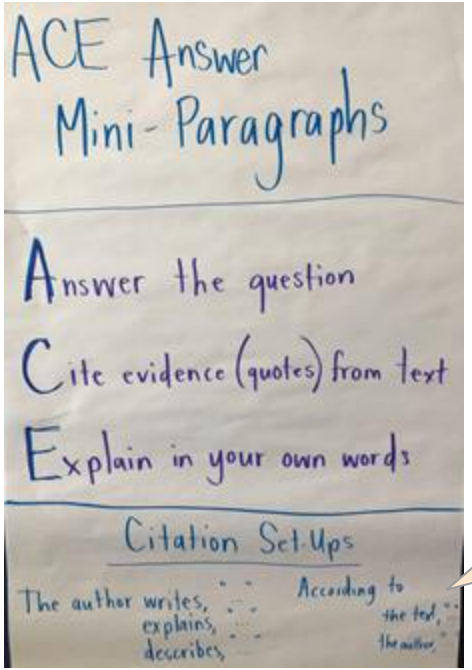
Modelling with Think-aloud Example: Writing



Consider the lesson at left. A teacher might name the three parts of an ACE mini paragraph, then demonstrate how to write one to answer a prompt with evidence.

Perhaps she noticed that students often just regurgitated the same language of their citation in their “Explain” section, so as she demonstrates writing one, she might purposely think-aloud to so students see expert thinking to avoid that mistake.

Modelling with Think-aloud Example: Writing



Okay, so I found the perfect quote to support my answer. I can't just copy the quote though, I need readers to know how it supports my claim. So I ask myself, how will I explain why this evidence matters in MY own words?

Share your ideas for how I might do that with a partner.

Modelling, Think-aloud, and Effortful Thinking

Earlier in this session, we discussed how managing cognitive load more effectively could work hand in hand with effortful, elaborative thinking. Notice the **rich questions that helped students unpack the models**,

- *Turn and tell your partner, how did the number line help us determine whether to round up or down?*
- *How will I explain why my evidence matters in my own words?*

This prompts **deeper thinking** - and it's **more equitable, because all students have been supported to engage in a meaningful way**.

Desk, By Vashti Harrison, retrieved from https://www.kid-lit-art.vashtiharrison.com/

Reflect on Your Thinking:

Take a moment to reflect on and revise your answers to the prompts in this section.

What do you need to add or change in your original responses?

What important ideas are you thinking about differently?

Cognitive Perspective by Oliver Caviglioli. From Dr Yana Weinstein and Dr Megan Sumeracki's 2018 book Understanding How We Learn, published by David Fulton/Routledge. Retrieved from olicav.com.

How can we make our models most effective?

You've just learned about how modeling can support all learners in engaging with meaningful, important content.

But how can we make our models as **effective** as possible?

How can we ensure that our modelling results in all students encoding important knowledge into long term memory?

Session Structure

- What is Cognitive Load Theory and why is it important?
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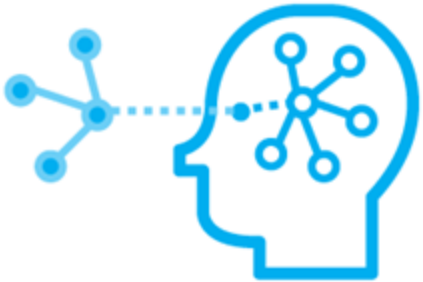
- **Dual Coding: How Visuals Scaffold Learning**
- Closing: Module Summary and Exit Ticket

Dual Coding: How Visuals Scaffold Learning



We've learned about cognitive load theory, and how modelling and explanation can scaffold cognitive load to support learning.

Now we will tune into a key feature of effective modeling and explanation -- **dual coding**. That is, how using **well-aligned, purposeful visuals** can **scaffold all learners** in understanding new concepts and developing new skills.

