

This Spotlight is the second of five Issues that focuses on Retrieval Practice. Over this half term we are going to have a whole school focus on Retrieval Practice. *Please try to have discussions with your classes about what Retrieval Practice is, why it is so powerful and what it might look like in your lessons and when the students are reviewing your subject.*

What is Retrieval Practice? Retrieval practice refers to the act of recalling learned information from memory (with no or little support) and every time that information is retrieved, or an answer is generated, it changes that original memory to make it stronger. 'Using your memory shapes your memory'.¹ The retrieval process cements information in the long term memory, which should enable that information to become easier to retrieve in the future. Retrieval practice focuses on recalling information from memory as a *powerful learning tool, not an assessment tool*. Therefore, it is regarded as essential classroom practice to support learning with regular practice of retrieval.

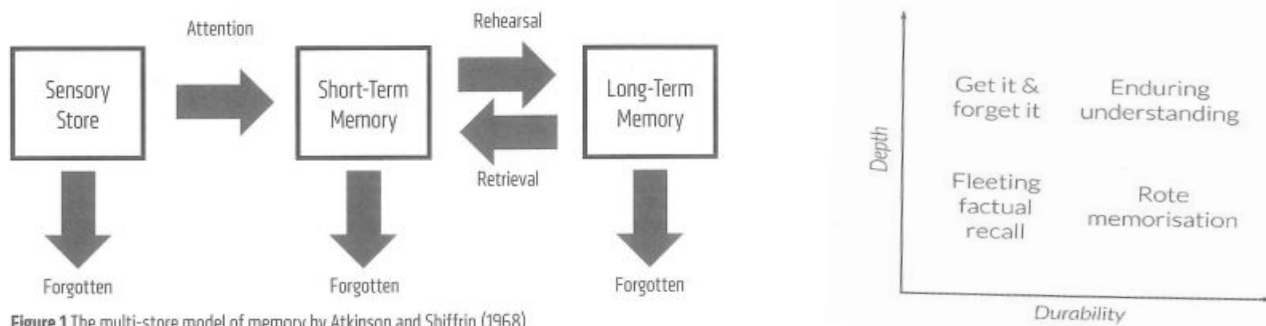


Figure 1 The multi-store model of memory by Atkinson and Shiffrin (1968)

I believe that to understand why retrieval practice works we need to have some understanding of short term memory (working memory - WM) and long-term memory (LTM).² These two Figures³ are starting points to aid our understanding. Information is detected by the sense organs and enters the sensory memory. If attended to this information enters the short term memory. When we encounter new material, the information is stored for a very brief time in our short-term memory. The reason for this is due to the capacity (how much information) and the duration (how long we can store it) of our short-term memory, which is very limited. Research suggests that almost all information stored in the short-term memory that is not rehearsed is lost within 18 to 30 seconds. If we do not revisit material it will be lost forever; snatched away by the curse of forgetting (though, as we will discover later forgetting isn't always as bad as we think). Information from the short-term memory is transferred to the long-term memory only if that information is rehearsed (i.e. repeated). It is not enough to be able to store information in our long-term memory - we need to be able to retrieve it from there too. Retrieval storage refers to how well information is embedded in our long-term memory. Retrieval strength refers to how easily a piece of information can be brought to mind when required⁴. The power of our LTM is the function of:

- Depth - how well structured our knowledge is. The more comprehensive and organised our LTM is, the better it performs for us
- Durability - how long these structures remain available to us. The more accessible our LTM is, the more useful it is

Our job as teachers is to help our students build deep and durable LTM. If LTM is equivalent to knowledge, then WM is the equivalent to thinking. The better we think, the more we know. And the more we know, the better we can think.

*"Memory is the residue of thought"*⁵

Why the sudden interest in Retrieval Practice now?

