

Studying Tips Based on Research in Learning and Memory
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Over the past century research in learning, memory, and cognition has produced several strategies that will help make your study time more effective and help you remember what you learn. This list summarizes some of the most important findings. One thing that you will notice is that the strategies are **active** and **effortful**. They require your attentive involved participation. Your brain is not a passive sponge!

Not all of these tips will be relevant for all subject matter or all courses. Read through these and select the ones that look like they will work the best for your subject, your course, your schedule, and your preferences for how to learn.

1. Pretest yourself:

- ☞ If you try to answer questions about the material (even if you know nothing about it) before you read it, you will remember more of it. If your text or instructor doesn't provide a pretest, use questions from the end of the chapter or from the publisher's materials online, or rewrite headings in the text as questions and then try to answer them.
- ☞ If your course is problem-oriented, try to figure out how to solve a problem before you've been shown how to do it.

2. Quiz yourself: Practice retrieving the information, and identify what you know (and don't know).

- ☞ One of the most effective ways of learning material is by trying to recall the material. Trying to remember an answer, finding out what it is, and then trying to remember it again later greatly improves the chances that you will remember it on an exam. Quizzing yourself on what you just learned also helps to improve your recall when you need it on an exam.
- ☞ Quizzing yourself on what you just learned helps you to identify gaps and problem areas in your knowledge.
- ☞ Quiz yourself later, too – a week or two after you've covered material in class, go back and quiz yourself on it; this will help you recall it later on, such as on a test.
- ☞ Make flash cards or use a flash-card app to test yourself on major concepts and vocabulary.

3. Make Mistakes:

- ☞ Making a mistake in trying to recall material and then correcting it improves memory for the material.

4. Don't confuse "familiarity" with "knowing": It's easier to recognize something you have learned than it is to recall it.

- ☞ Don't just read your textbook over and over without applying other strategies for learning. When you reread your textbook or notes you may be lulled into believing that you "know" the material because you recognize it from having read it before. You don't **know** it unless you can close the book and write down the important points, answer questions on it

correctly, or explain it to someone else without looking.

5. Don't confuse "highlighting" with "understanding":

- ☞ Highlight ONLY to emphasize important points that you want to return to. Don't confuse highlighting with comprehension or recall. Just because you've highlighted text doesn't mean you understand it or that you will be able to recall it.

6. Elaborate: Reading the book or attending a lecture is only the first step. Interact with the material actively.

- ☞ Make up questions about the material you have just read. (And then answer them. And then check your answers. Use these questions in quizzing yourself, as above.)
- ☞ Put the information you want to remember into a sentence, in your own words. This is especially helpful for learning the new vocabulary and technical terms that often are a part of a course.
- ☞ Form a visual image of the information you want to remember – bizarre visual images are especially helpful (and this is the basis of several mnemonic devices, such as a peg list).
- ☞ Summarize what you just read in your own words.

7. Associate: It's easier to remember information that is meaningful to you, and meaningless material is the most difficult of all to recall.

- ☞ Try to relate what you're learning to something you already know.
- ☞ Try to make what you're learning personally meaningful to you or relate it to something in your life.
- ☞ If you're trying to learn something in certain order associate it with a walk you take through a familiar place, e.g. associate each landmark along the route in sequence with a part of what you want to remember (Method of Loci).

8. Organize: It's easier to remember information that is organized.

- ☞ Organize the information you want to remember into a hierarchy, an outline, alphabetically, in a diagram, or in whatever way makes sense.
- ☞ Group things you want to recall into categories, and let the category names serve as triggers for the items.

9. Overlearn it: Overlearned material is remembered for a very long time.

- ☞ Work on a topic until you really NAIL it, not just until you think you sort-of have it. This is a very effective way of making memories more lasting.

10. Review and reflect immediately: Forgetting is more rapid when you do not immediately rehearse or review the material you just learned. Then review it again later (see "Study frequently, in small chunks," below).

- ☞ Review what you've just learned immediately, and then use the Expanding Rehearsal Method (below) for later review.
- ☞ Review your class notes and organize or clean them up immediately after class, while the material is still fresh. Correct errors and add more information as needed.

- ☞ Reflect on what you've just learned. Ask yourself questions like these: What were the major concepts? What are some examples? How do I relate these ideas to what I already know? What was clear and interesting to me? What was muddy and difficult to understand? What would I like to learn more about?

11. Study frequently, in small chunks: Spaced practice almost always results in better long-term retention than massed practice, for equivalent time spent studying.

