LEARNING, MASTERED · FREE COMPANION

COMPANION

HOW THE 12 WERE CHOSEN



The complete method and scores behind Learning, Mastered

MAGNUS MENTORIS

Copyright © 2026 Magnus Mentoris. Free to download and share unchanged.

magnusmentoris.com

About this document

Learning, Mastered teaches 12 core strategies for learning. Its Appendix A explains, in a few pages, how those 12 were chosen. This companion document gives the whole record: every criterion that was considered, every strategy that was considered, every score, and every decision.

It exists so that you do not have to take the choice on trust. You can check any score, disagree with it, and see whether a different score would change the result.

What you will find here:

1. The 10 meta-criteria: the tests a good criterion must pass.
2. Step 1: the 40 candidate criteria.
3. Step 2: how the 40 were scored, and the 20 that survived.
4. The final 20 criteria, their scoring guides, and the gates.
5. The 60 candidate strategies.
6. Step 3: the scores of all 60 strategies on all 20 criteria.
7. Step 3b: the merged chapters and their scores.
8. The selection rule, the final ranking and the 12.
9. Limits of this method, and what could change it.

Three things to know before you read the scores:

- **They are judgments, not measurements.** Each score was given by reading the research and applying a written scoring guide. Another careful reader might give some scores a point higher or lower. That is why every score is published.
- **They can change.** The studies cited in *Learning, Mastered* were checked against the published record before release. If later checking changes a score, an updated version of this document will record the change.
- **The method is deliberately open to criticism.** Weak options were included on purpose, so you can see that the method filters. Popular but weak study habits and one well-known myth are in the pool. All of them finished near the bottom.

---

1. The 10 meta-criteria

A list of criteria can be built to favor any answer. To guard against that, the criteria themselves were chosen by a higher set of tests, called **meta-criteria**. These come from established principles of good measurement and decision-making. No further level was used: the meta-criteria are not themselves chosen by another set.

A good criterion must be:

#	Meta-criterion	Meaning
1	Relevant	Tied to helping adults learn better.
2	Valid	Measures what it claims to measure.
3	Scorable	Can be rated 1–5 consistently from evidence.
4	Independent	Does not overlap another criterion.
5	Discriminating	Separates strong strategies from weak ones.
6	Evidence-based	Judged from published sources, not opinion.
7	Valuable to the reader	Reflects an adult's real success.
8	Universal	Applies across cultures and languages.
9	Neutral	Does not favor a strategy chosen in advance.
10	Clear	Can be explained in one sentence.

2. Step 1: the 40 candidate criteria

The process began with 20 working criteria. These were expanded to 40 candidates, drawn from six groups: Evidence, Adult fit, Practicality, Range, Metalearning and Roots.

Some weak candidates were included on purpose, such as "Popular with learners" and "Enjoyable to do." A method that only ever sees strong options proves nothing. Including plausible weak options shows whether the meta-criteria actually filter. Where two candidates overlapped, the Independent meta-criterion was used to lower the weaker one.

#	Criterion	Group	Definition
1	Strength of research	Evidence	How many well-designed studies support the strategy.
2	Size of the benefit	Evidence	How large the improvement is, compared with common methods.
3	Long-term retention	Evidence	Whether gains last weeks or months, not just hours.
4	Works outside the lab	Evidence	Whether it helps in real classrooms, jobs and daily life.
5	Tested on adults	Evidence	Whether studies include adults, not only children or students.
6	Fits a busy life	Adult fit	Whether it works within limited, irregular adult time.
7	Uses experience	Adult fit	Whether it draws on what adults already know and have lived.
8	Self-directed	Adult fit	Whether an adult can use it alone, without a teacher.
9	Works at any age	Adult fit	Whether it helps adults in their 20s through their 80s.
10	Goes against instinct	Adult fit	Whether it corrects a method that feels right but works poorly.
11	Easy and affordable to start	Practicality	Whether it needs little money, equipment or setup.
12	Easy to check	Practicality	Whether a learner can see if they are doing it right.
13	Combines well	Practicality	Whether it works alongside the other strategies.
14	Works across subjects	Range	Whether it helps in many fields, not just one.

#	Criterion	Group	Definition
15	Builds understanding	Range	Whether it deepens understanding, not just recall.
16	Builds skills	Range	Whether it improves performance, not only knowledge.
17	Improves self-judgment	Metalearning	Whether it helps learners judge accurately what they know.
18	Keeps people going	Metalearning	Whether it helps learners keep studying over months.
19	Proven in practice over time	Metalearning	Whether it has served learners across generations.
20	Two roots	Roots	Whether it has both a philosophical lineage and psychology evidence.
21	Independent replication	Evidence	Whether separate research teams have reproduced the main findings.
22	Meta-analytic support	Evidence	Whether a meta-analysis or systematic review confirms it.
23	Transfer to new situations	Range	Whether learning carries over to new problems and settings.
24	Tested across cultures	Evidence	Whether studies include learners from several countries and languages.
25	Known mechanism	Evidence	Whether science can explain why the strategy works.
26	Works in short sessions	Adult fit	Whether 10–20 minutes of use gives real benefit.
27	Works when tired	Adult fit	Whether it still helps when energy is low after work or caregiving.
28	No teacher needed	Adult fit	Whether it needs no instructor, class or institution.
29	Suits returning learners	Adult fit	Whether it helps adults who have been away from study for years.
30	Low cost in money	Practicality	Whether it can be done for free or nearly free.
31	Quick to learn the method	Practicality	Whether the strategy itself can be learned in under an hour.
32	Low risk of misuse	Practicality	Whether a learner is unlikely to do it wrong in a way that harms learning.

#	Criterion	Group	Definition
33	Early visible results	Practicality	Whether learners see benefit within days or weeks.
34	Scales from beginner to expert	Range	Whether it stays useful as the learner advances.
35	Supports problem-solving and creativity	Range	Whether it helps learners use knowledge in new ways.
36	Builds confidence	Metalearning	Whether it raises a learner's belief that they can learn.
37	Enjoyable to do	Metalearning	Whether learners find the strategy pleasant.
38	Builds lifelong independence	Metalearning	Whether it leaves learners better able to learn alone in future.
39	Roots across many traditions	Roots	Whether it appears in more than one cultural or philosophical tradition.
40	Popular with learners	Metalearning	Whether many learners already use or like it.

3. Step 2: scoring the 40 criteria

Each of the 40 candidates was scored 1–5 on each of the 10 meta-criteria, for a maximum of 50 and 400 scores in all. The top 20 were kept.

Scale: 5 = fully meets the meta-criterion · 4 = largely meets · 3 = partly meets · 2 = weakly meets · 1 = barely or does not meet.

Overlap rule: where two candidates overlap, the weaker or narrower one gets the lower Independent score; the broader one keeps the higher score.

Tie-break rule, set before ranking: equal totals are ordered by Independent, then Valid, then Relevant. Independent comes first because the purpose of this step is to remove overlap.

How to read each entry: the criterion's rank, its total out of 50, the result, then its 10 scores. Rel = Relevant · Val = Valid · Sco = Scorable · Ind = Independent · Dis = Discriminating · Evi = Evidence-based · Valu = Valuable to the reader · Uni = Universal · Neu = Neutral · Clr = Clear.

Ranked results

1. Long-term retention (criterion 3, Evidence): **47**, Kept
Rel 5 · Val 5 · Sco 4 · Ind 4 · Dis 5 · Evi 5 · Valu 5 · Uni 5 · Neu 4 · Clr 5

2. Strength of research (criterion 1, Evidence): **46**, Kept
Rel 5 · Val 4 · Sco 5 · Ind 4 · Dis 5 · Evi 5 · Valu 4 · Uni 4 · Neu 5 · Clr 5

3. Size of the benefit (criterion 2, Evidence): **46**, Kept
Rel 5 · Val 4 · Sco 4 · Ind 4 · Dis 5 · Evi 5 · Valu 5 · Uni 4 · Neu 5 · Clr 5

4. Works outside the lab (criterion 4, Evidence): **44**, Kept
Rel 5 · Val 4 · Sco 4 · Ind 4 · Dis 4 · Evi 4 · Valu 5 · Uni 4 · Neu 5 · Clr 5

5. Works across subjects (criterion 14, Range): **44**, Kept
Rel 5 · Val 4 · Sco 4 · Ind 4 · Dis 4 · Evi 4 · Valu 5 · Uni 4 · Neu 5 · Clr 5

6. Tested on adults (criterion 5, Evidence): **43**, Kept
Rel 5 · Val 4 · Sco 4 · Ind 4 · Dis 3 · Evi 5 · Valu 4 · Uni 4 · Neu 5 · Clr 5

7. Builds skills (criterion 16, Range): **43**, Kept
Rel 5 · Val 4 · Sco 3 · Ind 4 · Dis 4 · Evi 4 · Valu 5 · Uni 5 · Neu 4 · Clr 5

8. Improves self-judgment (criterion 17, Metalearning): **42**, Kept
Rel 5 · Val 4 · Sco 4 · Ind 4 · Dis 4 · Evi 4 · Valu 5 · Uni 4 · Neu 3 · Clr 5

9. Builds understanding (criterion 15, Range): **42**, Kept
Rel 5 · Val 4 · Sco 3 · Ind 3 · Dis 4 · Evi 4 · Valu 5 · Uni 5 · Neu 4 · Clr 5

10. Independent replication (criterion 21, Evidence): **41**, Kept
Rel 4 · Val 5 · Sco 4 · Ind 2 · Dis 4 · Evi 5 · Valu 3 · Uni 4 · Neu 5 · Clr 5

11. Keeps people going (criterion 18, Metalearning): **40**, Kept
Rel 5 · Val 3 · Sco 3 · Ind 4 · Dis 4 · Evi 3 · Valu 5 · Uni 4 · Neu 4 · Clr 5

12. Self-directed (criterion 8, Adult fit): **40**, Kept
Rel 5 · Val 4 · Sco 4 · Ind 3 · Dis 3 · Evi 3 · Valu 5 · Uni 4 · Neu 4 · Clr 5

13. Works at any age (criterion 9, Adult fit): **40**, Kept
Rel 5 · Val 4 · Sco 3 · Ind 3 · Dis 3 · Evi 3 · Valu 5 · Uni 4 · Neu 5 · Clr 5

14. Known mechanism (criterion 25, Evidence): **39**, Kept
Rel 4 · Val 4 · Sco 3 · Ind 4 · Dis 4 · Evi 4 · Valu 3 · Uni 5 · Neu 4 · Clr 4

15. Quick to learn the method (criterion 31, Practicality): **39**, Kept
Rel 4 · Val 4 · Sco 4 · Ind 4 · Dis 3 · Evi 3 · Valu 4 · Uni 4 · Neu 4 · Clr 5

16. Transfer to new situations (criterion 23, Range): **39**, Kept
Rel 5 · Val 4 · Sco 2 · Ind 3 · Dis 4 · Evi 3 · Valu 5 · Uni 5 · Neu 4 · Clr 4

