

MENTOR HANDBOOK

13 | INSTRUCTION: INSTRUCTION FOR MEMORY

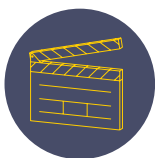
STUDY

KEY TAKEAWAYS FOR THIS MODULE

Your teacher can ensure their instruction supports pupil memory by understanding that:

- > Pupils remember content they think hard about, and they can't think if their working memory is overloaded.
- > Teachers can support thinking by introducing material which builds on prior knowledge, breaking it up into manageable steps and using worked and partially worked examples.
- > As pupil knowledge increases, support can get in the way of thinking and should be removed.
- > Opportunities to retrieve at increasingly spaced intervals promotes remembering.

Get yourself into a strong position to mentor your teacher by working through the following:



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SUMMARY BELOW:**

TEACHING CHALLENGE

Mr Alexander has a clear idea of the content that he wants his pupils to learn. However, despite 'covering' the content in lessons, he still finds that many of his pupils struggle to remember it in future lessons. What can Mr Alexander do to help his pupils remember what they have been taught?

KEY IDEA

Memory plays an important role pupil learning. Teachers need to understand this and design instruction that is sensitive to the properties and limitations of memory to support remembering.

PUPILS REMEMBER WHAT THEY THINK ABOUT

Memory plays an important role in pupil learning. Pupils use the store of knowledge in their long-term memory to make sense of new ideas and to help with higher order tasks like creativity and critical thinking (Willingham, 2009). Therefore, if pupils can't remember what has been taught previously, we might say that they haven't learnt it properly and, as a result, they are also unlikely to learn related new material or succeed at tasks that require higher order thinking. Mr Alexander needs to understand the link between memory and learning and adapt his instruction to make remembering more likely.

Mr Alexander's pupils may be struggling to remember material he has 'covered' if too many new ideas have been taught too quickly, exceeding the capacity of pupil working memory (Willingham, 2009). When this happens pupils might experience 'cognitive overload'.

Attempt the tasks below:

- > First try to work out in your head the sum 4×7 .
- > Now try to work out in your head the sum 14×273 .

Both sums require the same process, but the second sum is more complicated and requires more items to be held in working memory, causing cognitive overload for most people. We learn what we have thought hard about (Coe, 2013). However, when working memory is overloaded like this, pupils are unable to think sufficiently about any of the material and are therefore unlikely to be able to remember it. Some pupils with special educational needs or disabilities may experience particular challenges linked to working memory capacity (Gathercole et al., 2006) and are therefore likely to require additional or adapted support to successfully access material (Willingham, 2009). Conversations with colleagues, families and pupils may support teachers to identify effective strategies.

SUPPORTING PUPIL THINKING

Mr. Alexander can support pupils to remember taught material by ensuring his instruction supports effective thinking. The capacity of pupil working memory is limited to a few items, the exact number depends on pupil prior knowledge and the items' complexity (Cowan, 2008). Mr Alexander can support pupil thinking by explicitly linking new material to what has previously been learned and ensuring small steps are used (Rosenshine, 2012). If these steps are the right size, pupils can properly process new information and integrate it into their existing mental models.

Here are two approaches to introducing new material in ways that minimise overloading pupil working memory:

- > **Worked examples:** Showing all the steps of a process (for example long multiplication in sum two above) enables pupils to attend to one step at a time.
- > **Partially worked examples:** For example, completing the first step of the problem for pupils helps them focus on, and think more deeply about, fewer parts of the problem (Sweller et al., 1998).

However, as pupil knowledge develops, the support which initially helped pupils can get in the way of them using their growing knowledge (Sweller et al., 1998). For example, an explanation of a diagram might help a novice but may distract a pupil who already has the knowledge to interpret the same diagram. So, Mr Alexander gradually needs to remove support as pupil expertise increases.

The I-We-You model can be a useful approach to gradually removing support (Lemov, 2015):

- > **'I do':** Pupils need direct input to have enough knowledge to avoid their working memory becoming overloaded.
- > **'We do':** Pupils complete a worked or partially worked example using this knowledge, with teacher support.
- > **'You do':** Only when he has checked pupils can complete examples successfully with minimal support should Mr Alexander move to independent pupil practice.

RETRIEVAL FOR MEMORY OVER TIME

Having supported pupils to think successfully about new material, Mr Alexander needs to help pupils remember material over time. We have known for 100 years that without revisiting learning, people forget most material covered within a few days (Ebbinghaus, 1885 in Cowan, 2008).

