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7. How to study

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Dr. Nate Kornell (<http://nkornell.bol.ucla.edu/>) of UCLA, with the fifth article in our ongoing series of guest features.

Although as students we have all spent countless hours studying, we receive little guidance in how to study effectively. There are no shortcuts to effective studying, but in general, being actively involved in learning makes studying effective. Some specific points are obvious: pay attention in class, do the reading, don't procrastinate, while others should be obvious but aren't: study in a quiet place without distractions, don't send text messages during class, ask questions if you are confused.

Here are three unintuitive but very effective ways of studying based on findings from psychological research:

Space your study. We humans, and other animals as well, learn more by spacing study sessions out in time (pdf) than we do by massing them together (e.g. by cramming). For example, read a chapter at one time, and review it at another time; if you are studying a set of flashcards, study it every day, instead of intensely all at once. My own research has shown the benefits of spacing in learning about artists' styles, learning vocabulary words using flashcards, and learning physics concepts, among other topics. If you don't think spacing will work for you, think again-spacing is virtually always effective, even when it feels counterproductive.

Ask yourself questions. Testing oneself while studying has two advantages:

First, it requires retrieving knowledge from memory. Doing so creates powerful memories (pdf) that are not easily forgotten. Second, self-testing allows you to diagnose your learning. If you test yourself before your exams, you can identify and rectify your weaknesses beforehand, instead of regretting them afterwards. A warning though: Self-testing when the information is still fresh in your memory, immediately after studying, doesn't work. It does not create lasting memories, and it creates overconfidence.

Summarize and integrate. After going to class or reading a chapter, try to summarize the main points, and think about how they relate to the topic at large and to your own experience. This process, known as knowledge integration, creates lasting memories, and has the added benefit of requiring you to recall the information. One way to do so is to "learn by teaching"-that is, tell others about what you have learned, including fellow students or, if you don't mind being boring, friends and family. Explaining requires integration and summarization, and it is an excellent way to expose the gaps in your own knowledge.

The steps above might seem burdensome, but the long-term benefits far outweigh the costs. A student looking to minimize effort would do well to follow them.

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\* Visit the DIGEST BLOG: <http://www.researchdigest.org.uk> , for links to related research and more information on how to study.