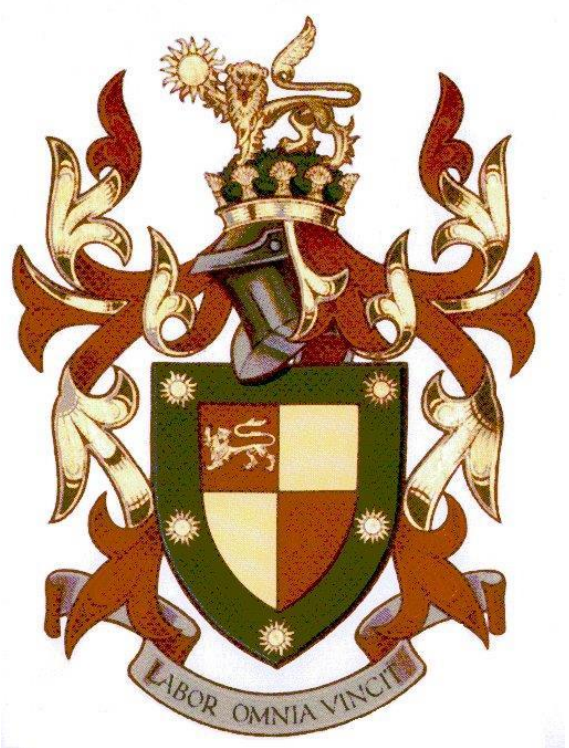
Effective Teaching



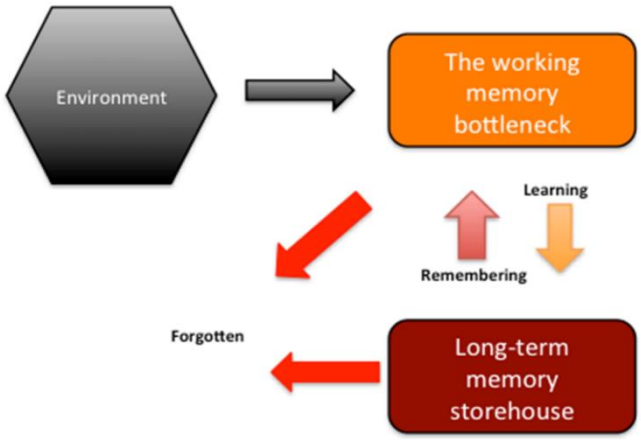
An evidence informed approach to effective teaching at Altrincham Grammar School for Boys

What is learning?

"Learning is defined as the alteration in the long term memory (LTM). If nothing has been altered nothing has been learned" Paas and Sweller (2014)

It is important to understand how memory works. This then allows teaching to be more effective in terms of our pupils retaining knowledge, making it accessible and transferable to different contexts.

Simplest model of memory



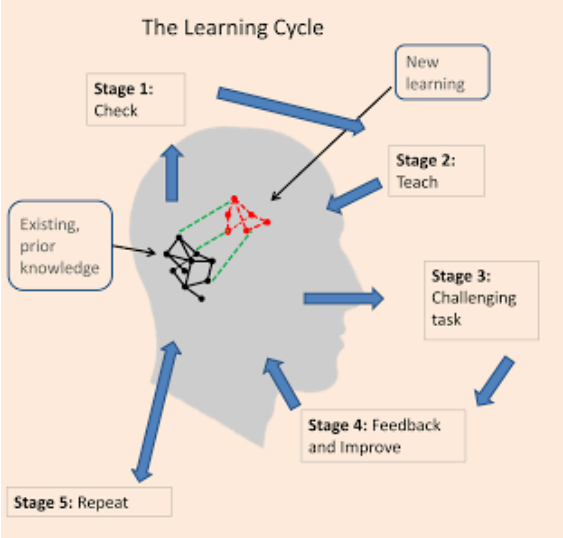
Two key points, that have a direct implication for teachers, arise from this model:

- The working memory (WM), the site of conscious processing, is limited and can act as a bottleneck. The working memory can be easily overloaded for an individual student in class
- Students will forget any material taught to them

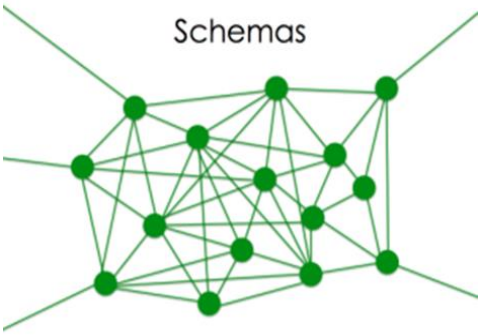
How are memories generated?