- ☞ Space your study sessions; don't cram. Studying a subject for a half hour a night for a week allows you to remember more in the long run than cramming for 3.5 hours in one night.
- ☞ **The Expanding Rehearsal Method:** initially study something, then immediately rehearse or quiz yourself on it, wait a few seconds, rehearse it again, wait longer still, then rehearse it again. If you must cram, do it early in the semester; then review and quiz yourself on the material in several short sessions with a few days between each review session. Revisiting material you've previously learned helps you to relearn it and to pick up things you missed the first time. Quizzing yourself after each study session will also help you remember more.

12. Work on different materials or tasks in the same study session (interleaving).

- ☞ Don't just work one set of the same thing, such as one type of math or accounting problem in a study session; work on several different types of problems, topics within a subject, or even different subjects. And then work on them all again in the next study session, and the next. This will help you see a "bigger picture," to form more diverse associations, to be able to determine which approach to a solution is appropriate for a problem, and to retain more of what you're learning.

13. Apply What You're Learning: Do exercises that accompany your reading.

- ☞ In many courses, especially quantitative and language courses, teachers often assign problems and exercises. Do them! Do more than what's assigned. These exercises help to solidify your knowledge as well as point out your problems with the material.

14. Study in a variety of places:

- ☞ People remember material better if they have learned it in a variety of different places or situations than if they always study in the same place.

15. Watch Out for the Middle: Things you learn first and things you learn last are generally remembered better than things you learn in between (the serial position effect).

- ☞ Spend a little more time studying and quizzing yourself on the material contained in the middle of a reading assignment or covered during the middle of a semester than you do on the beginning and end.

16. Teach it.

- ☞ Explaining something that you are trying to learn and remember to someone else is one of the best ways to ensure that you understand it and to fix it firmly in your memory.
- ☞ Work in a study group, where each person has responsibility for or explaining part of the material to others.

17. Study with no words in the background.

- ☞ Don't study in front of the TV or while watching a video, and don't study with music with vocals playing (at least, not in a language that you understand). The presence of speech and singing will interfere with your ability to encode and hence to retain verbal materials.

18. Don't try to multitask while you are studying.

- ☞ When you are studying, study. Don't try to carry on a conversation, make dinner, watch a baseball game, or do any other task that requires your attention and draws it away from what you are studying.

19. Try to learn in multiple ways: Don't believe that you have a single "learning style."

- ☞ Most of us can learn materials that are presented in different ways, even if we have a preferred method of learning (seeing, reading, hearing, doing, hands-on). Increase your flexibility and retention by attempting to learn materials in more than one way (e.g., listening, examining a diagram, writing a summary, acting it out).

20. Rehearse:

- ☞ Rote rehearsal and repetition are classical ways to increase your ability to remember something. However, they are less effective than the other strategies discussed here (which also involve rehearsal and repetition, but with elaboration, association, and organization that you contribute to the process.) If rote rehearsal and repetition are helpful to you, use them, but use other active, effortful methods along with them.

21. Follow the Stars:

- ☞ Professional actors and actresses don't memorize their lines by rote; they process the material deeply, working to understand the logical sequence of the script. They associate the words with actions and events that take place on the stage with movements that they and other characters have to make. And they associate the words with the thoughts, emotions, and motivations of the character. Even if you're not learning a script you can look for the logical sequences and associate words and concepts with actions, events, thoughts, information, emotions, and other things you already know. Sometimes acting out a concept or making up a song about it (maybe in private, if you're afraid of looking silly) can help you understand and remember it more completely.

22. Get plenty of sleep!

- ☞ Get plenty of sleep the night before an exam. Your memory is best when you are fully rested.
- ☞ Whenever possible, try to go to sleep within an hour or so after studying. Memories are consolidated throughout the night during sleep.
- ☞ If you're studying during the day, try to take a short nap after a study session. It's probably not as effective as a good night's sleep, but it also helps to consolidate and preserve what you've learned.

23. The SQ3R system of reading/studying uses many of these principles.

The SQ3R system is described here:

http://www.ucc.vt.edu/academic_support_students/study_skills_information/sq3r_reading-study_system/index.html or <http://tinyurl.com/k9n59lh>

P.S. Don't Procrastinate!

Sources

Descriptions of the research underlying this information can be found in just about any current textbook on Cognitive Psychology or the Psychology of Learning and Memory. Here's one: Goldstein, E. B. (2010). *Cognitive Psychology*, 3rd Ed. New York, NY: Wadsworth Publishers.

This book applies modern and recent research to techniques for improving memory. The authors have spent their careers doing research on human learning and memory.

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These two articles summarize some of this research:

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This describes the techniques that actors use.

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