RETPRAC
A project to improve learning

RETRIEVAL PRACTICE IN FIRST YEAR OF SECONDARY EDUCATION

Authors

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Spaced/distributed practice & forgetting curve	**Active recall & Testing Effect**
What do I know or what do I assume this concept means?	What do I know or what do I assume this concept means?
Interleaved practice	**Dual coding**
What do I know or what do I assume this concept means?	What do I know or what do I assume this concept means?

Active recall & Testing Effect

Definition: It is the process of actively bringing information from memory to consciousness, rather than simply reviewing or recognising that information. It's about actively remembering without looking at the answer.

Benefit: The act of actively recalling information strengthens neural connections, making that information easier to access in the future. It is more beneficial than simply passively rereading or reviewing the material.

Example of classroom application: After a lesson, instead of simply reviewing notes, a teacher can organise a short test or quiz. Throughout the semester, review can be done through cumulative tests to reinforce previous material.

Research: Roediger, H. L., & Karpicke, J. D. (2006). Test-enhanced learning: Taking memory tests improves long-term retention. *Psychological Science, 17*(3), 249-255.
This study found that students who took tests after studying material had significantly better long-term retention of information than those who simply studied the material repeatedly.

Spaced/distributed practice & forgetting curve

Definition: A learning strategy in which the study or practice of content is spread over several sessions, rather than in a single block.

Benefit: Improves long-term retention and consolidation of information compared to block learning. By re-exposure to the material after a period of time, neural connections to the content are strengthened.

Example of classroom implementation: Instead of teaching a topic for a single week and then moving on to the next, a teacher can introduce a concept, return to it several times in subsequent weeks, and intersperse activities related to other topics in between.

Research: Cepeda, N. J., Pashler, H., Vul, E., Wixted, J. T., & Rohrer, D. (2006). Distributed practice in verbal recall tasks: A review and quantitative synthesis. *Psychological Bulletin, 132*(3), 354–380.
In this meta-analysis they found that the intervals between study sessions have a significant impact on long-term retention. The longer the time interval (up to an optimal point), the better the retention.

Dual coding

Definition: Information can be encoded in our memory through two different channels: verbal (or linguistic) and visual. When both channels are used simultaneously, learning and retention can be enhanced.

Benefit: Using both verbal and visual codes creates multiple representations of information in memory, increasing the likelihood of successful retention and retrieval. This combination can make information more memorable and easier to recall.

Example of classroom application: When introducing a new concept, the written definition (verbal coding) can be presented together with a relevant diagram, graph or picture (visual coding). For example, a detailed description of the circulatory system could be given along with a diagram of the heart and blood vessels.

Research: Mayer, R. E., & Fiorella, L. (2014). Principles for reducing extraneous processing in multimedia learning: Coherence, signaling, redundancy, spatial contiguity, and temporal contiguity principles. In *The Cambridge Handbook of Multimedia Learning* (2nd ed., pp. 279-315). Cambridge University Press.

Interleaved practice

Definition: Alternating different topics or skills in a single study or practice session, rather than focusing on one topic or skill at a time (block practice).

Benefit: Interleaved practice helps improve discrimination between topics or skills, strengthening the ability to correctly identify and apply the appropriate solution or approach. Studies have shown that, although it may seem more challenging at first, it improves long-term skill retention and transfer.

Research and example of classroom application: Rohrer, D., & Taylor, K. (2007). The shuffling of mathematics problems improves learning. *Instructional Science, 35*(6), 481-498.
In this study, it was found that students who practiced mathematics through an interleaved approach (mixing different types of problems) had significantly better learning on subsequent tests compared to those who practiced using a blocked approach (focusing on one type of problem). at the same time), although they showed greater academic performance in the short term.

Generation effect	**Cueing**
What do I know or what do I assume this concept means?	What do I know or what do I assume this concept means?

Cueing

Definition: Cuing refers to the use of stimuli or cues to direct the learner's attention to specific information or to activate associated memories in memory.

Benefit: Clues or signals help facilitate the retrieval of information from memory, making the remembering process more efficient. They can also direct and maintain the learner's attention on specific content, improving comprehension and retention.

Example of implementation in the classroom: Imagine that a student is trying to remember the capital of a particular country. Instead of immediately giving you the answer when you can't remember, the teacher could give incremental clues, such as "Think of a European city that begins with the letter 'M'." These clues guide the student to make a cognitive effort and search their memory for the correct answer, facilitating the process of active evocation and strengthening the connection in memory.

Research: Karpicke, J. D., Butler, A. C., & Roediger III, H. L. (2009). Metacognitive strategies in student learning: Do students practise retrieval when they study on their own? *Memory, 17*(4), 471-479.

Generation effect

Definition: Cognitive phenomenon according to which information generated by oneself (as in elaboration or inference) is remembered better than information simply read or passively received.

Benefit: The act of actively generating responses or constructing information from what one already knows leads to longer memory and better understanding. By actively engaging in the generation process, a deeper connection is created.

Example of implementation in the classroom: Instead of simply giving students a list of words and their definitions, the teacher could provide definitions and ask students to generate the corresponding words. Another option could be to provide half of a concept or theory and ask students to complete or elaborate on the rest based on their prior knowledge.

Research: Bertsch, S., Pesta, B. J., Wiscott, R., & McDaniel, M. A. (2007). The generation effect: A meta-analytic review. *Memory & Cognition, 35*(2), 201-210.