



24 Ways to Embed Retrieval Practice in Your Classroom

Evidence-informed strategies, with or without technology · Rooted in the work of Bjork, Roediger & Karpicke, Agarwal, Dunlosky, Cepeda, Kornell, Rohrer, Ebbinghaus, Kapur and Metcalfe

"The act of retrieving knowledge is itself a learning event, not merely a test of what has been learned." — Roediger & Karpicke, 2006

Pedagogy First

24 STRATEGIES TO TRY TODAY

The Testing Effect **Spacing & Interleaving** **Desirable Difficulties** **Retrieval Formats** **Metacognition & Calibration**

01

THE TESTING EFFECT

Retrieval Beats Re-reading

Replace re-reading with retrieval. Instead of reviewing notes, ask students to write down everything they remember, then check. The testing is the learning, not the preparation for it.

TECH low-stakes quiz or flashcard tool

INFORMED BY Roediger & Karpicke

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THE TESTING EFFECT

Low-Stakes Starter Quizzes

Five questions per lesson on prior content; nothing in the gradebook. Agarwal found routine quizzing reduces test anxiety rather than causing it. The quiz is not the assessment. It is the learning.

TECH quiz or response tool

INFORMED BY Roediger & Karpicke; Agarwal et al.

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THE TESTING EFFECT

Brain Dump

A blank page, two minutes, no notes: write everything you remember. The imperfect attempt is the point. What students cannot recall shows precisely where teaching needs to return.

TECH shared doc or whiteboard tool

INFORMED BY Roediger; Karpicke; Agarwal

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THE TESTING EFFECT

Test Before You Teach

Quiz students before teaching. Struggling to retrieve primes the brain; students who fail before instruction remember the answer more reliably once taught. Failure is productive.

TECH pre-lesson quiz tool

INFORMED BY Bjork; Kapur

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THE TESTING EFFECT

Closed-Book Reconstruction

Students reconstruct key ideas from memory, then open notes and correct in a different colour. Karpicke and Blunt found this outperforms re-reading. The corrections are the data.

TECH document tool; colour annotation

INFORMED BY Karpicke & Blunt

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SPACING & INTERLEAVING

Distribute Practice Over Time

Spread retrieval across days and weeks rather than cramming it into one session. Build review points into your medium-term plan. The calendar is part of the pedagogy.

TECH spaced repetition tool

INFORMED BY Cepeda et al.; Ebbinghaus

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SPACING & INTERLEAVING

Yesterday, Last Week, Last Month

Three questions per lesson: one from yesterday, one from last week, one from last month. These intervals are a starting point; complex topics may need revisiting more frequently.

TECH quiz tool; lesson slide template

INFORMED BY Rosenshine; Bjork

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SPACING & INTERLEAVING

Interleave Topics, Don't Block

Kornell and Bjork found mixing topics produces stronger retention than finishing one before moving to the next. Blocked practice feels organised; it produces weaker retention. Discriminating is the mechanism.

TECH shuffled quiz or random question tool

INFORMED BY Kornell & Bjork; Rohrer

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SPACING & INTERLEAVING

The Retrieval Schedule

Dunlosky's review ranked re-reading among the least effective strategies. Teach students the evidence: study, return after two days, then a week, then a month. Many students do the opposite.

TECH spaced repetition or revision planner

INFORMED BY Dunlosky et al.

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SPACING & INTERLEAVING

Cumulative Review

Plan retrieval into your medium-term planning, not just lessons. Bring back earlier content in starters and assessments. When it never reappears, students conclude it no longer matters.

TECH question bank or quiz builder

INFORMED BY Bjork; Carey

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DESIRABLE DIFFICULTIES

Embrace the Struggle

Bjork coined desirable difficulties for conditions that slow apparent learning but improve long-term retention. Effortful retrieval is the clearest example. Resist the urge to make it easier.

TECH any retrieval tool; hints disabled

INFORMED BY R. Bjork

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DESIRABLE DIFFICULTIES

Remove the Scaffolding

Retrieval with notes open is reading, not retrieval. Fade support gradually: notes first, then headings only, then nothing. The transition to unaided retrieval is where consolidation happens.