17. Easy and affordable to start (criterion 11, Practicality): **39**, Kept
Rel 4 · Val 4 · Sco 4 · Ind 3 · Dis 3 · Evi 3 · Valu 5 · Uni 4 · Neu 5 · Clr 4

18. Meta-analytic support (criterion 22, Evidence): **39**, Kept
Rel 4 · Val 4 · Sco 5 · Ind 1 · Dis 4 · Evi 5 · Valu 3 · Uni 4 · Neu 4 · Clr 5

19. Scales from beginner to expert (criterion 34, Range): **37**, Kept
Rel 4 · Val 4 · Sco 2 · Ind 4 · Dis 3 · Evi 3 · Valu 4 · Uni 4 · Neu 4 · Clr 5

20. Low risk of misuse (criterion 32, Practicality): **37**, Kept
Rel 4 · Val 4 · Sco 3 · Ind 3 · Dis 4 · Evi 3 · Valu 4 · Uni 4 · Neu 4 · Clr 4

21. Fits a busy life (criterion 6, Adult fit): **37**, Dropped
Rel 5 · Val 3 · Sco 3 · Ind 3 · Dis 3 · Evi 2 · Valu 5 · Uni 4 · Neu 4 · Clr 5

22. Works in short sessions (criterion 26, Adult fit): **37**, Dropped
Rel 4 · Val 4 · Sco 3 · Ind 2 · Dis 3 · Evi 3 · Valu 5 · Uni 4 · Neu 4 · Clr 5

23. Low cost in money (criterion 30, Practicality): **37**, Dropped
Rel 3 · Val 5 · Sco 5 · Ind 1 · Dis 2 · Evi 3 · Valu 4 · Uni 4 · Neu 5 · Clr 5

24. No teacher needed (criterion 28, Adult fit): **36**, Dropped
Rel 4 · Val 4 · Sco 4 · Ind 1 · Dis 3 · Evi 3 · Valu 4 · Uni 4 · Neu 4 · Clr 5

25. Easy to check (criterion 12, Practicality): **35**, Dropped
Rel 4 · Val 4 · Sco 3 · Ind 3 · Dis 3 · Evi 2 · Valu 4 · Uni 4 · Neu 4 · Clr 4

26. Tested across cultures (criterion 24, Evidence): **34**, Dropped
Rel 4 · Val 4 · Sco 2 · Ind 2 · Dis 2 · Evi 3 · Valu 3 · Uni 5 · Neu 4 · Clr 5

27. Builds lifelong independence (criterion 38, Metalearning): **34**, Dropped
Rel 5 · Val 3 · Sco 2 · Ind 2 · Dis 3 · Evi 2 · Valu 5 · Uni 4 · Neu 4 · Clr 4

28. Combines well (criterion 13, Practicality): **33**, Dropped
Rel 4 · Val 3 · Sco 2 · Ind 4 · Dis 2 · Evi 2 · Valu 4 · Uni 4 · Neu 4 · Clr 4

29. Two roots (criterion 20, Roots): **33**, Dropped
Rel 3 · Val 4 · Sco 3 · Ind 3 · Dis 4 · Evi 3 · Valu 3 · Uni 4 · Neu 2 · Clr 4

30. Builds confidence (criterion 36, Metalearning): **33**, Dropped
Rel 4 · Val 3 · Sco 2 · Ind 3 · Dis 2 · Evi 3 · Valu 4 · Uni 4 · Neu 3 · Clr 5

31. Early visible results (criterion 33, Practicality): **33**, Dropped
Rel 3 · Val 2 · Sco 3 · Ind 3 · Dis 3 · Evi 3 · Valu 4 · Uni 4 · Neu 3 · Clr 5

32. Works when tired (criterion 27, Adult fit): **32**, Dropped
Rel 4 · Val 3 · Sco 1 · Ind 3 · Dis 2 · Evi 1 · Valu 5 · Uni 4 · Neu 4 · Clr 5

33. Suits returning learners (criterion 29, Adult fit): **32**, Dropped
Rel 4 · Val 3 · Sco 2 · Ind 2 · Dis 2 · Evi 2 · Valu 5 · Uni 4 · Neu 4 · Clr 4

34. Roots across many traditions (criterion 39, Roots): **32**, Dropped
Rel 3 · Val 3 · Sco 3 · Ind 2 · Dis 3 · Evi 3 · Valu 3 · Uni 5 · Neu 3 · Clr 4

35. Proven in practice over time (criterion 19, Metalearning): **32**, Dropped
Rel 4 · Val 2 · Sco 3 · Ind 2 · Dis 3 · Evi 3 · Valu 4 · Uni 4 · Neu 3 · Clr 4

36. Uses experience (criterion 7, Adult fit): **31**, Dropped
Rel 4 · Val 3 · Sco 2 · Ind 3 · Dis 3 · Evi 2 · Valu 4 · Uni 4 · Neu 2 · Clr 4

37. Supports problem-solving and creativity (criterion 35, Range): **31**, Dropped
Rel 4 · Val 3 · Sco 2 · Ind 1 · Dis 3 · Evi 2 · Valu 4 · Uni 4 · Neu 4 · Clr 4

38. Goes against instinct (criterion 10, Adult fit): **29**, Dropped
Rel 3 · Val 2 · Sco 3 · Ind 4 · Dis 2 · Evi 3 · Valu 3 · Uni 3 · Neu 2 · Clr 4

39. Enjoyable to do (criterion 37, Metalearning): **28**, Dropped
Rel 2 · Val 1 · Sco 3 · Ind 4 · Dis 1 · Evi 3 · Valu 3 · Uni 3 · Neu 3 · Clr 5

40. Popular with learners (criterion 40, Metalearning): **25**, Dropped
Rel 1 · Val 1 · Sco 4 · Ind 4 · Dis 1 · Evi 2 · Valu 2 · Uni 3 · Neu 2 · Clr 5

The reason for each score

1. Strength of research (46): Core evidence measure, easy to rate from the literature; Valid 4 because study count is not the same as study quality. Gate criterion.

2. Size of the benefit (46): Effect sizes are published for most strategies; Scorable 4 because the comparison method varies between studies.

3. Long-term retention (47): Sharply separates spacing and retrieval from cramming and rereading; Neutral 4 because it slightly favours memory strategies over motivation strategies. Gate criterion.

4. Works outside the lab (44): Classroom and workplace studies exist for many strategies but not all; directly reflects real adult success.

5. Tested on adults (43): Easy to check from study samples; Discriminating 3 because many strategies have at least some adult data.

6. Fits a busy life (37): Highly valuable to readers but judged mostly by analysis, not studies; overlaps 26.

7. Uses experience (31): Hard to rate consistently; Neutral 2 because it nearly restates strategy 6 (Connecting to What You Know).

8. Self-directed (40): Clear and important for adults; Independent 3 because 28 and 38 overlap it (8 is the stronger form, so it keeps the higher score).

9. Works at any age (40): Strong reader value; evidence across the 20s to 80s is uneven; overlaps 5.

10. Goes against instinct (29): Rewards being counterintuitive, not being effective (Valid 2) and favours the desirable-difficulty strategies (Neutral 2).

11. Easy and affordable to start (39): Practical and scorable; Clear 4 because it joins two ideas (ease and cost); 30 is its near-duplicate.

12. Easy to check (35): Useful but rated mostly by judgment; overlaps 32.

13. Combines well (33): Almost every strategy combines with others, so it barely discriminates; little direct evidence.

14. Works across subjects (44): Research tests many strategies in several domains; separates general methods from narrow tricks.

15. Builds understanding (42): Central to the book; Scorable 3 because studies measure recall more often than understanding; overlaps 23.

16. Builds skills (43): Covers performance, which memory-only criteria miss; skill outcomes are measured less often.

17. Improves self-judgment (42): Calibration research makes it scorable; Neutral 3 because it favours the self-judgment strategies (35–38).

18. Keeps people going (40): Persistence matters greatly to adults; Valid 3 because studies measure it in many different ways.

19. Proven in practice over time (32): Rereading has also 'served generations', so long use is not proof (Valid 2); overlaps 20 and 39.

20. Two roots (33): Defines the book's identity rather than learning success (Relevant 3) and favours strategies with ancient sources (Neutral 2). Kept as a pass/fail gate instead.

21. Independent replication (41): Very valid quality signal, but largely contained in 1, so Independent is lowered to 2.

22. Meta-analytic support (39): Easiest of all to score, but overlaps both 1 and 2 (Independent 1); favours well-studied lab strategies.

23. Transfer to new situations (39): One of the most valuable outcomes, but transfer studies are scarce and mixed, so it is hard to score.

24. Tested across cultures (34): Most research comes from a few Western countries, so nearly every strategy would score low (Discriminating 2); overlaps 9.

25. Known mechanism (39): Distinct from outcome criteria and filters out fads; mechanism is still debated for some strategies.

26. Works in short sessions (37): More measurable than 6 but sits inside it (Independent 2).

27. Works when tired (32): Real adult concern but almost no research tests strategies under fatigue (Scorable 1, Evidence 1).

28. No teacher needed (36): Near-duplicate of 8 (Independent 1).

29. Suits returning learners (32): Valuable idea but thin evidence; overlaps 7 and 9.

30. Low cost in money (37): Perfectly measurable, but nearly every strategy is free (Discriminating 2) and it duplicates 11 (Independent 1).

31. Quick to learn the method (39): Distinct and easy to rate from how long each method takes to teach; judged partly by analysis.

32. Low risk of misuse (37): Separates robust methods from ones learners commonly do wrong (e.g. highlighting); overlaps 12.

33. Early visible results (33): Early gains can mislead: desirable difficulties often look worse in the short run (Valid 2); overlaps 18.

34. Scales from beginner to expert (37): Distinct idea supported by expertise-reversal research, but few strategies are tested across levels.

35. Supports problem-solving and creativity (31): Largely contained in 23 (Independent 1) and hard to measure.

36. Builds confidence (33): Confidence is not competence; can reward strategies that feel good; overlaps 18.

37. Enjoyable to do (28): Deliberate test. Some of the best methods feel unpleasant, so it measures comfort, not learning (Valid 1, Discriminating 1).

38. Builds lifelong independence (34): Very valuable aim but long-term evidence is rare; overlaps 8 and 17.

39. Roots across many traditions (32): Strong on Universal but not directly tied to learning success; overlaps 19 and 20.

40. Popular with learners (25): Deliberate test. Rereading and highlighting are popular yet weak, so popularity rewards the controls (Valid 1, Neutral 2).

What step 2 showed

- **The deliberate tests failed, as they should.** Popular with learners (25), Enjoyable to do (28) and Goes against instinct (29) finished in the bottom three.
- **Seven of the 20 working criteria were dropped:** Fits a busy life, Uses experience, Goes against instinct, Easy to check, Combines well, Proven in practice over time, and Two roots.
- **Seven new candidates took their places:** Independent replication, Meta-analytic support, Transfer to new situations, Known mechanism, Quick to learn the method, Low risk of misuse, and Scales from beginner to expert.
- **Both criteria used in the evidence gate survived easily.** Long-term retention ranked 1st and Strength of research 2nd.