Retrieval practice is not new. Karpicke wrote in 2012 *"Given the importance of retrieval for understanding the process of learning, it is surprising that the retrieval processes have not received more attention in educational research"*. Kate Jones argues that there are a number of reasons why retrieval practice is finally moving towards receiving the 'recognition, focus and attention it deserves'. There include Twitter, blogging, the ResearchEd movement and the increasing range and quality of accessible educational books. Don't be put off by the sheer volume of 'stuff'.....why not explore:

<https://www.learningscientists.org/> <https://www.retrievalpractice.org/> Seneca Learning: <https://app.senecalearning.com/courses>

¹ Robert Bjork: <https://www.youtube.com/watch?v=69VPjsgm-E0>

² http://www.deansforimpact.org/wp-content/uploads/2016/12/The_Science_of_Learning.pdf

³ Kate Jones: *Retrieval Practice* & Peps McCrea: *Memorable Teaching*

⁴ Didau and Rose: *What Every Teacher Need to Know About Psychology* (2016)

⁵ *Why Don't Students Like School? A Cognitive Scientist Answers Questions about How the Mind Works and What It Means for the Classroom* by Daniel T. Willingham

What does the research say?

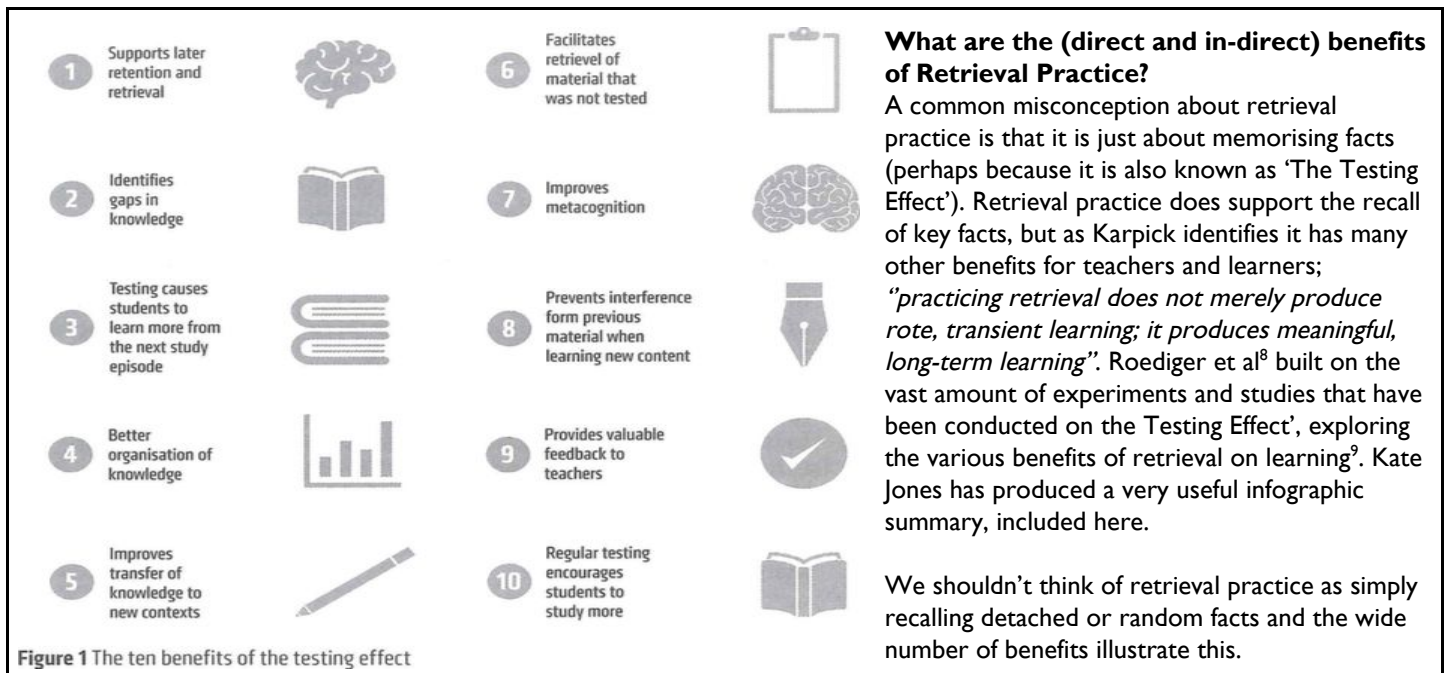
Roediger and Karpicke⁶ studied the impact of different study strategies on how much students learn. They tested how effective retrieval practice was compared to simply reading and re-reading key passages. As well as comparing final test scores they also measured how effective the students thought these strategies were and how interesting they found their revision sessions to be.

