HOW WE LEARN

Q: ***How important is routine when it comes to learning? For example, is it important to have a dedicated study area?***

A: Most people do better over time by varying their study or practice locations. The more environments in which you rehearse, the sharper and more lasting the memory of that material becomes—and less strongly linked to one "comfort zone." Knowledge becomes increasingly *independent* of surroundings the more changes you make—taking your laptop onto the porch, out to a café, on the plane. The goal, after all, is to be able to perform well in any condition.

Changing locations is not the only way to take advantage of the so-called context effect on learning. Altering the time of day you study also helps, as does changing how you engage the material, by reading or discussing, typing into a computer or writing by hand, reciting in front of a mirror or studying while listening to music. Each counts as a different learning "environment" in which you store the material in a different way.

Q: ***Is cramming a bad idea?***

A: Cramming works fine as a last resort, a way to ramp up fast for an exam if you're behind and have no choice.

The downside is that, after the test, you won't remember a whole lot of what you "learned"—if you remember any at all. The brain can sharpen a memory only after some forgetting has occurred. In this way, memory is like a muscle; a little "breakdown" allows it to subsequently build greater strength. Cramming, by definition, prevents this from happening.

Spaced study or self-examination are far more effective ways to prepare. You'll remember the material longer and be able to carry it into the next course or semester easily. Studies find that people remember up to twice as much of material that they rehearsed in spaced or tested sessions than during cramming.

Q: ***Is there an optimal amount of time to study or practice?***

A: More important than how long you study is how you distribute the study time you have. Breaking up study or practice time—dividing it into two or three sessions, instead of one—is far more effective than concentrating it. If you've allotted two hours to mastering a German lesson, for example, you'll remember more if you do an hour today and an hour tomorrow, or—even better—an hour the next day. That split forces you to reengage the material, dig up what you already know, and *re*-store it—an active mental step that reliably improves memory. Three sessions is better still, as long as you're giving yourself enough time to dive into the material or the skills each time. **Spacing study time is the most powerful and reliable technique scientists know of to deepen and extend memory.**

Q: ***Is it best to practice one skill at a time until it becomes automatic, or to work on many things at once?***

A: Focusing on one skill at a time—a musical scale, free throws, the quadratic formula—leads quickly to noticeable, tangible improvement. But over time, such focused practice actually limits our development of each skill.

Mixing or interleaving multiple skills in a practice session, by contrast, sharpens our grasp of all of them. In a subject like math, mixed problems sets not only remind you what you've learned but also train you to *match* the problem types with the appropriate strategies.

Q: ***How much does quizzing oneself, like with flashcards, help?***

A: Self-testing is one of the strongest study techniques. The best self-quizzes do two things: they force you to choose the right answer form several possibilities, and they give you immediate feedback. **Self-examination improves retention and comprehension far more than an equal amount of review time.** It can take many forms as well. Reciting a passage from memory, either in front of a classmate or the mirror, is a form of testing. So is explaining it to yourself while pacing the kitchen, or to a friend over lunch. As teachers often say, "You don't fully understand a topic until you have to teach it."

Q: ***There's so much concern that social media and smartphones and all manner of electronic gadgets are interfering with learning—and even changing the way people think. Is this merited? Is distraction always bad?***

A: Distraction is a hazard if you need continuous focus, like when listening to a lecture.

But a short study break—five, ten, twenty minutes—is the most effective technique learning scientists know of to help you solve a problem when you're stuck. Distracting yourself from the task at hand allows you to let go of mistaken assumptions, reexamine the clues in a new way, and come back fresh. If you're motivated to solve the problem, your brain will continue to work on it during the break subconsciously, without the (fixated, unproductive) guidance you've been giving it.

Q: ***How much does it help to review notes from a class or lesson?***

A: The answer depends on how the reviewing is done. Verbatim copying adds very little to the depth of your learning, and the same goes for looking over highlighted text or formulas. Both exercises are fairly passive, and can cause what learning scientists call a "fluency illusion"—the impression that, because something is self-evident in the moment, it will remain that way in a day, or a week. Just because you've marked something or rewritten it doesn't mean your brain has engaged the material more deeply. Studying highlighted notes and trying to write them out—without looking—works memory harder and is a much more effective approach to review.

Q: ***What's the most common reason for bombing a test after what felt like careful preparation?***

A: The illusion that you "knew" something well just because it seemed so self-evident at the time you studied it. Fluency illusions form automatically and subconsciously. Beware study "aids" that can reinforce the illusion: highlighting or rewriting notes, working from a teacher's outline, restudying after you've just studied. These are mostly passive exercises, and they enrich learning not at all. Making your memory work a little harder—by self-quizzing, for example, or spacing out study time—sharpens the imprint of what you know, and exposes fluency's effects.

Source: Carey, Benedict. How We Learn. Random House, 2014. Pages 223-228.