Four decisions made after step 2

The raw top 20 had three problems. Each was fixed by a decision that is recorded here, so you can judge it.

1. **Two roots became a gate, not a criterion.** The book promises that every strategy has both a philosophical root and psychology evidence. But "Two roots" ranked only 29th. It lost on Relevant, because it measures the book's identity rather than how well a strategy helps people learn, and on Neutral, because it favors strategies with ancient sources. Rather than protect it, the method keeps it as a pass/fail **gate**: a rule about what the book may include, not a measure of quality. It is still rated 1–5 (passing at 3), but it never adds to a strategy's total.
2. **Research strength is counted once.** Strength of research, Independent replication and Meta-analytic support all survived. Together they would have counted the same thing three times. Independent replication and Meta-analytic support were folded into the scoring guide for Strength of research: a 5 now requires both.
3. **Fits a busy life returned, merged with Works in short sessions.** Fits a busy life tied at 37 with four other criteria and lost the tie-break because Works in short sessions overlapped it. Merging the two removed the overlap and gave one clearer criterion.
4. **The two freed places went to the merged Fits a busy life and to Easy to check.** Low cost in money and No teacher needed ranked higher, but were skipped as near-duplicates of Easy and affordable to start and Self-directed.

One more note: Transfer to new situations and Scales from beginner to expert survived with low Scorable ratings. Their scoring guides below were written with care, and some strategy scores on them rest on thin evidence.

---

4. The final 20 criteria and their scoring guides

After the decisions above, these 20 criteria were kept and renumbered 1–20. They fall into five groups.

How to read the scoring guides

Each criterion is scored 1–5. The guide fixes what 5, 3 and 1 mean; 4 and 2 fall between. Every score is judged from published evidence. Where the evidence is thin, the score is lowered, never guessed upward.

Evidence

1. Strength of research. How many well-designed studies support the strategy, including independent replication and meta-analysis. - **5:** Many controlled studies, replicated by independent teams, confirmed by at least one meta-analysis or systematic review. - **3:** Several controlled studies with mostly positive results, but limited replication or no meta-analysis. - **1:** Few or no controlled studies, or the studies show no benefit.

2. Size of the benefit. How large the improvement is, compared with common methods such as rereading. - **5:** Large, reliable gains over common methods (typically d about 0.6 or more). - **3:** Moderate gains (around d about 0.3–0.5), or large gains only in some conditions. - **1:** No gain, a trivial gain, or a gain only against doing nothing.

3. Long-term retention. Whether gains last weeks or months, not just hours. - **5:** Benefits shown on tests a month or more later. - **3:** Benefits shown a day to a week later, or long-term evidence is thin but positive. For strategies that act indirectly (body, motivation), positive evidence on delayed learning outcomes. - **1:** Gains fade within hours or days, or no delayed tests exist and no mechanism links it to lasting learning.

4. Works outside the lab. Whether it helps in real classrooms, jobs and daily life. - **5:** Field studies (classrooms, workplaces, training) confirm the lab results. - **3:** Some field evidence, or field results weaker than lab results. - **1:** Lab-only evidence, or field studies show no benefit.

5. Tested on adults. Whether studies include adults beyond school age, not only children or students. - **5:** Many studies with working-age and older adults. - **3:** Mostly college students, with a few studies of older adults. - **1:** Children or school pupils only.

6. Known mechanism. Whether science can explain why the strategy works. - **5:** A well-tested explanation in memory, attention or skill research. - **3:** Plausible explanations, still debated. - **1:** No accepted explanation, or the proposed one has been disproved.

Adult fit

7. Fits a busy life. Whether it works within limited, irregular adult time, including short sessions of 10–20 minutes. - **5:** Works in short, scattered sessions and adds little or no extra time. - **3:** Needs regular blocks of time or some planning, but fits most weeks. - **1:** Needs long, protected time, a fixed schedule or conditions most adults cannot control.

8. Self-directed. Whether an adult can use it alone, without a teacher, class or institution. - **5:** Fully usable alone with ordinary materials. - **3:** Usable alone with prepared materials or occasional help. - **1:** Needs a teacher, coach, group or institution.

9. Works at any age. Whether it helps adults from their 20s through their 80s. - **5:** Benefits shown, or strongly expected from the mechanism, across the adult age range, including older adults. - **3:** Benefits shown in younger adults; older adults untested or benefit less. - **1:** Benefit shrinks sharply or disappears with age.

Practicality

10. Easy and affordable to start. Whether it needs little money, equipment or setup. - **5:** Free or nearly free; can start today with no setup. - **3:** Modest cost or some setup (an app, a course, a partner). - **1:** Significant cost, equipment, or hard-to-find resources.

11. Easy to check. Whether a learner can see if they are doing it right. - **5:** Clear, built-in signs of correct use (a score, a match, a yes or no). - **3:** Can be checked with some effort or a simple rubric. - **1:** No practical way for the learner to tell.

12. Quick to learn the method. Whether the strategy itself can be learned in under an hour. - **5:** Learnable in minutes. - **3:** Learnable in about an hour, or needs a few practice sessions. - **1:** Needs weeks of training before it helps.

13. Low risk of misuse. Whether a learner is unlikely to do it wrong in a way that harms learning. - **5:** Hard to do wrongly; mistakes still help. - **3:** Common mistakes reduce the benefit but rarely harm. - **1:** Commonly misused in ways that waste time or harm learning.

Range

14. Works across subjects. Whether it helps in many fields, not just one. - **5:** Shown in many subjects (languages, sciences, history, practical skills). - **3:** Shown in a few related fields. - **1:** Works in one narrow kind of material only.

15. Builds understanding. Whether it deepens understanding, not just recall. - **5:** Shown to improve inference, explanation or conceptual tests. - **3:** Mainly improves recall, with some evidence on understanding. - **1:** Improves recall of isolated items only, or nothing.

16. Builds skills. Whether it improves performance, not only knowledge. - **5:** Shown to improve motor, procedural or professional performance. - **3:** Some evidence of skill gains, or skills benefit indirectly. - **1:** Knowledge only, or no evidence on skills.

17. Transfer to new situations. Whether learning carries over to new problems and settings. - **5:** Shown on new problems or settings unlike those practiced. - **3:** Near transfer (similar problems) shown. - **1:** No transfer shown, or gains tied to the practiced items.

18. Scales from beginner to expert. Whether it stays useful as the learner advances. - **5:** Useful at every level, often more so with expertise. - **3:** Useful mainly at one stage but adaptable. - **1:** Helps beginners only, or harms advanced learners.

Metalearning

19. Improves self-judgment. Whether it helps learners judge accurately what they know. - **5:** Shown to improve calibration or monitoring accuracy. - **3:** Gives learners some feedback on what they know. - **1:** No effect on self-judgment, or it creates false confidence.

20. Keeps people going. Whether it helps learners keep studying over months. - **5:** Shown to increase persistence, completion or sustained effort. - **3:** Neutral to motivation, or helps through visible gains. - **1:** Feels aversive enough that many adults stop.

The three gates

A strategy must pass all three gates to become a chapter.

- **Evidence gate:** at least 3 on Strength of research and at least 3 on Long-term retention.
- **Two-roots gate:** at least 3 on this scale: 5 = a named thinker and text that clearly taught this practice, plus psychology evidence; 3 = a thinker who taught something close to it, or a lineage that needs care in the telling, plus psychology evidence; 1 = no real philosophical lineage.
- **No-myths gate:** debunked ideas, such as learning styles, are excluded, alone or inside a merged chapter.

How the gates apply to merged chapters

Some strategies are so closely related that a reader would use them together. For these, the method allows a **merged chapter**. The rule, stated in full:

1. Every strategy is first scored on its own, and those scores are published (section 6).
2. Closely related strategies may then be combined into a merged chapter, which is scored on all 20 criteria as one entry. Those scores are published too (section 7).
3. The evidence and two-roots gates apply to the final chapter. A strategy that fails a gate on its own may enter the book **only as part of a merged chapter that passes every gate**. It never becomes a chapter on its own.
4. The no-myths gate is never softened. A myth cannot enter as part of any chapter.

This rule matters, and critics should look at it closely. Section 8 lists every strategy that entered only this way.

---

5. The 60 candidate strategies

The pool holds 60 strategies, each placed under one of the book's 10 first principles: the things that must happen in the mind for anything to be learned. The pool includes 53 genuine candidates, 6 **controls** (popular study habits expected to score low) and 1 **myth** (expected to be excluded). The controls and the myth are there to test whether the method filters.

Principle 1: You learn only what you attend to

#	Strategy	What it is	Role
1	Focused Attention	One task, full attention, set period, calm return when the mind wanders.	Candidate
2	Session Goals	Deciding in one sentence what you will learn before each session.	Candidate
3	Curiosity and Pre-Questions	Raising questions before study so the mind hunts for answers.	Candidate
4	Mindfulness Training	Regular practice in noticing and steadying attention.	Candidate
5	Managing Cognitive Load	Breaking material into manageable pieces so working memory is not overloaded.	Candidate

Principle 2: Memory stores meaning linked to what you know

#	Strategy	What it is	Role
6	Connecting to What You Know	Asking why and how, and tying new ideas to existing knowledge and experience.	Candidate
7	Words Plus Pictures	Pairing words with images, diagrams or timelines (dual coding).	Candidate
8	Memory Palace	Placing vivid images along a familiar route to recall them in order.	Candidate
9	Mnemonic Devices	First-letter cues, rhymes, keywords and number pegs for lists and terms.	Candidate
10	Chunking	Grouping many items into a few meaningful units.	Candidate
11	Concrete Examples	Learning an abstract idea through several real cases, then naming what they share.	Candidate

#	Strategy	What it is	Role
12	Analogy and Comparison	Comparing a new idea with a known one, or two cases side by side.	Candidate
13	Saying It Aloud	Reading or explaining key points out loud (the production effect).	Candidate
14	Gesture and Enactment	Acting out, gesturing or physically doing what you learn.	Candidate
15	Highlighting	Marking key passages with a highlighter or underline.	Control

Principle 3: Pulling knowledge out builds memory

#	Strategy	What it is	Role
16	Retrieval Practice	Recalling from memory: self-tests, blank-page recall, practice tests.	Candidate
17	Try Before You Are Told	Attempting answers or problems before being taught (generation, pretesting, productive failure).	Candidate
18	Rereading	Reading the same material again.	Control
19	Learning-Style Matching	Studying in one's supposed style (visual, auditory, hands-on).	Myth

Principle 4: Forgetting is normal; timing beats it

#	Strategy	What it is	Role
20	Spaced Practice	Spreading study and review across days, weeks and months.	Candidate
21	Interleaving	Mixing problem types or topics in one session.	Candidate
22	Varied Practice	Practicing in changing conditions, settings and forms.	Candidate
23	Overlearning	Continuing practice well past first mastery in one session.	Control