Main findings:

- If the final test was 2-7 days away, students who had one study period followed by a session on retrieval practice did at least 30% better than those who had done two study periods of reading
- The longer you need to remember information, the more powerful the 'testing effect' is
- Students were most likely to rate re-reading as being more effective than retrieval practice. However, the students who used mainly retrieval practice remembered over 50% more than those who had just re-read during revision.
- Students who had revised using retrieval practice found it more interesting than those who had just read the material⁷

Classroom implications:

- Students are likely to choose ineffective strategies for revision; ***we need to educate them as to the best learning strategies***
- Studying isn't something that students do in order to do well in tests. ***Tests are something they should do in order to study more effectively***



Retrieval practice and stress

Are students who revise using retrieval practice better able to recall that information when they are stressed, such as in highly pressurised exams? Smith et al¹⁰ had half their students revise by doing lots of tests and quizzes (retrieval practice) and the other half revise by re-reading key passages of the text. They then placed half of each group in either stressful or non-stressful environments and recorded how much they were able to remember.

Main findings:

- Those who revised using retrieval practice outperformed those who had just re-read their notes by 17-26%
- Increased stress made those who studied by re-reading their notes perform up to 32% worse
- Increased stress did not negatively affect the memory of those who used retrieval practice
- Retrieval practice was so effective at combating the negative effect of stress on memory that the stressed retrieval practice students performed better than those who weren't stressed and had used the re-reading techniques in their revision

Classroom implications: By teaching students the importance of retrieval (quizzes, multiple choice tests, essay answers or verbally questioning), we can not only help them learn the content at a faster rate, we can also help ensure that they access this knowledge when they are under stress in the exams.

The message to students could not be clearer or simpler: ***don't study in order to do well on the test. Do lots of study in order to study well.*** By doing so, they will learn more and perform better under pressure. This means they will deliver their best when it matters the most.

⁶ Test-enhanced learning: taking memory tests improves long-term retention

⁷ The science of learning - 77 Studies That Every Teacher Should Know Busch and Watson

⁸ Ten Benefits of Testing and Their Applications to Educational Practice Roediger et al

⁹ Taken from Kate Jones: Retrieval Practice

¹⁰ Retrieval practice protects memory against acute stress (Smith et al)

Retrieval Practice - A Starting Point

Use this audit to prompt your thinking about Retrieval Practice. Over this half term we are going to have a whole school focus on Retrieval Practice. *Please try to have discussions with your classes about what Retrieval Practice is, why it is so powerful and what it might look like in your lessons.*

Use this audit as a checklist at the end of this half term.

Have you heard about retrieval practice?	
Are you confident that you understand and can explain what it means?	
Have you read any of the research behind retrieval practice	
Can you explain why retrieval improves learning?	
Can you give examples of retrieval practice you could use in the classroom?	
What do you think are the benefits of retrieval practice, beyond just recalling facts?	
Do you specifically refer to retrieval practice and talk to your classes about why it is powerful?	
How much space should you leave between teaching and retrieval?	
Does the position of retrieval practice within a lesson matter?	

Does the question format of retrieval practice matter?	
If retrieval helps learning correct information, then doesn't it also reinforce misconceptions when incorrect answers are retrieved?	
Does retrieval practice work with students at different ages or abilities? Is it more effective with older students?	
Is retrieval practice more effective than other revision strategies, if so why?	
Does retrieval practice lead to more exam pressure, anxiety and stress?	
Are there any negative effects or downsides / challenges to retrieval practice?	
Have you heard of Rosenshine's Principles of Instruction?	
How do Rosenshine's Principles link with Retrieval Practice?	
Do you understand the idea of Long Term Memory and Working Memory, and how this links to Retrieval Practice?	