Information is stored in the LTM as schemas - inter-connected web of facts, ideas, examples and experiences.

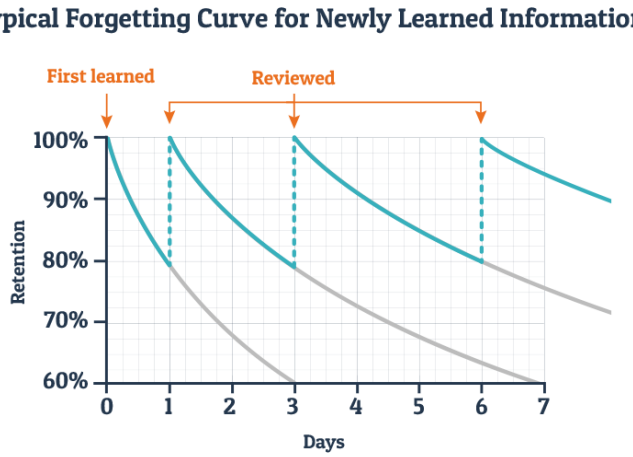
When a student thinks hard their working memory will be engaged and this information will be passed to their LTM in a process called encoding. The new facts/ideas will be unconnected to much else. However, when a number of related ideas are learnt, all the individual items become connected together and, when we recall one piece of knowledge, the rest of the schema is dragged along making it easier for us to think about the new knowledge we've learned – so it's important to introduce complex ideas in small steps (or 'chunks') and to make connections explicit for students.



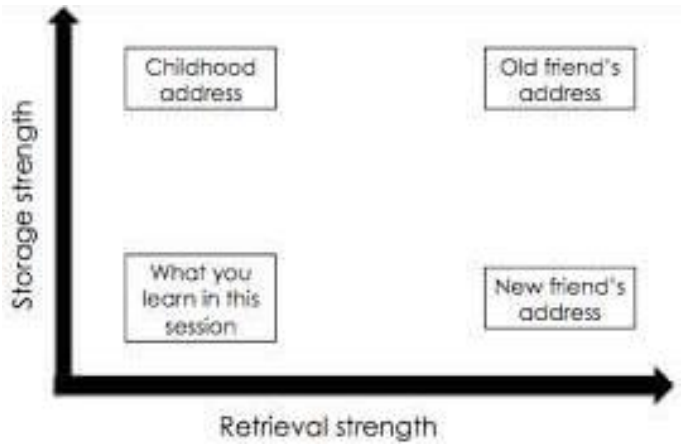
"The packets that organise information and make sense of experience are 'schemas', the building blocks of cognition."



However, even with effective encoding the material will be forgotten in a very predictable way.



The **new theory of disuse** suggests that memories have a storage and a retrieval strength. You need to retrieve learning a number of times with a spacing gap to build storage strength. Gains in storage strength (i.e. depth of understanding) are much greater if done after a period of forgetting i.e. 'forgetting is the friend of learning'. Deep learning is built up over time by revisiting topics/concepts a number of times when they become difficult, but not impossible, to retrieve from memory.

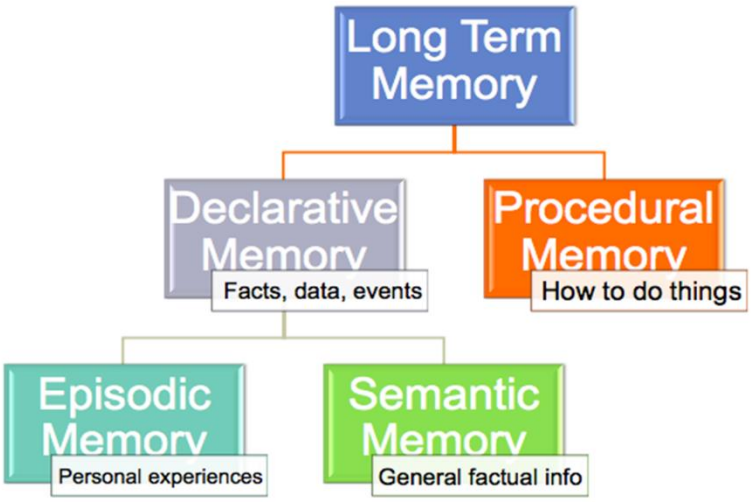


Interleaving, the mixing up of various topics rather than having a block, also makes recalling information more difficult and increase the storage strength; interleaving appears to work by making students better able to discriminate between various ideas or topics.