Principle 5: Skills grow through targeted practice with feedback

#	Strategy	What it is	Role
24	Deliberate Practice	Focused work on a specific weak point, just beyond	Candidate

#	Strategy	What it is	Role
		current ability.	
25	Feedback and Error Correction	Fast, specific information on errors, used through a mistake log.	Candidate
26	Copy, Rebuild, Compare	Studying expert work, rebuilding it from memory, comparing the two.	Candidate
27	Mental Rehearsal	Practicing a skill in the mind before doing it.	Candidate

Principle 6: Understanding means a usable mental model

#	Strategy	What it is	Role
28	Socratic Self-Questioning	Questioning your own understanding step by step until the weak points show.	Candidate
29	Self-Explanation	Explaining to yourself, in plain words, why each step is true.	Candidate
30	Worked Examples, Then Fewer Hints	Studying solved examples, then gradually solving more yourself.	Candidate
31	Mapping the Subject	Building an overview of how a subject's ideas fit together.	Candidate
32	First-Principles Reasoning	Breaking a subject into basic truths and rebuilding from them.	Candidate
33	Structured Note-Taking	Taking organized notes in your own words during study.	Candidate
34	Summarization	Condensing material into a short summary.	Control

Principle 7: Learners misjudge what they know

#	Strategy	What it is	Role
35	Predict, Then Check	Predicting your score or recall, then comparing it with the result.	Candidate
36	Plan, Monitor, Evaluate	A cycle each session: plan the goal, monitor understanding, evaluate afterward.	Candidate
37	Learning Journal	Writing regularly about what you learned, what worked and what to change.	Candidate

#	Strategy	What it is	Role
38	Source Checking	Judging whether information is reliable, by checking other sources (lateral reading).	Candidate

Principle 8: The brain runs on the body

#	Strategy	What it is	Role
39	Protecting Sleep	Enough nightly sleep, especially after learning.	Candidate
40	Strategic Naps	Short daytime naps after learning.	Candidate
41	Regular Exercise	Ongoing physical activity, plus movement around study sessions.	Candidate
42	Rest and Breaks	Planned short breaks and quiet rest after learning.	Candidate
43	Managing Stress	Simple methods to calm stress around study and tests.	Candidate
44	Daily Rhythms	Daylight, regular sleep times and studying at your peak hours.	Candidate

Principle 9: Learning needs showing up despite adult life

#	Strategy	What it is	Role
45	Habits and If-Then Plans	Fixed times and places, set with 'If X, then I will Y' plans.	Candidate
46	Environment Design	Arranging your space so studying is the easy, cued option.	Candidate
47	Purposeful Projects	Learning by building or doing something real that you care about.	Candidate
48	Intrinsic Motivation	Choosing learning that connects to your own values and interests.	Candidate
49	Small Wins	Building self-efficacy through early, achievable successes.	Candidate
50	Visible Progress	Tracking and seeing progress to fuel continued effort.	Candidate
51	Reframing Struggle	Treating confusion and effort as signs of learning, not failure.	Candidate
52	Learner Identity	Seeing yourself as 'someone who learns' as part of who you	Candidate

#	Strategy	What it is	Role
		are.	
53	Growth Mindset	Believing abilities can grow with effort and good strategies.	Control
54	Grit	Sustained passion and persistence toward long-term goals.	Control

Principle 10: Other people and tools multiply learning

#	Strategy	What it is	Role
55	Learning by Teaching	Preparing to teach, and explaining what you learned to others.	Candidate
56	Study Partners and Groups	Studying with others: discussing, questioning and testing each other.	Candidate
57	Writing to Learn	Writing summaries, questions and links in a commonplace book.	Candidate
58	AI Tutoring	Using AI to question you, quiz you and guide you, without giving answers.	Candidate
59	Mentors and Apprenticeship	Learning under a skilled person who models, coaches and hands over the work.	Candidate
60	Learning in Public	Sharing what you learn openly, through posts, talks or demonstrations.	Candidate

6. Step 3: scoring the 60 strategies

Each of the 60 strategies was scored on its own, 1–5 on each of the 20 criteria, for a maximum of 100 and 1,200 scores in all.

Order: by total. Ties are broken by Strength of research, then Long-term retention, then Size of the benefit.

How to read each entry: the strategy's rank and number, its total out of 100, its gate results, then its 20 scores grouped as in section 4 (criteria 1–20). Roots is the two-roots gate score (pass at 3; not counted in the total).

1. Retrieval Practice (#16, Candidate): **88** · evidence gate passed · roots 4 · Passes
Evidence: 1=5 · 2=5 · 3=5 · 4=5 · 5=4 · 6=4
Adult fit: 7=5 · 8=5 · 9=4
Practicality: 10=5 · 11=5 · 12=5 · 13=4
Range: 14=5 · 15=4 · 16=4 · 17=3 · 18=4
Metalearning: 19=4 · 20=3

2. Spaced Practice (#20, Candidate): **87** · evidence gate passed · roots 3 · Passes
Evidence: 1=5 · 2=5 · 3=5 · 4=5 · 5=5 · 6=4
Adult fit: 7=5 · 8=5 · 9=5
Practicality: 10=5 · 11=4 · 12=5 · 13=4
Range: 14=5 · 15=3 · 16=5 · 17=3 · 18=4
Metalearning: 19=2 · 20=3

3. Protecting Sleep (#39, Candidate): **82** · evidence gate passed · roots 3 · Passes
Evidence: 1=5 · 2=4 · 3=5 · 4=4 · 5=5 · 6=5
Adult fit: 7=2 · 8=5 · 9=4
Practicality: 10=5 · 11=4 · 12=5 · 13=5
Range: 14=5 · 15=3 · 16=5 · 17=3 · 18=4
Metalearning: 19=1 · 20=3

4. Feedback and Error Correction (#25, Candidate): **80** · evidence gate passed · roots 3 · Passes
Evidence: 1=5 · 2=4 · 3=4 · 4=5 · 5=4 · 6=4
Adult fit: 7=4 · 8=3 · 9=4
Practicality: 10=4 · 11=4 · 12=4 · 13=2
Range: 14=5 · 15=4 · 16=5 · 17=3 · 18=5
Metalearning: 19=4 · 20=3

5. Learning by Teaching (#55, Candidate): **77** · evidence gate passed · roots 5 · Passes
Evidence: 1=4 · 2=4 · 3=4 · 4=4 · 5=3 · 6=4
Adult fit: 7=3 · 8=3 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=4
Range: 14=5 · 15=5 · 16=3 · 17=3 · 18=4
Metalearning: 19=4 · 20=4

6. Focused Attention (#1, Candidate): **77** · evidence gate passed · roots 5 · Passes
Evidence: 1=4 · 2=4 · 3=3 · 4=4 · 5=4 · 6=5
Adult fit: 7=4 · 8=5 · 9=4
Practicality: 10=5 · 11=3 · 12=5 · 13=4
Range: 14=5 · 15=3 · 16=4 · 17=2 · 18=4
Metalearning: 19=2 · 20=3

7. Connecting to What You Know (#6, Candidate): **77** · evidence gate passed · roots 5 · Passes
Evidence: 1=4 · 2=3 · 3=3 · 4=4 · 5=4 · 6=5
Adult fit: 7=4 · 8=5 · 9=5
Practicality: 10=5 · 11=3 · 12=4 · 13=4
Range: 14=4 · 15=5 · 16=2 · 17=3 · 18=5
Metalearning: 19=2 · 20=3

8. Habits and If-Then Plans (#45, Candidate): **77** · evidence gate failed · roots 5 · Fails evidence
Evidence: 1=4 · 2=4 · 3=2 · 4=5 · 5=5 · 6=4
Adult fit: 7=5 · 8=5 · 9=5
Practicality: 10=5 · 11=5 · 12=5 · 13=4
Range: 14=5 · 15=1 · 16=2 · 17=1 · 18=3
Metalearning: 19=2 · 20=5

9. Plan, Monitor, Evaluate (#36, Candidate): **75** · evidence gate passed · roots 4 · Passes
Evidence: 1=4 · 2=4 · 3=3 · 4=4 · 5=4 · 6=3
Adult fit: 7=3 · 8=5 · 9=4
Practicality: 10=5 · 11=3 · 12=3 · 13=3
Range: 14=5 · 15=3 · 16=3 · 17=3 · 18=4
Metalearning: 19=5 · 20=4

10. Session Goals (#2, Candidate): **75** · evidence gate failed · roots 3 · Fails evidence
Evidence: 1=3 · 2=3 · 3=2 · 4=4 · 5=4 · 6=4
Adult fit: 7=5 · 8=5 · 9=4
Practicality: 10=5 · 11=4 · 12=5 · 13=4
Range: 14=5 · 15=2 · 16=3 · 17=2 · 18=4
Metalearning: 19=3 · 20=4

11. Worked Examples, Then Fewer Hints (#30, Candidate): **74** · evidence gate passed · roots 2 · Fails roots
Evidence: 1=5 · 2=4 · 3=3 · 4=4 · 5=4 · 6=5
Adult fit: 7=4 · 8=3 · 9=4
Practicality: 10=5 · 11=4 · 12=4 · 13=4
Range: 14=3 · 15=4 · 16=4 · 17=3 · 18=2
Metalearning: 19=2 · 20=3

12. Managing Cognitive Load (#5, Candidate): **73** · evidence gate passed · roots 2 · Fails roots
Evidence: 1=5 · 2=4 · 3=3 · 4=4 · 5=4 · 6=5
Adult fit: 7=4 · 8=3 · 9=4
Practicality: 10=5 · 11=3 · 12=3 · 13=4
Range: 14=4 · 15=4 · 16=4 · 17=3 · 18=2
Metalearning: 19=2 · 20=3

13. Try Before You Are Told (#17, Candidate): **73** · evidence gate passed · roots 4 · Passes
Evidence: 1=4 · 2=4 · 3=4 · 4=4 · 5=3 · 6=4
Adult fit: 7=4 · 8=4 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=3
Range: 14=4 · 15=4 · 16=3 · 17=4 · 18=3
Metalearning: 19=3 · 20=2

14. Analogy and Comparison (#12, Candidate): **73** · evidence gate passed · roots 4 · Passes
Evidence: 1=4 · 2=4 · 3=3 · 4=3 · 5=3 · 6=4
Adult fit: 7=4 · 8=4 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=3
Range: 14=5 · 15=5 · 16=3 · 17=4 · 18=4
Metalearning: 19=1 · 20=3

15. Self-Explanation (#29, Candidate): **73** · evidence gate passed · roots 3 · Passes
Evidence: 1=4 · 2=4 · 3=3 · 4=3 · 5=3 · 6=4
Adult fit: 7=4 · 8=5 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=3
Range: 14=4 · 15=5 · 16=3 · 17=4 · 18=3
Metalearning: 19=3 · 20=2

