METHOD SHEET · LEARNING HOW TO LEARN

What cognitive science tells us

Retrieval practice, spaced repetition, interleaving: the three levers that hold

THE ESSENTIALS

Three practices clearly outperform the rest in learning research: retrieval practice (testing yourself instead of rereading), spaced repetition (returning to a topic at increasing intervals) and interleaving different exercise types. Conversely, the two techniques students use most — rereading notes and highlighting — are among the least effective. Rebuilding revision around these three levers usually does more for a grade than adding hours of work.

- Testing yourself without notes beats rereading, for the same time spent.
- Spacing reviews (day 1, 3, 7, 21) makes memory last far longer than cramming the night before.
- Mixing exercise types teaches you to recognise which method to apply — exactly what is missing on test day.
- What feels easy during revision is usually ineffective: felt difficulty is a good sign.

The principles

Retrieval practice (the testing effect)
Pulling information out of memory strengthens it far more than rereading. In practice: close the notebook and write down everything you know, answer questions, redraw a diagram from memory.

Spaced repetition
The forgetting curve described by Ebbinghaus in the late nineteenth century shows that most is lost in the first few days. Brief reviews on day 1, 3, 7 and 21 cost less time than cramming and hold until the exam.

Interleaving
Work on mixed exercise types rather than uniform blocks. Performance during practice drops, but exam results clearly improve: the student learns to identify the right method rather than repeating the same one.

Elaboration and self-explanation
Asking "why?" and "how does this connect to what I already know?" turns a list of facts into a network. A connected course is retained without brute-force memorising.

Dual coding
Pairing text with a visual representation (diagram, timeline, map) creates two routes to the same information. Especially useful in biology, history-geography and physics.

Example — What does not work (and everybody does)

Reviews of study techniques consistently rank the most widespread practices among the least productive.

1. Rereading several times: produces a feeling of mastery with no lasting memory trace.
2. Highlighting: useful for sorting, useless for retention if nothing is then done with the highlighted passage.
3. Copying notes out neatly: expensive in time, almost worthless for learning.
4. Revising a whole subject in one block the night before: effective for the test, ineffective two weeks later — therefore disastrous for a final exam.

How it is used in lessons

The first five minutes of every lesson
Recall of the previous session without notes, spoken or written. This makes retrieval practice a habit and immediately reveals what did not stick.

Revision cards written as questions

Instead of a summary to reread, the student produces question-and-answer cards. They become a testing tool, not one more text.

A review calendar
Every topic covered is scheduled again at day 3, 7 and 21. The written summary sent after each lesson is the material for those reviews.

Mixed exercise sets
As a test approaches, we stop working chapter by chapter: exercises are shuffled, exactly as on the day.

Who is it for?

- Students who work hard for disappointing results.
- Final-year school students facing the volume of a national exam.
- University and preparatory-class students who must retain material over a year, not a week.
- Adults returning to study or preparing competitive exams.

Its limits, honestly

- These techniques are more demanding than rereading: you have to accept some discomfort at first.
- They do not replace understanding: testing yourself on material you have not understood teaches nothing.
- Spaced repetition requires minimal organisation — without a schedule it stays a good intention.
- Review intervals depend on the subject and the student: the days given are guides, not a law.

Frequently asked questions

What is the best way to memorise a course?
Test yourself without notes rather than reread. Retrieval practice — writing down everything you remember, answering questions, redrawing a diagram from memory — is the most effective technique measured by research, for the same time spent. It becomes formidable when combined with spaced reviews on day 1, 3, 7 and 21.

Why is rereading not enough?
Because rereading creates a feeling of familiarity that the brain mistakes for mastery. Nothing has been retrieved from memory, so on the day the information does not come back. Reviews of study techniques rank rereading and highlighting among the least productive practices.

What is spaced repetition?
It means revisiting a topic at increasing intervals instead of in a single session. Forgetting is massive in the first days: short reviews on day 1, 3, 7 and 21 cost less time overall than cramming and keep the memory alive until the exam.

What is interleaving?
It means mixing different exercise types instead of working through them in blocks. Performance during practice drops, but exam results improve: the student learns to recognise which method to apply, which is precisely the difficulty of a test.