A powerful way Mr Alexander can support pupils to remember learning is to get them to regularly 'retrieve' material covered. Retrieval is the act of recalling information from memory and is beneficial in itself because it helps to 'cement the information to memory' and makes forgetting less likely (Pashler et al., 2007).

Retrieval is most powerful when pupils have begun to forget material, as this makes pupils think harder when retrieving, strengthening their memories. So, to be most effective, retrieval practice should be spaced out over time (Pashler et al., 2007). For example, Mr Alexander could return to material in a few days and then a few weeks to support his pupils to remember it most successfully.

NUANCES AND CAVEATS

One challenge some pupils with special educational needs or disabilities may experience is limited working memory capacity (Gathercole et al., 2006). So, supporting pupil thinking may in itself support these pupils to be successful. However, pupils may have other barriers so teachers should always take care to find out about specific barriers (e.g. visual impairment) and support strategies (e.g. large font copy of class materials).

Individual differences may mean retrieval practice is not equally powerful for all pupils. Factors that affect the impact of retrieval practice on pupil memory include the intervals between teaching and recall, and whether feedback on pupil responses is provided (Agarwal et al., 2017).

SELECT

Before you observe, first select a **DEVELOPMENT AREA** to focus on. Next, familiarise yourself with the **FOCUSED DEVELOPMENT AREAS**, as you will zoom in on one of these during your observation. Finally, craft a **PRECISE TARGET** when you observe your teacher (examples are provided below).

DEVELOPMENT AREA	FOCUSED DEVELOPMENT AREA	EXAMPLE PRECISE TARGETS
Worked examples	<ul style="list-style-type: none"> > Teacher identifies the key learning points to draw from the worked example and primes pupils to focus on these. > Teacher models a worked example, narrating both the steps and the thought process behind them. > Teacher supports pupils to remember and replicate the process, e.g. using concise steps and/or a mnemonic device. 	
Repetition and retrieval within a lesson	<ul style="list-style-type: none"> > Teacher has identified the key knowledge that they want pupils to understand and remember. > Teacher refers and links repeatedly to key terminology in order to help pupils to understand it. > Teacher plans opportunities throughout the lesson to create retrieval tasks that give pupils the opportunity to retrieve key knowledge and skills at strategic points throughout the lesson. 	<p>If your teacher is...</p> <ul style="list-style-type: none"> > Not doing it at all: Plan a task that prompts pupils to retrieve key knowledge and skills. > Doing it but needs some improvement: Identify and plan opportunities throughout the lesson for pupils to retrieve key knowledge and skills. > Doing it well, but needs some stretch: Plan retrieval tasks that get pupils to retrieve key knowledge and skills once pupils have had a chance to forget the knowledge e.g. vary time between teaching and retrieval leaving smaller gaps after new knowledge or skills have been taught, as these are likely to be forgotten quickly.
Spacing and sequencing	<ul style="list-style-type: none"> > Teacher breaks down the key learning into steps and sequences the learning so that pupils acquire the most basic concept before encountering complexity over a series of lessons. > Teacher spaces out the learning so that pupils have an opportunity to understand and revisit the basic underlying concepts before engaging with more complex learning. 	

RECORD YOUR THINKING HERE

DEVELOPMENT AREA	FOCUSED DEVELOPMENT AREA	EXAMPLE PRECISE TARGETS
(select before observing)	(select whilst observing)	(select/write whilst observing)

OBSERVE

Consider the following questions based on a short (approximately 15 minute) observation of your teacher.

What was your teacher's **previous** target? Are they meeting it? How do you know?

For the **DEVELOPMENT AREA** you are focussing on for this observation, what is your teacher already doing well?

Next, go to the previous page and select a **FOCUSED DEVELOPMENT AREA** to further zoom in on. Then select (from the examples) or write one **PRECISE TARGET** (bite-sized action) to coach your teacher on. You can choose to stick with the previous target if your teacher have not made enough progress yet.

How will you model the target to your teacher to show them what good looks like? What questions will you ask to check your teacher understands the model? For example, 'How it is different from your current practice?', 'What impact might it have on your practice and pupils?', 'What links can you see between the model and the module principles (below)?'

Reminder: Your model should help your teacher develop their ability in some of the following:

- > Break complex material into smaller steps.
- > Reduce distractions that take attention away from what is being taught.
- > Balance exposition, repetition, practice and retrieval of critical knowledge and skills.
- > Use modelling, explanations and scaffolds, acknowledging that pupils need more structure earlier in their learning.

Next, meet with your teacher to work through the 'Feedback' stage of instructional coaching. See the guidance on the feedback stage in the appendices of the Mentor Handbook for support.

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