16. Visible Progress (#50, Candidate): **73** · evidence gate failed · roots 4 · Fails evidence
Evidence: 1=3 · 2=3 · 3=2 · 4=4 · 5=4 · 6=3
Adult fit: 7=5 · 8=5 · 9=5
Practicality: 10=5 · 11=5 · 12=5 · 13=3
Range: 14=5 · 15=1 · 16=2 · 17=1 · 18=4
Metalearning: 19=3 · 20=5

17. Predict, Then Check (#35, Candidate): **73** · evidence gate failed · roots 4 · Fails evidence
Evidence: 1=3 · 2=2 · 3=2 · 4=3 · 5=3 · 6=4
Adult fit: 7=5 · 8=5 · 9=4
Practicality: 10=5 · 11=5 · 12=5 · 13=4
Range: 14=5 · 15=2 · 16=2 · 17=2 · 18=4
Metalearning: 19=5 · 20=3

18. Source Checking (#38, Candidate): **72** · evidence gate passed · roots 4 · Passes
Evidence: 1=3 · 2=4 · 3=3 · 4=4 · 5=3 · 6=3
Adult fit: 7=4 · 8=5 · 9=4
Practicality: 10=5 · 11=4 · 12=5 · 13=3
Range: 14=4 · 15=3 · 16=4 · 17=3 · 18=3
Metalearning: 19=3 · 20=2

19. Small Wins (#49, Candidate): **72** · evidence gate failed · roots 3 · Fails evidence
Evidence: 1=3 · 2=3 · 3=2 · 4=4 · 5=4 · 6=4
Adult fit: 7=5 · 8=5 · 9=5
Practicality: 10=5 · 11=4 · 12=5 · 13=4
Range: 14=5 · 15=1 · 16=2 · 17=1 · 18=3
Metalearning: 19=2 · 20=5

20. Interleaving (#21, Candidate): **71** · evidence gate passed · roots 2 · Fails roots
Evidence: 1=4 · 2=4 · 3=4 · 4=4 · 5=3 · 6=3
Adult fit: 7=4 · 8=4 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=3
Range: 14=3 · 15=4 · 16=4 · 17=4 · 18=3
Metalearning: 19=2 · 20=2

21. Concrete Examples (#11, Candidate): **71** · evidence gate passed · roots 3 · Passes
Evidence: 1=4 · 2=3 · 3=3 · 4=3 · 5=3 · 6=4
Adult fit: 7=4 · 8=4 · 9=4
Practicality: 10=5 · 11=3 · 12=5 · 13=3
Range: 14=5 · 15=5 · 16=2 · 17=4 · 18=3
Metalearning: 19=1 · 20=3

22. Writing to Learn (#57, Candidate): **71** · evidence gate passed · roots 5 · Passes
Evidence: 1=4 · 2=2 · 3=3 · 4=4 · 5=3 · 6=3
Adult fit: 7=4 · 8=5 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=3
Range: 14=5 · 15=4 · 16=2 · 17=3 · 18=4
Metalearning: 19=3 · 20=3

23. Chunking (#10, Candidate): **71** · evidence gate passed · roots 2 · Fails roots
Evidence: 1=3 · 2=3 · 3=3 · 4=3 · 5=3 · 6=5
Adult fit: 7=4 · 8=4 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=4
Range: 14=4 · 15=4 · 16=4 · 17=3 · 18=5
Metalearning: 19=1 · 20=2

24. Mentors and Apprenticeship (#59, Candidate): **71** · evidence gate passed · roots 5 · Passes
Evidence: 1=3 · 2=3 · 3=3 · 4=5 · 5=5 · 6=3
Adult fit: 7=3 · 8=1 · 9=4
Practicality: 10=2 · 11=4 · 12=3 · 13=3
Range: 14=4 · 15=4 · 16=5 · 17=3 · 18=5
Metalearning: 19=4 · 20=4

25. Words Plus Pictures (#7, Candidate): **70** · evidence gate passed · roots 3 · Passes
Evidence: 1=4 · 2=4 · 3=3 · 4=4 · 5=4 · 6=4
Adult fit: 7=4 · 8=4 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=3
Range: 14=4 · 15=4 · 16=2 · 17=3 · 18=3
Metalearning: 19=1 · 20=3

26. Curiosity and Pre-Questions (#3, Candidate): **70** · evidence gate passed · roots 4 · Passes
Evidence: 1=3 · 2=3 · 3=3 · 4=3 · 5=3 · 6=4
Adult fit: 7=4 · 8=5 · 9=4
Practicality: 10=5 · 11=3 · 12=5 · 13=4
Range: 14=4 · 15=3 · 16=2 · 17=2 · 18=4
Metalearning: 19=2 · 20=4

27. Socratic Self-Questioning (#28, Candidate): **70** · evidence gate passed · roots 5 · Passes
Evidence: 1=3 · 2=3 · 3=3 · 4=3 · 5=3 · 6=3
Adult fit: 7=4 · 8=4 · 9=4
Practicality: 10=5 · 11=3 · 12=3 · 13=3
Range: 14=5 · 15=5 · 16=2 · 17=3 · 18=4
Metalearning: 19=4 · 20=3

28. Regular Exercise (#41, Candidate): **69** · evidence gate passed · roots 4 · Passes
Evidence: 1=4 · 2=3 · 3=3 · 4=3 · 5=5 · 6=4
Adult fit: 7=3 · 8=5 · 9=5
Practicality: 10=4 · 11=4 · 12=4 · 13=4
Range: 14=5 · 15=2 · 16=2 · 17=2 · 18=3
Metalearning: 19=1 · 20=3

29. Varied Practice (#22, Candidate): **69** · evidence gate passed · roots 2 · Fails roots
Evidence: 1=3 · 2=3 · 3=3 · 4=3 · 5=3 · 6=3
Adult fit: 7=4 · 8=4 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=4
Range: 14=3 · 15=3 · 16=5 · 17=4 · 18=4
Metalearning: 19=1 · 20=3

30. Deliberate Practice (#24, Candidate): **69** · evidence gate passed · roots 4 · Passes
Evidence: 1=3 · 2=3 · 3=3 · 4=5 · 5=5 · 6=3
Adult fit: 7=3 · 8=3 · 9=4
Practicality: 10=3 · 11=4 · 12=3 · 13=3
Range: 14=4 · 15=3 · 16=5 · 17=2 · 18=5
Metalearning: 19=3 · 20=2

31. Intrinsic Motivation (#48, Candidate): **69** · evidence gate failed · roots 3 · Fails evidence
Evidence: 1=3 · 2=3 · 3=2 · 4=4 · 5=4 · 6=3
Adult fit: 7=3 · 8=5 · 9=5
Practicality: 10=5 · 11=2 · 12=3 · 13=4
Range: 14=5 · 15=3 · 16=2 · 17=2 · 18=4
Metalearning: 19=2 · 20=5

32. Reframing Struggle (#51, Candidate): **69** · evidence gate failed · roots 5 · Fails evidence
Evidence: 1=3 · 2=3 · 3=2 · 4=3 · 5=3 · 6=3
Adult fit: 7=5 · 8=5 · 9=4
Practicality: 10=5 · 11=2 · 12=5 · 13=4
Range: 14=5 · 15=2 · 16=2 · 17=2 · 18=4
Metalearning: 19=3 · 20=4

33. Copy, Rebuild, Compare (#26, Candidate): **69** · evidence gate failed · roots 5 · Fails evidence
Evidence: 1=2 · 2=3 · 3=3 · 4=3 · 5=3 · 6=3
Adult fit: 7=3 · 8=5 · 9=4
Practicality: 10=5 · 11=5 · 12=4 · 13=4
Range: 14=3 · 15=3 · 16=4 · 17=2 · 18=3
Metalearning: 19=4 · 20=3

34. Mapping the Subject (#31, Candidate): **68** · evidence gate passed · roots 3 · Passes
Evidence: 1=4 · 2=3 · 3=3 · 4=3 · 5=3 · 6=3
Adult fit: 7=3 · 8=5 · 9=4
Practicality: 10=5 · 11=3 · 12=3 · 13=3
Range: 14=4 · 15=5 · 16=1 · 17=3 · 18=4
Metalearning: 19=3 · 20=3

35. Learning Journal (#37, Candidate): **68** · evidence gate passed · roots 5 · Passes
Evidence: 1=3 · 2=3 · 3=3 · 4=3 · 5=3 · 6=3
Adult fit: 7=3 · 8=5 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=3
Range: 14=4 · 15=3 · 16=2 · 17=2 · 18=4
Metalearning: 19=4 · 20=4

36. Purposeful Projects (#47, Candidate): **68** · evidence gate passed · roots 4 · Passes
Evidence: 1=3 · 2=3 · 3=3 · 4=5 · 5=3 · 6=2
Adult fit: 7=2 · 8=4 · 9=4
Practicality: 10=3 · 11=3 · 12=3 · 13=2
Range: 14=4 · 15=4 · 16=5 · 17=4 · 18=4
Metalearning: 19=2 · 20=5

37. Structured Note-Taking (#33, Candidate): **67** · evidence gate passed · roots 3 · Passes
Evidence: 1=4 · 2=3 · 3=3 · 4=4 · 5=3 · 6=3
Adult fit: 7=4 · 8=5 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=3
Range: 14=5 · 15=3 · 16=1 · 17=2 · 18=3
Metalearning: 19=2 · 20=3

38. Study Partners and Groups (#56, Candidate): **67** · evidence gate passed · roots 5 · Passes
Evidence: 1=4 · 2=3 · 3=3 · 4=4 · 5=2 · 6=3
Adult fit: 7=2 · 8=2 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=2
Range: 14=5 · 15=4 · 16=3 · 17=3 · 18=3
Metalearning: 19=3 · 20=5

39. Rest and Breaks (#42, Candidate): **67** · evidence gate passed · roots 3 · Passes
Evidence: 1=3 · 2=2 · 3=3 · 4=3 · 5=3 · 6=3
Adult fit: 7=5 · 8=5 · 9=4
Practicality: 10=5 · 11=4 · 12=5 · 13=5
Range: 14=4 · 15=1 · 16=3 · 17=1 · 18=3
Metalearning: 19=1 · 20=4

40. Environment Design (#46, Candidate): **67** · evidence gate failed · roots 2 · Fails evidence and roots
Evidence: 1=3 · 2=3 · 3=2 · 4=4 · 5=4 · 6=3
Adult fit: 7=5 · 8=5 · 9=5
Practicality: 10=4 · 11=4 · 12=5 · 13=5
Range: 14=5 · 15=1 · 16=1 · 17=1 · 18=2
Metalearning: 19=1 · 20=4

41. Mental Rehearsal (#27, Candidate): **65** · evidence gate failed · roots 3 · Fails evidence
Evidence: 1=4 · 2=3 · 3=2 · 4=4 · 5=4 · 6=3
Adult fit: 7=5 · 8=5 · 9=4
Practicality: 10=5 · 11=1 · 12=4 · 13=3
Range: 14=2 · 15=2 · 16=4 · 17=2 · 18=4
Metalearning: 19=1 · 20=3

