The role of schemas in learning – the importance of addressing misconceptions
https://youtu.be/5LdJaip6FJQ (Up to 4.59; Misconceptions: 5.00 – 5.28) Key points: ✓ Students need to build a correct schema for a specific topic ✓ Misconceptions can affect students' schemas and how they process/recall information Action research suggestions: ✓ Give students a list of questions to answer during a lesson rather than making notes ✓ Address misconceptions at the start of a new topic – e.g. True/False quiz on common misconceptions with answers/discussion at the end of the quiz OR get students to write down what they know about a topic and either collate them on the board (e.g. using post-its) or get students to put them in a box prior to the lesson so you can start the topic by tackling the specific misconceptions that students have

| **Cue-dependent memory and recall** |
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| Key points:
✓ Duration of LTM = UNLIMITED!
✓ Then why do we lose information once we have submitted it to our LTM?
    • Possible that the information was never stored in LTM in the first place
    • Or the information is there but not accessible
✓ If you are suddenly given a cue (reminder) then you may suddenly be able to bring it to mind

Action research suggestions:
✓ Learning frames:
    • Provide a learning frame, the skeleton of which is key terms – the key terms will act as cues
    • The heading/lead term should be something likely to appear in an exam Q or from the specification
    • Get students to do essay plans/make notes around this structure and then assess them on it
✓ Give students headings under which to make notes for a topic, particularly headings that are similar or the same as a potential exam question
✓ Highlight specific key terms they should know from the topic
✓ Plenary activity: Get students to recall the key facts, giving them specific key terms as triggers
✓ Plenary activity for procedural tasks (e.g. maths/essays/exam-style questions): Get students to list/bullet-point the steps involved in answering a specific question |

| **The Multi-store Model of Memory and Retrieval practice** |
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| Richard Atkinson and Richard Shiffrin's (1968, 1971) **multi-store model** describes how information flows through the memory system (see diagram below). The model suggests that memory is made up of three stores linked by processing.
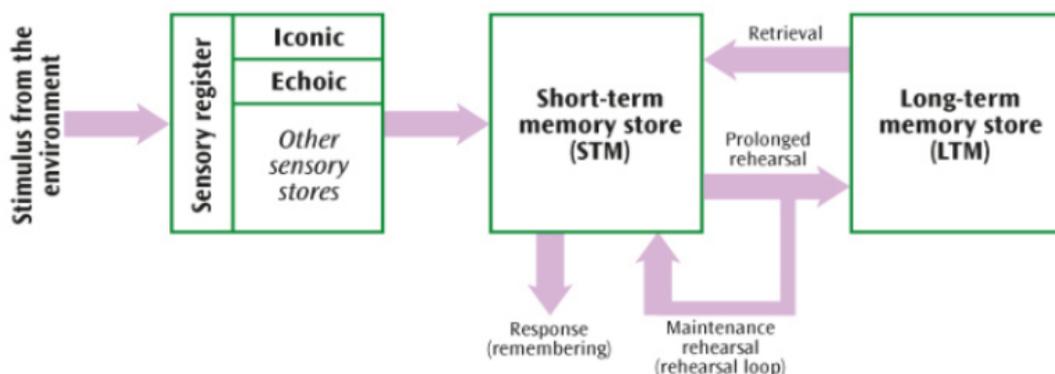
Key point:
✓ Rehearsal/repeated exposure increases the likelihood that information will be transferred to LTM |

Ebbinghaus's Forgetting Curve and Spaced Repetition

Spaced repetition eases the forgetting curve
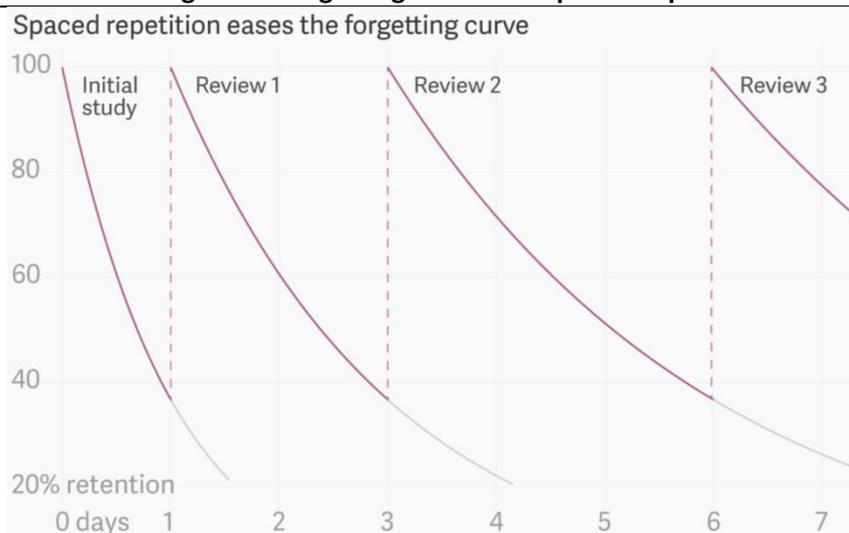
Key points:
- ✓ Learning is evolutionary – we only retain what is important for our survival
- ✓ Repeated exposure to information increases the likelihood that it will be retained in the long term
- ✓ When doing retrieval practice, students need to think back to a prior time when they learned information to reconstruct this information (Karpicke, Lehman, et al., 2014) - **some amount of difficulty is ideal during this process**
- ✓ The important thing is to balance retrieval difficulty and success
- ✓ Teachers can also provide scaffolding to help their students achieve success initially, and then slowly make retrieval more difficult as the students become more comfortable with the material. Doing this has the added benefit of ensuring repeated retrieval, and continuing to retrieve information multiple times over a period of time is very beneficial to learning (Kapler et al., 2015).
- ✓ In terms of short-term learning, findings from studies suggest that interspersing quiz questions throughout learning can help with learning information presented later on in the class in comparison to not quizzing, because the quiz questions help relieve some of the interference that typically builds up during a longer learning session
- ✓ For long-term learning, no difference has been determined between conditions when students were either quizzed throughout class or at the end of class. Importantly, students who were not quizzed at all did more poorly on the long-term learning tests.
- ✓ The take-home message is that it doesn't matter where you put quiz questions, as long as you do give students retrieval practice opportunities in as many classes as possible

Action Research suggestions:
- ✓ Use past/sample paper exam Qs at the start, during and at the end of lessons – you could make use of whiteboards to quickly assess students and give feedback/use questioning to extend understanding or address misconceptions
- ✓ Construct multiple-choice, short answer questions or hybrid Qs to assess learning during the lesson and give feedback
- ✓ Use Google Forms to set multiple choice/short answer questions as homework or to give in lesson (if students use their phones sensibly!) – you can set it up so that these mark themselves and send the feedback to each student

Further reading
Optimising learning using retrieval practice: **https://impact.chartered.college/article/sumeracki-weinstein-optimising-learning-retrieval-practice/** **https://impact.chartered.college/article/firth-assessment-as-learning-role-of-retrieval-practice-in-classroom**