Connecting To Prior Knowledge by Oliver Caviglioli, From Dr Yana Weinstein and Dr Megan Sumeracki's 2018 book Understanding How We Learn, and published by David Fulton/Routledge, retrieved from https://www.olicav.com/#/icons/

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Dual Coding ≠ Learning Styles

You might be wondering,

"Wait, but I thought learning styles was a myth?"

You're right. **Learning styles is a myth** -- after many, many studies, there is no evidence that attempting to match students' experiences to learning style preferences (such as auditory, kinesthetic, or visual) supports learning.

However, there is an abundance of evidence suggesting that **effective visual supports can scaffold cognitive load for all learners**! Let's learn how this works.

Retrieved from https://www.masterhowtolearn.com/2020-11-14-learning-styles-as-a-myth-some-evidence-from-books/

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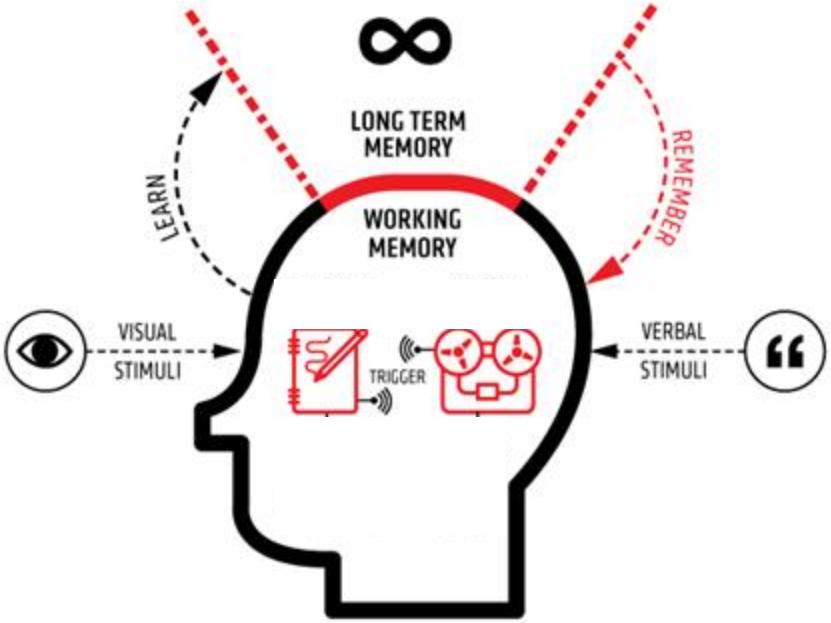
Intro to Dual Coding

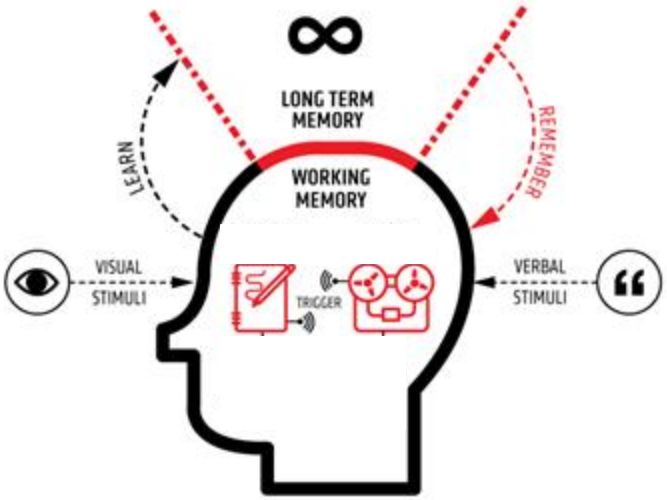
Listen to this short extract on an **Introduction to Dual Coding Theory video by Oliver Caviglioli**. Take a moment to consider the following question:

How can visual supports make explanation and modeling more effective?

Use the terms "working memory" and "encoding" to support your answer.



Check your answer: How can visual supports make modelling and explanation more effective?