42. Saying It Aloud (#13, Candidate): **64** · evidence gate passed · roots 3 · Passes
Evidence: 1=4 · 2=2 · 3=3 · 4=2 · 5=4 · 6=4
Adult fit: 7=4 · 8=5 · 9=4
Practicality: 10=5 · 11=4 · 12=5 · 13=4
Range: 14=4 · 15=2 · 16=2 · 17=1 · 18=2
Metalearning: 19=1 · 20=2

43. Managing Stress (#43, Candidate): **64** · evidence gate failed · roots 5 · Fails evidence
Evidence: 1=3 · 2=3 · 3=2 · 4=4 · 5=3 · 6=4
Adult fit: 7=4 · 8=5 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=4
Range: 14=4 · 15=1 · 16=2 · 17=1 · 18=3
Metalearning: 19=1 · 20=4

44. AI Tutoring (#58, Candidate): **63** · evidence gate failed · roots 1 · Fails evidence and roots
Evidence: 1=2 · 2=3 · 3=2 · 4=3 · 5=2 · 6=2
Adult fit: 7=5 · 8=5 · 9=3
Practicality: 10=4 · 11=3 · 12=4 · 13=1
Range: 14=5 · 15=3 · 16=3 · 17=2 · 18=4
Metalearning: 19=3 · 20=4

45. Memory Palace (#8, Candidate): **62** · evidence gate passed · roots 5 · Passes
Evidence: 1=4 · 2=5 · 3=4 · 4=2 · 5=4 · 6=4
Adult fit: 7=3 · 8=5 · 9=3
Practicality: 10=5 · 11=5 · 12=2 · 13=3
Range: 14=2 · 15=1 · 16=1 · 17=1 · 18=3
Metalearning: 19=2 · 20=3

46. Strategic Naps (#40, Candidate): **62** · evidence gate passed · roots 1 · Fails roots
Evidence: 1=3 · 2=3 · 3=3 · 4=2 · 5=3 · 6=4
Adult fit: 7=2 · 8=5 · 9=3
Practicality: 10=5 · 11=4 · 12=5 · 13=3
Range: 14=4 · 15=2 · 16=3 · 17=2 · 18=3
Metalearning: 19=1 · 20=2

47. Gesture and Enactment (#14, Candidate): **61** · evidence gate passed · roots 2 · Fails roots
Evidence: 1=3 · 2=3 · 3=3 · 4=2 · 5=4 · 6=3
Adult fit: 7=3 · 8=4 · 9=4
Practicality: 10=5 · 11=3 · 12=4 · 13=4
Range: 14=3 · 15=3 · 16=3 · 17=2 · 18=2
Metalearning: 19=1 · 20=2

48. Mnemonic Devices (#9, Candidate): **59** · evidence gate failed · roots 4 · Fails evidence
Evidence: 1=3 · 2=4 · 3=2 · 4=3 · 5=3 · 6=3
Adult fit: 7=4 · 8=5 · 9=3
Practicality: 10=5 · 11=5 · 12=4 · 13=3
Range: 14=3 · 15=1 · 16=1 · 17=1 · 18=2
Metalearning: 19=1 · 20=3

49. Summarization (#34, Control): **59** · evidence gate failed · roots 3 · Fails evidence
Evidence: 1=3 · 2=2 · 3=2 · 4=3 · 5=3 · 6=3
Adult fit: 7=4 · 8=5 · 9=4
Practicality: 10=5 · 11=2 · 12=3 · 13=2
Range: 14=4 · 15=3 · 16=1 · 17=2 · 18=3
Metalearning: 19=2 · 20=3

50. Overlearning (#23, Control): **58** · evidence gate failed · roots 2 · Fails evidence and roots
Evidence: 1=3 · 2=3 · 3=1 · 4=3 · 5=3 · 6=3
Adult fit: 7=2 · 8=5 · 9=4
Practicality: 10=5 · 11=4 · 12=5 · 13=3
Range: 14=4 · 15=1 · 16=3 · 17=1 · 18=2
Metalearning: 19=1 · 20=2

51. Mindfulness Training (#4, Candidate): **56** · evidence gate failed · roots 4 · Fails evidence
Evidence: 1=3 · 2=2 · 3=2 · 4=3 · 5=4 · 6=3
Adult fit: 7=3 · 8=4 · 9=4
Practicality: 10=4 · 11=2 · 12=3 · 13=3
Range: 14=3 · 15=1 · 16=2 · 17=2 · 18=3
Metalearning: 19=2 · 20=3

52. Learner Identity (#52, Candidate): **56** · evidence gate failed · roots 3 · Fails evidence
Evidence: 1=2 · 2=2 · 3=1 · 4=3 · 5=2 · 6=3
Adult fit: 7=4 · 8=5 · 9=4
Practicality: 10=5 · 11=1 · 12=4 · 13=4
Range: 14=5 · 15=1 · 16=1 · 17=1 · 18=3
Metalearning: 19=1 · 20=4

53. Growth Mindset (#53, Control): **53** · evidence gate failed · roots 2 · Fails evidence and roots
Evidence: 1=3 · 2=1 · 3=2 · 4=3 · 5=1 · 6=3
Adult fit: 7=5 · 8=5 · 9=3
Practicality: 10=5 · 11=1 · 12=5 · 13=3
Range: 14=4 · 15=1 · 16=1 · 17=1 · 18=2
Metalearning: 19=1 · 20=3

54. Daily Rhythms (#44, Candidate): **53** · evidence gate failed · roots 1 · Fails evidence and roots
Evidence: 1=2 · 2=2 · 3=2 · 4=2 · 5=3 · 6=3
Adult fit: 7=2 · 8=4 · 9=3
Practicality: 10=5 · 11=3 · 12=4 · 13=4
Range: 14=4 · 15=1 · 16=2 · 17=1 · 18=2
Metalearning: 19=1 · 20=3

55. Rereading (#18, Control): **52** · evidence gate failed · roots 2 · Fails evidence and roots
Evidence: 1=2 · 2=1 · 3=1 · 4=2 · 5=3 · 6=3
Adult fit: 7=5 · 8=5 · 9=4
Practicality: 10=5 · 11=2 · 12=5 · 13=2
Range: 14=4 · 15=1 · 16=1 · 17=1 · 18=1
Metalearning: 19=1 · 20=3

56. Highlighting (#15, Control): **49** · evidence gate failed · roots 1 · Fails evidence and roots
Evidence: 1=2 · 2=1 · 3=1 · 4=2 · 5=3 · 6=2
Adult fit: 7=5 · 8=5 · 9=4
Practicality: 10=5 · 11=2 · 12=5 · 13=1
Range: 14=4 · 15=1 · 16=1 · 17=1 · 18=1
Metalearning: 19=1 · 20=2

57. Learning in Public (#60, Candidate): **49** · evidence gate failed · roots 3 · Fails evidence
Evidence: 1=1 · 2=1 · 3=1 · 4=2 · 5=1 · 6=2
Adult fit: 7=3 · 8=4 · 9=3
Practicality: 10=5 · 11=2 · 12=4 · 13=3
Range: 14=4 · 15=2 · 16=2 · 17=1 · 18=3
Metalearning: 19=2 · 20=3

58. First-Principles Reasoning (#32, Candidate): **47** · evidence gate failed · roots 5 · Fails evidence
Evidence: 1=1 · 2=1 · 3=1 · 4=2 · 5=1 · 6=2
Adult fit: 7=2 · 8=4 · 9=3
Practicality: 10=5 · 11=2 · 12=2 · 13=2
Range: 14=3 · 15=4 · 16=2 · 17=3 · 18=3
Metalearning: 19=2 · 20=2

59. Grit (#54, Control): **42** · evidence gate failed · roots 3 · Fails evidence
Evidence: 1=2 · 2=1 · 3=1 · 4=2 · 5=2 · 6=1
Adult fit: 7=3 · 8=3 · 9=3
Practicality: 10=4 · 11=1 · 12=2 · 13=3
Range: 14=4 · 15=1 · 16=2 · 17=1 · 18=2
Metalearning: 19=1 · 20=3

60. Learning-Style Matching (#19, Myth): **39** · evidence gate failed · roots 1 · Excluded (myth)
Evidence: 1=1 · 2=1 · 3=1 · 4=1 · 5=2 · 6=1
Adult fit: 7=4 · 8=4 · 9=3
Practicality: 10=4 · 11=2 · 12=4 · 13=1
Range: 14=3 · 15=1 · 16=1 · 17=1 · 18=1
Metalearning: 19=1 · 20=2

The reason for each strategy's scores

1. Focused Attention (77, P1): Divided-attention and multitasking research is strong and explains why; little direct evidence on understanding or transfer. Root: Stoic prosoche.

2. Session Goals (75, P1): Goal-setting evidence is mostly from work performance, not learning; cheap and quick. Root (Aristotle's telos) needs care.

3. Curiosity and Pre-Questions (70, P1): Prequestion and curiosity studies are promising but newer (Gruber et al., 2014; Carpenter), mostly with students.

4. Mindfulness Training (56, P1): Many trials on well-being, but effects on learning itself are small and mixed; needs weeks of practice.

5. Managing Cognitive Load (73, P1): Cognitive load theory is well tested (Sweller) but mostly a designer's tool; benefit reverses with expertise. Thin root.

6. Connecting to What You Know (77, P2): Prior knowledge and elaboration are central to memory research; adults' experience makes it stronger with age.

7. Words Plus Pictures (70, P2): Dual coding and multimedia research (Paivio; Mayer) is solid; decorative pictures can distract.

8. Memory Palace (62, P2): Huge gains for ordered lists that last months (Dresler et al., 2017), but narrow: little for understanding or skills.

9. Mnemonic Devices (59, P2): Good for terms and lists; Dunlosky et al. (2013) rated the keyword method low, partly because gains may fade.

10. Chunking (71, P2): Chunking is a well-explained feature of expertise (Miller; Chase and Simon), but weaker as a deliberate study strategy. Thin root.

11. Concrete Examples (71, P2): Several examples help abstract ideas (Rawson et al., 2015); learners can fixate on surface details.

12. Analogy and Comparison (73, P2): Comparing cases improves transfer (Gentner; Alfieri et al., 2013 meta-analysis); weak analogies can mislead.

13. Saying It Aloud (64, P2): The production effect replicates widely (MacLeod et al., 2010) but is small and mostly lab-based.

14. Gesture and Enactment (61, P2): Enactment effect is reliable, including in older adults; gesture evidence is mostly with children. Thin root.

15. Highlighting (49, P2): Control. Easy and popular, but rated low utility (Dunlosky et al., 2013); over-highlighting is common.

16. Retrieval Practice (88, P3): The strongest evidence in the pool: large, lasting, replicated in classrooms and with older adults; reveals what you know.