Finally, there are two types of long-term memories:

Episodic memories are those of experiences and specific events. Memories of how we felt are episodic and help us to reconstruct events from our past in detail.

Semantic memories are a more structured record of facts, concepts and meaning. These are stored independently to the specific context in which they were first learned and so can be more generally applied across a range of contexts.



Students' memories of lessons are often episodic - they remember the experience, but forget the specific knowledge which a teacher might have been trying to embed.

Episodic memory underpins semantic memory at first; semantic memory may become 'stand alone' from the context from which they were learnt. Exploiting the narrative structure can help with understanding and remembering ideas/principles/facts. This is because stories are 'psychologically privileged' and make any semantic knowledge easier to understand and recall.

Implications for the classroom

1. The Working Memory is limited; this means that we should:

    - Making it clear what is going to be learnt so that students can link to existing ideas in their LTM; consider using a graphic organiser to help students organise the ideas
    - Introduce materials in small steps and give time for practise
    - Model correct answers ('worked examples') and provide scaffolds at the start of the process
    - Ensure that presentations are clear, not overwhelmed with distracting images and/or text
    - Use visuals to enhance explanations, text or speech (dual coding theory)

2. Ideas fade quickly in the Long Term Memory (LTM); this means that we should:

    - Accept that students will forget most of the semantic content of the lesson ('Ebbinghaus forgetting curve') – however, it will be somewhere in the LTM
    - Incorporate **retrieval practice, spacing** and **interleaving** into our teaching. The greatest gains in learning are obtained when these '**desirable difficulties**' are introduced
    - Exploit any narrative structure – stories are 'psychologically privileged' and make any semantic knowledge easier to understand and recall
    - Pre - questions can be useful in getting students to focus and remember key ideas and facts

3. Encoding of information is effective if the teaching is responsive; this means that we should:

    - Teach challenging material that will make the students think
    - Ask many questions to check for understanding of all students
    - Give feedback that is specific and improves the student; this feedback should generate thinking for the student
    - Ensure that students obtain a high success rate to ensure continued motivation

AGSB Principles of Effective Teaching

1. **Begin a lesson with a short review of previous learning**
    - This could be a short, low stakes quiz or students could be asked to remind the class of key points from a previous lesson

2. **Be clear about what is going to be learnt**
    - Learning objectives can be written on the board but it's important to refer to these throughout and, especially, at the end of a lesson
    - Pre-questions can be a good way to prime and focus upon the lesson's key concepts

3. **Present new material in small steps, with student practise after each step**
    - Provide models for problem solving and worked examples; use exemplar material to show good practice

4. **Think carefully about your presentations**
    - Avoid distracting images and text; visuals/graphics enhance understanding but be careful not to talk over text that students are reading

5. **Ask a large number of questions and check the responses of *all* students**
    - Give the students time to think and ensure that 'random' students are asked rather than volunteers

6. **Teach material that will challenge and cause thinking**
    - Scaffolds are required for difficult tasks but these should be removed as student confidence increases
    - It's important for student motivation to obtain a high success rate (~80%)

7. **Check for student understanding**
    - This can be via questioning in class, exit tickets or follow up homework

8. **Monitor independent practice**
    - The most effective homework activities check for understanding and allow for independent practice of the ideas

9. **Engage students in weekly and monthly review – embrace 'desirable difficulties'**
    - Have regular low or no stakes tests/quizzes which contain questions from a range of topics from days, weeks and months ago

10. **Give timely and specific feedback**
    - The feedback should cause thinking and, therefore, action from the student
    - Consider asking questions as the main part of your feedback

Teaching Checklist

- [ ] Am I starting the lesson with a short review of last lesson's ideas?
- [ ] Have I made it clear what we are going to learn?
- [ ] Am I planning to introduce new material in small steps with time for practise?
- [ ] Is my presentation clear? Too many images/words?
- [ ] What activities will make the pupils think? Will it/they challenge all?
- [ ] What key questions will I ask to check for understanding? Who will I ask?
- [ ] Can I model correct answers?
- [ ] How will I know if all students understand?
- [ ] Is the homework any good? Does it reinforce or test key ideas?
- [ ] Can I build in a review of key ideas from weeks/months ago?