

How Teaching Can Help You Be a Better Student

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Objectives: After reading this document, you will be able to...

- apply good teaching strategies to improve your studying strategies
- evaluate your own knowledge of a topic and catch misconceptions
- create study strategies to improve your retention of material

Why should I read through this document?

Teaching well requires commitment, and sometimes it's easier to convince yourself to invest in your own learning rather than in the learning of others. However, this document is meant to help you understand that there is less of a trade-off between your learning and your teaching than you might expect. Learning to teach can improve your learning strategies as well!

• Multiple choice •

Which of the following is the best study strategy?

- A) Memorization of relevant information and facts
- B) Quizzing yourself or others with flashcards and practice problems
- C) Rereading relevant notes and textbook
- D) Highlighting key phrases and concepts in notes and articles

Think • Pair • Share: What have your teachers done in the past to help or hinder your learning?

In this activity, think of some answers to the above question before pairing up with someone and discussing your answers. Share your answer or your partner's answer and relevant observations from your discussion with your partner with the class.

How we teach and learn

What should happen in a classroom?

One of the difficult choices teachers must make is what to include in an actual class, both what content is chosen and how it is presented. These choices usually boil down to questions about practice, feedback, and performance.

Overall, class can be defined as an opportunity for practice (learning opportunities such as practice problems, and lecture) and feedback from your teacher and your classmates before performance based on what you've learned in a class (problem sets, quizzes, tests). Teachers and classmates can then provide further feedback (comments, grades, etc.), which can lead to better performance in the future. The two main ways you improve during a course are through practice and feedback.

The difference between a teacher and student

We all have a general idea of what should happen in a classroom, but the experience of being a teacher can feel very different than being a student. Everyone sits somewhere on a continuum from novice to expert in various subjects. When we teach something, we usually sit closer to the expert side of that continuum. As students, we may be absolute beginners!

As teaching assistants or teachers, we can be subject to expert amnesia, the inability to explain a concept in a way that makes sense to a novice. We forget what it was like to be a beginner! Similarly, as students, some concepts may be difficult to understand because your teacher does not remember what is hard for beginners. Research has shown that experts and novices organize knowledge about their field differently. To advance your knowledge of a field, you should try to think and organize information like an expert.

▪ **Knowledge organization** ▪

Take one minute to memorize the following sets of letters:

C I A C B S A B C F B I I R S

Now turn to a neighbor and discuss the strategy you used to memorize these letters. What did your partner do differently?

The continuum of learning strategies

To think like an expert, we need to employ good study habits that build towards solid knowledge organization. Good study habits and teaching practices should pave the way from novice to expert. As teachers and students, we should think about scaffolding, building up to new concepts using the information someone already has mastered, to make our way to an expert understanding of something.

What strategies should we use? Instead of thinking of learning strategies as separate methods or as individual styles, we can place them on a continuum. On this continuum, we progress from memorization to deeper understanding. While a basic understanding of a topic is a good starting point, as scientists, our end goal is typically to be able to create something with our knowledge.

We want to become experts, which means we should be doing tasks that take us farther up the hierarchy (commonly called Bloom's taxonomy and represented by a pyramid) of abilities, or learning domains. In the same way, a good teacher should take their students from understanding to creation.

Research-tested Learning Strategies

Distributed Practice

Long-term retention

Whatever method you choose, research shows that you should try to learn over a longer period of time for good retention of information. The longer the length of time, the better your overall learning.

How do I use distributed practice techniques in the classroom?

- Don't be afraid to teach the same topic twice or in two different contexts (this may even help students understand the value of the topic!)
- Create multiple opportunities to interact with material (in class, during recitation, office hours)

How do I use distributed practice techniques as a student?

- Engage with difficult concepts when you first realize that they are hard and seek out practice problems in your text
- Attend office hours to hear and practice the same material in different ways
- Use several strategies to learn the material (quiz yourself, review with friends, use flashcards, do practice problems)

The Importance of Assessment

Types of Assessment

You may be most familiar with assessments in the form of problem sets and exams during a course. These are known as summative assessments. They test the total knowledge you have retained over the course of the class.

Good teachers also use formative assessments to determine what their students know and where their deficits are. These assessments happen throughout the quarter and determine what material a teacher may need to review or reteach. Formative assessment is a great way to catch misconceptions or correct mistakes before an exam.

Examples of formative assessments

In the classroom, common formative assessments (that you might not have considered a true assessment in the past!) are sharing out results from group work, multiple choice questions posed to the class, or perhaps anonymous feedback at the end of each class.

Outside the classroom, research shows that study methods that involve testing and retesting are some of the most effective ways to retain information (i.e. flashcards, mock quizzes, quizzed by a friend, etc.). These self-quizzes can be formative assessments. If you fail a self-given quiz, you may need to spend more time mastering a topic.

Prior knowledge and misconceptions

As mentioned in the previous section, formative assessments can also help you understand what your and your students' initial understanding of a subject is. Just because we have learned something before does not mean we have learned it correctly. Every student enters the classroom with prior knowledge, information or background in a subject that they have before taking the course. However, not all prior knowledge is created equal. Experts also may assume that novices entering a course have the prior knowledge they need to succeed, when that may not be true!

Video ▪ College students explain the seasons

The video shown during the session can be found on YouTube (Harvard graduates explain seasons).

Common misconceptions can be hard to avoid, especially if you're only ever tested once on a concept. Formative assessment is one way teachers and students can catch these misconceptions before they become ingrained.

How can you use formative assessment in the classroom as a TA?

- Take this session as an example! Provide active learning opportunities to students (multiple choice questions, think-pair-share, etc. Find more on the CTLO website!) and have them report out their results. Are they reporting what you expect to hear? If not, reteach and review the material.
- Provide opportunities for anonymous feedback. For example, you can solicit the unclear point from a lecture or recitation by giving students forms with the question, "What is still unclear?" or "What was the muddiest point from this session?"

How can you use formative assessment as a student?

- Find opportunities to get feedback from your professor or TAs. Find out what's confusing before turning in a problem sets!
- Attend and participate in class to receive feedback from your professor in real time.
- Go to office hours and ask questions. Come with examples you may struggle with and ask for help.
- Quiz yourself or your classmates and correct each other when you struggle.

▪ Multiple choice revisited ▪

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While one strategy is the best, is there still value to other strategies?

When combined with distributed practice, many of methods can be used to improve your retention, and maybe even your grade on a final!

• **Final reflections** •

What is one strategy you learned about in this session that you found interesting? How will you apply it as a student? As a TA?

If you're looking for more helpful strategies for studying, check out [the article "What Works, What Doesn't"](#) from Dunlosky et. al. in *Scientific American*.