17. Try Before You Are Told (73, P3): Generation, pretesting and productive failure (Sinha and Kapur, 2021) help, if correct answers follow; can frustrate.

18. Rereading (52, P3): Control. Feels fluent but gives little lasting gain (Dunlosky et al., 2013) and inflates confidence.

19. Learning-Style Matching (39, P3): Myth. No support for matching instruction to styles (Pashler et al., 2008). Excluded by the no-myths gate.

20. Spaced Practice (87, P4): Among the most replicated findings in psychology, at all ages and in the field (Cepeda et al., 2008). Root: Quintilian, Institutio Oratoria 11.2.41–43, learn a little at a time, adding a line a day.

21. Interleaving (71, P4): Strong in math and category learning, including a classroom trial (Rohrer et al., 2020); feels harder, weaker in other subjects. Thin root.

22. Varied Practice (69, P4): Mostly motor-skill evidence; good for skills and transfer. Thin root.

23. Overlearning (58, P4): Control. Short-term gains fade within weeks (Rohrer et al., 2005); the extra time is better spent spacing.

24. Deliberate Practice (69, P5): Central to expert performance but debated (Ericsson; Macnamara et al., 2014); demanding, classically needs a coach.

25. Feedback and Error Correction (80, P5): Large average effects (Hattie; Wisniewski et al., 2020), but about a third of feedback effects are negative (Kluger and DeNisi, 1996).

26. Copy, Rebuild, Compare (69, P5): Supported by modeling research in general, but the exact method is little tested. Root: Franklin's Autobiography.

27. Mental Rehearsal (65, P5): Meta-analyses show real but smaller gains than physical practice, fading with delay (Driskell et al., 1994); mainly skills.

28. Socratic Self-Questioning (70, P6): Guided self-questioning helps understanding (King, 1992; Rosenshine et al., 1996); quality depends on the questions. Very strong root.

29. Self-Explanation (73, P6): Solid meta-analytic support (Bisra et al., 2018); builds understanding and transfer; takes effort.

30. Worked Examples, Then Fewer Hints (74, P6): Strong for beginners in structured subjects (Sweller; Renkl); reverses for experts. Thin root.

31. Mapping the Subject (68, P6): Concept-mapping meta-analyses are positive (Nesbit and Adesope, 2006; Schroeder et al., 2018), mostly with students.

32. First-Principles Reasoning (47, P6): Very strong root (Aristotle, Descartes) but almost no direct study as a learning strategy.

33. Structured Note-Taking (67, P6): Note-taking helps modestly (Kobayashi, 2005); verbatim copying weakens it.

34. Summarization (59, P6): Control. Rated low utility unless learners are trained (Dunlosky et al., 2013).

35. Predict, Then Check (73, P7): Directly improves calibration (Koriat; Bjork); learning gains are indirect, through better study choices.

36. Plan, Monitor, Evaluate (75, P7): Self-regulated learning training helps, including adults online (Dignath and Büttner, 2008; Sitzmann and Ely, 2011).

37. Learning Journal (68, P7): Learning-protocol studies are positive but limited (Nückles; Berthold). Strong root (Seneca's evening review; Marcus Aurelius).

38. Source Checking (72, P7): Lateral-reading training works in field trials (Wineburg and McGrew, 2019; Breakstone et al., 2021); evidence still young.

39. Protecting Sleep (82, P8): Strong evidence that sleep consolidates memory and skills (Diekelmann and Born, 2010); hard to protect in a busy life. Root: Quintilian 11.2.43, a single night greatly strengthens memory; he does not name sleep.

40. Strategic Naps (62, P8): Naps after learning help in lab studies (Mednick); few adults can nap at work. No root.

41. Regular Exercise (69, P8): Good evidence for brain health, especially in older adults (Erickson et al., 2011); direct effects on study outcomes are small to moderate.

42. Rest and Breaks (67, P8): Wakeful rest helps memory in some studies (Dewar et al., 2012) but replications are mixed; easy and harmless.

43. Managing Stress (64, P8): Stress harms retrieval (Schwabe and Wolf); brief methods help test performance (Ramirez and Beilock, 2011), with mixed replication. Root: Epictetus.

44. Daily Rhythms (53, P8): Time-of-day effects are mixed and small; most adults cannot choose their hours. No root.

45. Habits and If-Then Plans (77, P9): If-then plans reliably help people act on goals (Gollwitzer and Sheeran, 2006); acts on learning only indirectly. Strong root (Aristotle; William James).

46. Environment Design (67, P9): Cue-based habit research supports it (Wood); some distraction findings have failed to replicate. Thin root.

47. Purposeful Projects (68, P9): Project-based learning helps in some meta-analyses but is contested; can skip foundations. Root: Dewey.

48. Intrinsic Motivation (69, P9): Self-determination research is large but mostly correlational (Deci and Ryan; Cerasoli et al., 2014).

49. Small Wins (72, P9): Self-efficacy research (Bandura) supports persistence; little direct evidence on learning outcomes.

50. Visible Progress (73, P9): Monitoring progress helps goal attainment (Harkin et al., 2016); tracking hours instead of learning misleads. Root: Franklin's chart.

51. Reframing Struggle (69, P9): Reappraisal and desirable-difficulty framing show early promise; evidence still small. Strong Stoic root.

52. Learner Identity (56, P9): Identity-based motivation has some field trials (Oyserman), mostly with school pupils; thin for adult learning.

53. Growth Mindset (53, P9): Control. Well studied, but average effects on achievement are very small (Sisk et al., 2018), mostly in schools.

54. Grit (42, P9): Control. A trait, not a method; weak links to performance beyond conscientiousness (Credé et al., 2017).

55. Learning by Teaching (77, P10): Preparing to teach and teaching help (Nestojko et al., 2014; Fiorella and Mayer, 2013). Root: Seneca, 'men learn while they teach.'

56. Study Partners and Groups (67, P10): Cooperative learning meta-analyses are positive, but mostly in schools; groups drift and are hard to schedule.

57. Writing to Learn (71, P10): Meta-analysis shows a small average gain (Bangert-Drowns et al., 2004); stronger when writing prompts reflection. Root: Seneca, Locke.

58. AI Tutoring (63, P10): Early trials are mixed: large gains with guarded tutors (Kestin et al.), losses when AI gives answers (Bastani et al.). No root on its own.

59. Mentors and Apprenticeship (71, P10): Strong in workplace practice, with modest measured effects (Eby et al., 2008); needs a willing mentor.

60. Learning in Public (49, P10): Almost no direct research; overlaps Learning by Teaching.

What step 3 showed

- **The method filters.** The myth, Learning-Style Matching, finished last (39). All six controls ranked between 49th and 59th. Rereading and Highlighting, two of the most popular study habits, were near the bottom.
- **The evidence leaders came first.** Retrieval Practice (88) and Spaced Practice (87) ranked first and second, as the research consensus would predict.
- **28 strategies passed every gate on their own.**
- **Some strong strategies have thin roots.** Interleaving, Varied Practice, Worked Examples, Managing Cognitive Load, Chunking and Strategic Naps are well supported by evidence but have no clear philosophical lineage, so they fail the two-roots gate on their own.

- **Most strategies for "showing up" fail the evidence gate.** Habits and If-Then Plans, Session Goals, Visible Progress and Small Wins help people study more, but there is little evidence that they improve lasting learning by themselves. They score 2 on Long-term retention.

---

7. Step 3b: the merged chapters

Seven possible merged chapters were formed, scored and checked against the gates.

How a merged chapter is scored

A merged chapter is scored as the reader will use it: as one chapter that teaches all its parts.

- **Evidence criteria (1–6):** set by the part the chapter rests on. Other parts raise a score only where they add evidence the core lacks.
- **Adult-fit and practicality criteria (7–13):** reflect doing the whole chapter. They usually fall a little, because there is more to learn, unless a part makes the chapter easier.
- **Range and metalearning criteria (14–20):** can rise when parts cover different outcomes.
- **Two roots:** the chapter's root must cover the chapter's idea, not only one part.

A merged score is never a sum or an average of its parts, and each part keeps its own published score.

Scores of the seven merged chapters

Memory Palace and Mnemonics (parts 8, 9): **66** · best part alone 62 · roots 5 · Passes
Evidence: 1=4 · 2=5 · 3=4 · 4=3 · 5=4 · 6=4
Adult fit: 7=4 · 8=5 · 9=3
Practicality: 10=5 · 11=5 · 12=3 · 13=3
Range: 14=3 · 15=1 · 16=1 · 17=1 · 18=3
Metalearning: 19=2 · 20=3

The Timing of Practice (parts 20, 21, 22, 45): **90** · best part alone 87 · roots 4 · Passes
Evidence: 1=5 · 2=5 · 3=5 · 4=5 · 5=5 · 6=4
Adult fit: 7=5 · 8=5 · 9=5
Practicality: 10=5 · 11=5 · 12=3 · 13=4
Range: 14=5 · 15=4 · 16=5 · 17=4 · 18=4
Metalearning: 19=2 · 20=5

Deliberate Practice with Feedback (parts 24, 25, 26): **80** · best part alone 80 · roots 4 · Passes
Evidence: 1=4 · 2=4 · 3=4 · 4=5 · 5=5 · 6=4
Adult fit: 7=3 · 8=3 · 9=4
Practicality: 10=4 · 11=5 · 12=3 · 13=3
Range: 14=5 · 15=4 · 16=5 · 17=3 · 18=5
Metalearning: 19=4 · 20=3

Socratic Self-Questioning (with AI Tutoring) (parts 28, 58): **72** · best part alone 70 · roots 5 · Passes
Evidence: 1=3 · 2=3 · 3=3 · 4=3 · 5=3 · 6=3
Adult fit: 7=5 · 8=5 · 9=4
Practicality: 10=4 · 11=4 · 12=3 · 13=2
Range: 14=5 · 15=5 · 16=2 · 17=3 · 18=4
Metalearning: 19=4 · 20=4

Knowing What You Don't Know (parts 35, 36, 37): **79** · best part alone 75 · roots 5 · Passes
Evidence: 1=4 · 2=4 · 3=3 · 4=4 · 5=4 · 6=4
Adult fit: 7=4 · 8=5 · 9=4
Practicality: 10=5 · 11=4 · 12=3 · 13=4
Range: 14=5 · 15=3 · 16=3 · 17=3 · 18=4
Metalearning: 19=5 · 20=4

Habit and Consistency (withdrawn) (parts 45, 46, 49, 50): **76** · best part alone 77 · roots 5 · Fails evidence
Evidence: 1=4 · 2=4 · 3=2 · 4=5 · 5=5 · 6=4
Adult fit: 7=5 · 8=5 · 9=5
Practicality: 10=5 · 11=5 · 12=4 · 13=4
Range: 14=5 · 15=1 · 16=2 · 17=1 · 18=3
Metalearning: 19=2 · 20=5

Body and Mind (parts 39, 40, 41, 42, 43, 44): **83** · best part alone 82 · roots 4 · Passes
Evidence: 1=5 · 2=4 · 3=5 · 4=4 · 5=5 · 6=5
Adult fit: 7=3 · 8=5 · 9=5
Practicality: 10=5 · 11=4 · 12=4 · 13=4
Range: 14=5 · 15=3 · 16=5 · 17=3 · 18=4
Metalearning: 19=1 · 20=4

Why each merge was made

Memory Palace and Mnemonics (66). Both use vivid cues for recall, and both come from the classical art of memory (Cicero, Quintilian). The memory palace sets the evidence; mnemonics add quick tools for terms. The chapter stays narrow: it does little for understanding, skills or transfer. *Parts alone:* 8 Memory Palace 62 (roots 5); 9 Mnemonic Devices 59 (roots 4, fails a gate alone).

