



Studying and Learning Strategies

We are always looking for time and ways to study, but how many of us understand the educational or psychological research on studying techniques? Research shows that the strategies that work may not be the ones students use most often—we are not typically taught how to study well, so many of us struggle through it using a few strategies that we already know about. These common techniques include rereading, summarizing, and underlining, but those are shown to be minimally effective learning strategies. In other words, they do little to improve your understanding, your ability to analyze and apply information, or your ability to recall when you need it. This handout will go over three of the most effective learning strategies, according to researchers. These techniques are **self-testing**, **distributed practice**, and **interleaved practice**.

Self-Testing: Many of us have a passing familiarity with this technique. This practice improves learning and retention by engaging long-term memory and activates multiple mental pathways for connecting information, making information easier to access. This is called the retrieval effect—to retrieve knowledge from your memory when you need it (for exams, in class discussions, in real-world applications), you have to practice retrieving it from memory. Forms of self-testing include practice tests, flash cards (use two-way method), and answering sample questions in texts. You can structure your notetaking to help with self-testing: following the Cornell system, make a column on the edge of your page with key concepts, processes, and questions, then test yourself by answering the questions, defining the concepts, or describing the processes. This can be done both when you are reading a text or when you are in lecture. This low-stakes testing will help you, especially during time-sensitive assessments.

For the Cornell notetaking system, please see: <http://lsc.cornell.edu/wp-content/uploads/2016/10/Cornell-NoteTaking-System.pdf>

Distributed Practice: This technique involves studying in smaller chunks that are spread out over larger periods of time. It improves your performance and helps with retaining information because you have to recall the information more frequently than in massed studying. You can spread out the blocks of time over a couple of days, or several weeks, but ideally you will return to a given topic regularly for an hour or two at a time. You are still retaining information during the in-between time, and you quickly relearn the information. Distributed practice is ideal for learning fundamental concepts for advanced knowledge but has shown to work at all age groups and with a variety of information. Time management is key to distributed practices because you must plan when studying takes place over time and with exams and other deadlines in mind.

Interleaved Practice: This refers to alternating the topics, information, problems, topics, or skills that you are studying. For example, rather than learning A before B in a pattern of AAABBBCCC, interleaved practice is mixed, creating a pattern of ABCABCABC. This intermixing is useful when students need to practice discriminating between concepts, selecting the correct method, or comparing different kinds of problems. Interleaving does not work in all situations, but it works in practicing technical and structured topics such as math, and it is an effective study method for students who are already fairly competent within a topic. Because interleaving improves the ability to discriminate between concepts and strengthens memory associations, it has



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been successfully used in at the graduate level in medical fields. Interleaved practice helps with understanding juxtapositions and nuanced comparisons, improving the rate of successful diagnoses.

Inefficient Strategies: Highlighting—there is no active engagement when highlighting, and highlighting too much is detrimental to your ability to go back over materials. However, it can be used in support of active learning; highlight information that you then use to self-test through flash cards or practice test questions, or highlight as a way to map cues and keywords to your Cornell notes. Underlining key words and sentences is similarly a less-effective practice than other approaches.

Rereading—this is the most time-intensive, yet ineffective strategy that most students use. It is passive and does not help you learn concepts or build connections between concepts. Studies have shown that rereading may slightly improve recall in the short-term, but multiple readings do not add additional information. Go over materials only if you had issues reading them effectively the first time.

Massed Studying/Cramming—many of us grew familiar with this strategy during high school and undergrad. This typically consists of one or two lengthy study sessions shortly before the due date of an assignment or exam. Reviewing this much material in a short period of time does not allow sufficient time for it to go into your long-term memory, though it may work enough to recall the material on an exam. You do not store the material effectively this way, and it has adverse effects on your stress levels and sleep patterns that often harm your academic performance. Instead, utilize distributed practice whenever possible.

Helpful Resources: Here are a few readings that provide more details about study techniques.

Lang, James M. (2016). *Small Teaching: Everyday lessons from the science of learning*. San Francisco, CA: Jossey-Bass.

Brown, Peter C., Roediger III, H.L., & McDaniel, M.A. (2014). *Make it Stick: The science of successful learning*. Cambridge, MA: The Belknap Press.

Dunlosky, John et al. (2013). Improving Students' Learning with Effective Learning Techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest* 14(1).

Pauk, Walter and Owens, Ross J.Q. (2013). *How to Study in College*, Eleventh Edition. Boston, MA: Cengage Learning.

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