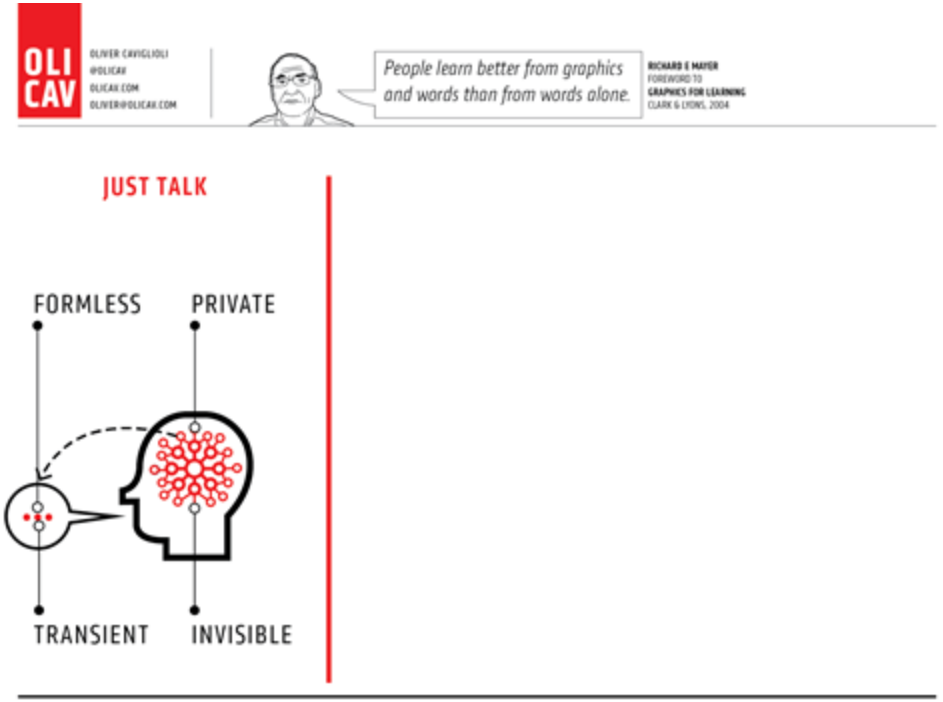
Working memory is limited. But **we can take in images (visual) AND words (verbal) simultaneously without getting overloaded**, and those inputs actually **work together to support learning**!

By **combining visual and verbal stimuli,** or inputs, teachers can **strengthen the encoding of new information** and double the pathways for **future retrieval (or remembering)** of that knowledge.

Check your answer: How can visual supports make modelling and explanation more effective?

Without visuals, **our schema** (the organization of our ideas -- the relationships between parts of a concept) are invisible to the learner. They are "formless" because we're not visually *showing* the learner how the pieces fit together.