The Timing of Practice (90). All four parts decide *when* practice happens. Spacing, mixing and varying set the schedule; if-then plans make busy adults keep it. Spacing sets the evidence; interleaving adds the ability to tell similar problems apart; varied practice adds transfer; if-then plans make the schedule happen. Root: Quintilian, *Institutio Oratoria* 11.2 (learn a little at a time; a single night's interval strengthens memory) and Aristotle on habit. *Parts alone:* 20 Spaced Practice 87 (roots 3); 21 Interleaving 71 (roots 2, fails a gate alone); 22 Varied Practice 69 (roots 2, fails a gate alone); 45 Habits and If-Then Plans 77 (roots 5, fails a gate alone).

Deliberate Practice with Feedback (80). Deliberate practice needs feedback, and comparing your work with an expert model is a source of feedback. Feedback supplies the strong evidence; deliberate practice gives it a target; Copy, Rebuild, Compare gives a way to get feedback alone. *Parts alone:* 24 Deliberate Practice 69 (roots 4); 25 Feedback and Error Correction 80 (roots 3); 26 Copy, Rebuild, Compare 69 (roots 5, fails a gate alone).

Socratic Self-Questioning (with AI Tutoring) (72). An AI tutor is a tool for Socratic questioning, not a separate method. Self-questioning sets the evidence; an AI tutor makes a questioning partner available at any time, but AI that simply gives answers can harm learning, so the risk of misuse is high. *Parts alone:* 28 Socratic Self-Questioning 70 (roots 5); 58 AI Tutoring 63 (roots 1, fails a gate alone).

Knowing What You Don't Know (79). All three parts belong to one self-monitoring cycle. Plan, Monitor, Evaluate sets the evidence; predicting then checking makes monitoring concrete; the journal keeps a lasting record. It is the strongest entry on self-judgment. *Parts alone:* 35 Predict, Then Check 73 (roots 4, fails a gate alone); 36 Plan, Monitor, Evaluate 75 (roots 4); 37 Learning Journal 68 (roots 5).

Habit and Consistency (76, withdrawn). All four parts help adults study regularly. But no part shows lasting learning gains on its own; each acts only through the study it makes happen. The chapter fails the evidence gate (Long-term retention 2) and was withdrawn. Its core part, Habits and If-Then Plans, moved into The Timing of Practice, where it makes the schedule happen. *Parts alone:* 45 Habits and If-Then Plans 77 (roots 5); 46 Environment Design 67 (roots 2); 49 Small Wins 72 (roots 3); 50 Visible Progress 73 (roots 4); all fail a gate alone.

Body and Mind (83). All six parts work through the body's care of the brain. Sleep and exercise set the evidence; breaks and stress methods add easy, everyday options. Root: Quintilian on the night's interval; Plato on training the body; Epictetus on what is in our control. *Parts alone:* 39 Protecting Sleep 82 (roots 3); 40 Strategic Naps 62 (roots 1, fails a gate alone); 41 Regular Exercise 69 (roots 4); 42 Rest and Breaks 67 (roots 3); 43 Managing Stress 64 (roots 5, fails a gate alone); 44 Daily Rhythms 53 (roots 1, fails a gate alone).

A check before one merge: do if-then plans improve lasting learning?

Before Habits and If-Then Plans was merged, the research was searched to see whether it deserved a higher Long-term retention score, which would have let it pass the evidence gate alone. The evidence was mixed. One trial with medical students found a small gain on a final exam after 40 days of preparation. A university study found no effect on study time or exam scores. Planning prompts raised completion in three online courses but showed no overall effect across four other large trials. One study with middle-school children found better report-card grades, but not in adults. Most studies measure how much people study, not what they retain. The score stayed at 2. If the medical-student result is repeated by other researchers, the score will be reviewed.

---

8. The selection rule and the 12

The rule

1. Every entry that passes every gate, single strategies and merged chapters alike, goes into one ranked list.
2. The list is ranked by total. Ties are broken by Strength of research, then Long-term retention, then Size of the benefit.
3. Entries are taken from the top. A strategy can appear in only one chapter, so once an entry is chosen, any other entry that shares a part with it is skipped.
4. Selection stops at 12.

The combined ranking (top 24 eligible entries)

Rank	Entry	Type	Total	Result
1	The Timing of Practice	Merged chapter	90	**Chosen**
2	Retrieval Practice	Single strategy	88	**Chosen**
3	Spaced Practice	Single strategy	87	Skipped: part of a chosen chapter
4	Body and Mind	Merged chapter	83	**Chosen**
5	Protecting Sleep	Single strategy	82	Skipped: part of a chosen chapter
6	Feedback and Error Correction	Single strategy	80	**Chosen**
7	Deliberate Practice with Feedback	Merged chapter	80	Skipped: shares a part with a chosen entry
8	Knowing What You Don’t Know	Merged chapter	79	**Chosen**
9	Learning by Teaching	Single strategy	77	**Chosen**
10	Focused Attention	Single strategy	77	**Chosen**
11	Connecting to What You Know	Single strategy	77	**Chosen**
12	Plan, Monitor, Evaluate	Single strategy	75	Skipped: part of a chosen chapter
13	Try Before You Are Told	Single strategy	73	**Chosen**
14	Analogy and Comparison	Single strategy	73	**Chosen**
15	Self-Explanation	Single strategy	73	**Chosen**
16	Source Checking	Single strategy	72	**Chosen**

Rank	Entry	Type	Total	Result
17	Socratic Self-Questioning (with AI Tutoring)	Merged chapter	72	Not chosen (twelve already chosen)
18	Concrete Examples	Single strategy	71	Not chosen
19	Writing to Learn	Single strategy	71	Not chosen
20	Mentors and Apprenticeship	Single strategy	71	Not chosen
21	Words Plus Pictures	Single strategy	70	Not chosen
22	Curiosity and Pre-Questions	Single strategy	70	Not chosen
23	Socratic Self-Questioning	Single strategy	70	Not chosen
24	Regular Exercise	Single strategy	69	Skipped: part of a chosen chapter

The 12, and where they appear in the book

The chapters are ordered so that each builds on the last, not by score.

Score rank	Strategy	Type	Parts	Total	First principle	Chapter
1	The Timing of Practice	Merged	20 Spaced Practice, 21 Interleaving, 22 Varied Practice, 45 Habits and If-Then Plans	90	4, 9	7
2	Retrieval Practice	Single	16	88	3	5
3	Body and Mind	Merged	39 Protecting Sleep, 40 Strategic Naps, 41 Regular Exercise, 42 Rest and Breaks, 43 Managing Stress, 44 Daily Rhythms	83	8	13
4	Feedback and Error Correction	Single	25	80	5	11
5	Knowing What You Don't Know	Merged	35 Predict, Then Check, 36 Plan, Monitor, Evaluate, 37	79	7	9

Score rank	Strategy	Type	Parts	Total	First principle	Chapter
			Learning Journal			
6	Learning by Teaching	Single	55	77	10	12
7	Focused Attention	Single	1	77	1	2
8	Connecting to What You Know	Single	6	77	2	3
9	Try Before You Are Told	Single	17	73	3	6
10	Analogy and Comparison	Single	12	73	2	4
11	Self-Explanation	Single	29	73	6	8
12	Source Checking	Single	38	72	7	10

All 10 first principles are covered. Principle 9, "Learning needs showing up despite adult life," is covered through Habits and If-Then Plans inside The Timing of Practice.

Strategies that entered only as part of a merged chapter

Each of these fails a gate on its own. Under the rule in section 4, it is in the book only because the chapter it belongs to passes every gate.

Strategy	Gate failed alone	Chapter it entered through
21 Interleaving	Two roots	The Timing of Practice
22 Varied Practice	Two roots	The Timing of Practice
45 Habits and If-Then Plans	Evidence	The Timing of Practice
40 Strategic Naps	Two roots	Body and Mind
43 Managing Stress	Evidence	Body and Mind
44 Daily Rhythms	Evidence and two roots	Body and Mind
35 Predict, Then Check	Evidence	Knowing What You Don't Know

The chapters say plainly where a part's root is thin or its evidence is mixed.

Close calls

Two places in the 12 were decided by tie-breaks. Both should be watched as the studies are verified.

- **Feedback and Error Correction (80) vs Deliberate Practice with Feedback (80).** The single strategy won on Strength of research (5 vs 4). Choosing the merged chapter instead would change no other

selection. The book still teaches deliberate practice and Copy, Rebuild, Compare as methods inside Chapter 11.

- **Source Checking (72) vs Socratic Self-Questioning with AI Tutoring (72).** These tied on total, Strength of research and Long-term retention. Source Checking won on Size of the benefit (4 vs 3). The book still teaches a question ladder and an AI questioning partner as methods inside Chapter 8.

Strong strategies that did not become chapters

Several strategies passed every gate but ranked below the 12: Concrete Examples, Writing to Learn, Mentors and Apprenticeship, Words Plus Pictures, Curiosity and Pre-Questions, Memory Palace and others. Not being chosen does not mean they do not work. It means 12 others scored higher on these 20 criteria. Some of their methods appear as steps inside the chapters.

---

9. Limits of this method

No selection method is neutral in every way. These are the known limits.

- **The scores are judgments.** They follow written guides, but they are made by one author reading the research. Different readers could score some items differently.
- **Equal weights.** All 20 criteria count equally. Seven of them reward ease of use (Fits a busy life, Self-directed, Easy and affordable to start, Easy to check, Quick to learn the method, Low risk of misuse and, partly, Works at any age). This can lift easy strategies above harder ones with stronger evidence. Equal weights were kept because they are the simplest and most transparent choice. A check of how the results change when the Evidence group counts double has not yet been published; it is planned for an updated version.
- **Thin evidence on some criteria.** Transfer to new situations and Scales from beginner to expert are hard to score, because few studies test them.
- **Most research comes from a few countries.** The studies behind these scores come mostly from Western countries and often from university students.
- **Verification is ongoing.** The scores most likely to change after verification are Strength of research and Long-term retention for Curiosity and Pre-Questions, Try Before You Are Told, Interleaving, Source Checking, Rest and Breaks, Managing Stress, Reframing Struggle and AI Tutoring, because their gate results could flip.

If a score changes after further checking, the change will be recorded in an updated version of this document.