TECH quiz tool; timed or closed-book mode

INFORMED BY R. Bjork; Kornell

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DESIRABLE DIFFICULTIES

Vary the Retrieval Context

Retrieve the same content in different formats and settings, decontextualising knowledge so it is not tied to one context or format. Harder for students; that is precisely the point.

TECH varied formats; multi-modal tools

INFORMED BY Godden & Baddeley; Bjork

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DESIRABLE DIFFICULTIES

The Generation Effect

Slamecka and Graf found generating an answer, even a wrong one, before being told it produces stronger retention than passive exposure. The effort of generation drives encoding, not the accuracy.

TECH response tool; pre-teach quiz

INFORMED BY Slamecka & Graf; McDaniel

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DESIRABLE DIFFICULTIES

Forget Before You Retrieve

Do not retrieve immediately after teaching. Wait a day, then quiz. Wait a week, then quiz again. The gap between learning and retrieval is where consolidation happens.

TECH spaced quiz tool; lesson timer

INFORMED BY R. Bjork; Roediger

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RETRIEVAL FORMATS

Retrieval Beyond Facts

Factual retrieval builds the schema; higher-order retrieval tests whether students can use it. Secure the foundations first, then push beyond them. Retrieval is not a pub quiz.

TECH quiz tool with varied question types

INFORMED BY Agarwal

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RETRIEVAL FORMATS

Concept Mapping from Memory

Karpicke and Blunt found concept mapping from memory outperformed re-reading for retention. Not just what students know but how ideas connect. Relational knowledge beats isolated facts.

TECH mind-mapping or diagram tool

INFORMED BY Karpicke & Blunt

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RETRIEVAL FORMATS

Retrieval Through Teaching

The learning happens during preparation, not delivery. Preparing to teach demands complete, organised retrieval. Organising knowledge to explain it is where consolidation occurs.

TECH video recording or presentation tool

INFORMED BY Nestojko et al.; Fiorella

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RETRIEVAL FORMATS

Cued Recall

Tulving and Thomson showed retrieval depends on available cues. A heading, a keyword, labels removed: each triggers retrieval without doing the work. Builds confidence before unaided retrieval.

TECH cloze quiz or gapped handout tool

INFORMED BY Tulving & Thomson

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METACOGNITION & CALIBRATION

Teach the Illusion of Knowing

Show students their own illusion of knowing. Ask them to rate confidence before revealing the answer. When they were certain and wrong, that is the precise moment to intervene.

TECH confidence-rated quiz tool

INFORMED BY Koriati & Bjork; Dunlosky

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METACOGNITION & CALIBRATION

Provide Instant Feedback

Metcalfe shows instant feedback is essential for confident errors. For general retrieval, allow a processing gap before revealing answers. Speed matters most when confidence is highest.

TECH quiz tool with instant answer reveal

INFORMED BY Metcalfe

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METACOGNITION & CALIBRATION

Confidence Ratings

Dunlosky and Metcalfe showed students are most confident about things most recently read, not things they actually know. Rate confidence after each attempt, then reveal the answer. That gap is the target.

TECH quiz tool with confidence rating

INFORMED BY Dunlosky & Metcalfe

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METACOGNITION & CALIBRATION

Retrieval Journals

Zimmerman showed students who monitor their performance make better revision decisions. Log what came back, what did not, and what needs revisiting. It is a map of what to do next.

TECH learning journal or digital notebook

INFORMED BY Dunlosky et al.; Zimmerman

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METACOGNITION & CALIBRATION

Study Strategy Audit

Dunlosky's review rated ten strategies: re-reading scored low; practice testing scored highest. Ask students how they revise, then show them the data. That conversation is the intervention.

TECH survey or discussion tool

INFORMED BY Dunlosky et al.

PEDAGOGY FIRST, TECHNOLOGY SECOND. Always.

Rooted in the work of Bjork, Roediger & Karpicke, Agarwal, Dunlosky, Cepeda, Kornell, Rohrer, Ebbinghaus, Kapur, Metcalfe, Nestojko, Fiorella & Mayer, Slamecka & Graf and Godden & Baddeley

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CREATED BY

Mark Anderson