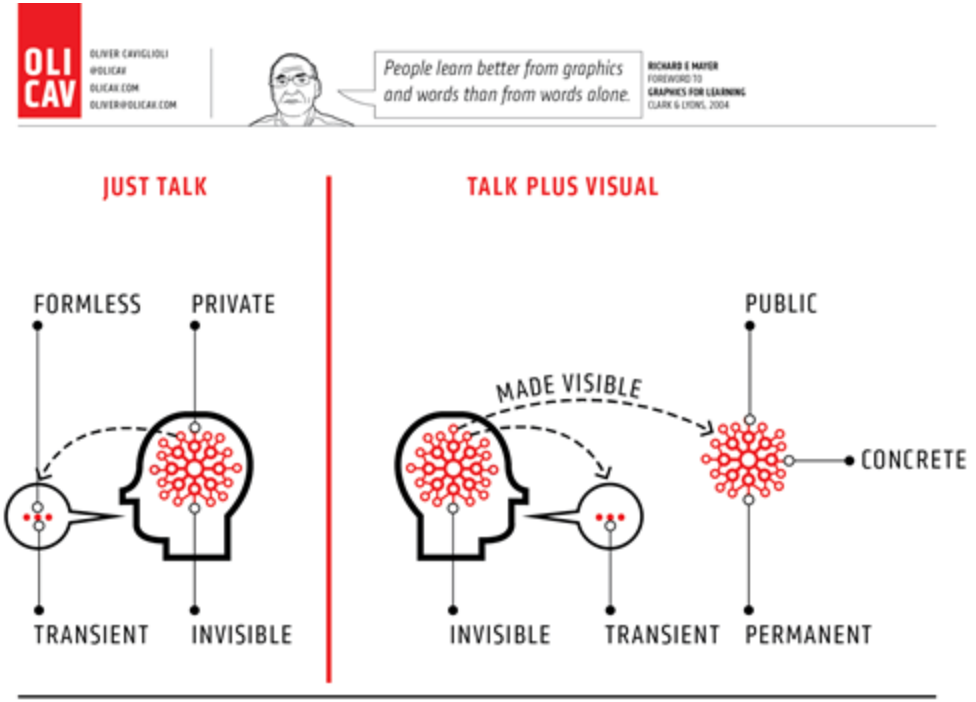
Our words are also transient -- they disappear, so if a student doesn't hear what you say the first time, they can easily get lost!



Check your answer: How can visual supports make modelling and explanation more effective?

When we add visuals to our modeling or explanation, it **makes our schema concrete and permanent**. The visual concretely shows the student **how the ideas connect** (strengthening encoding).

And the student doesn't have to remember (or hold in working memory) every word the teacher says -- they can refer to the visual later in the lesson!



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- What is Cognitive Load Theory and why is it important?
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- **Closing: Summary and Exit Ticket**

Summary: Modelling and Think-Aloud (use with trainees)

- **Cognitive Load Theory:** Working memory is limited but long term memory is infinite. By reducing distractions and providing scaffolds like modeling and think-aloud, we can ensure students have the working memory space to think deeply about what's most important.
- **Modelling:** By chunking material into smaller "bites", providing models, and thinking aloud to make expert thinking visible, we can decrease the likelihood that students experience cognitive overload that prevents meaningful learning.
- **Dual Coding:** Words and images support encoding together more effectively, without taxing working memory. Effective visuals also scaffold retrieval (remembering) by providing an additional pathway to find the knowledge in long term memory (you can remember the words or the image).

DFI

Summary: Equity and Modelling (use with trainees)

Whenever "cognitive overload" occurs, students are less likely to think deeply about the most important new ideas. This is likely to disproportionately affect students who have already have additional burdens placed on their working memory (ex: students with disabilities and emergent multilingual learners).

Modeling and think-alouds offer a way to structure every lesson so that all learners can access rich, rigorous content.

Andrea Pippin, Teaching Tolerance. Retrieved from: https://www.learningforjustice.org/magazine/fall-2019/advice-from-the-experts

Reflecting on Modelling and Learning Load:

How has your thinking about the role of modelling in managing cognitive load shifted as a result of this session?

How do you intend to change your practice as an educator as a result of your learning today?

Retrieved from melbournecounsellingcentre.com.au

Mentor Knowledge Survey

How confident are you in using Cognitive Science evidence insights when working with novice teachers?

Take a moment to complete the quick survey (link in the chat)

Related Resources:

If you're interested in learning more…

- **Cognitive Load Theory:**
  - Cognitive Load Theory and Its Application in the Classroom (Shibli and West)
  - Cognitive Load Theory in Action (Ollie Lovell)
- **Intro to Modelling:**
  - Explanations and Modelling (Teach First - ECF)
  - Principles of Instruction (summary of Rosenshine's Principles by How2)
- **Dual Coding:**
  - An Introduction to Dual Coding Theory (by Oliver Caviglioli)
  - Dual Coding Podcast (by The Learning Scientists (Weinstein and Sumeracki)