

Make It Stick: Best Practices for Teachers

...students must be helped to understand such fundamental ideas as these:

- Some kinds of difficulties during learning help to make the learning stronger and better remembered.
- When learning is easy, it is often superficial and soon forgotten.
- Not all of our intellectual abilities are hardwired. In fact, when learning is effortful, it changes the brain, making new connections and increasing intellectual ability.
- You learn better when you wrestle with new problems before being shown the solution, rather than the other way around.
- To achieve excellence in any sphere, you must strive to surpass your current level of ability.
- Striving, by its nature, often results in setbacks, and setbacks are often what provide the essential information needed to adjust strategies to achieve mastery.

Brown, Peter C. (2014-04-14). *Make It Stick* (pp. 225-226).
Harvard University Press. Kindle Edition.

General:

1. Teach students about learning.
2. Use frequent quizzing, and make them count toward students' grade, even if it is low-stakes.
3. Create study tools that incorporate retrieval practice, generation, and elaboration.
4. Make practice exercises count toward the course grade (studies show students learn better when practice exercises carry consequences).
5. Design quizzes and exercises that spiral through previously-learned material.
6. Space, interleave, and vary topics and problems.
7. Be transparent. Show students the ways you incorporate desirable difficulties into your lessons. Tell them the perils of "illusions of knowing."

Specific:

Professor Mary Pat Wenderoth, Biology, University of Washington

1. Pose a question to class, and have them think about it. Write three possible answers on the board and vote on which one is correct by holding up 1,2, or 3 fingers. Now find someone with “different fingers” than yours, and talk to them to figure out who has the correct answer.
2. Testing Groups: give a problem to the group and have them collaborate on the final solution (no textbooks or notes). Select one student to go to the board to explain the concept. As the student (perhaps) struggles, other groups should question the student in such a way as to lead to the correct solution. The emphasis is on exploration and understanding.
3. Free Recall: tell students to spend ten (yes, ten) minutes at the end of each day sitting with a blank piece of paper on which to write everything they can remember from class. They must sit for ten minutes. After ten minutes, “go to your class notes and fill in the blanks. Focus on the material you forgot.”
4. Summary Sheets: Every Monday, students turn in a single sheet summarizing the previous week’s material (drawings, key ideas, arrows, graphs, etc.).
5. Learning Paragraphs (typically on Friday): A 5-6 sentence response to a “major” question from previous week’s lessons to stimulate retrieval and reflection. Read and make comments in class—perhaps show on document projector?

Comments from Professor Wenderoth: “This is the discipline that you have to have in order to succeed in the sciences. They’ve never thought about that, that every discipline has a culture. We teach them to think like the professionals they want to become. And when they fall, we show them how to get up again.”

Brown, Peter C. (2014-04-14). *Make It Stick* (pp. 233-234). Harvard University Press. Kindle Edition.

Michael D. Matthews, Psychology Professor, U.S. Military Academy at West Point

1. The pedagogical philosophy at West Point is founded on an instructional system called the Thayer method, developed almost two hundred years ago by an early superintendent of the academy named Sylvanus Thayer. The method provides very specific learning objectives for every course, puts the responsibility for meeting those objectives on the student, and incorporates quizzing and recitation in every class meeting.

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2. Quizzing is a way of shooting an azimuth...
3. the Thayer method worked well. In fact, such methods that include daily participation are especially likely to help students who are not prone to work hard on their own outside of class. The Thayer method is a strong encouragement for them to keep at it, and echoes what Mary Pat Wenderoth (above) has found in her empirical studies: that high-structure classes help students who lack a history of using effective learning techniques and habits to develop them and succeed in rigorous settings.

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Kathleen McDermott, Psychology Professor, Washington University, St. Louis

1. Kathleen McDermott administers daily low-stakes quizzes in a university course on human learning and memory. It's a class of twenty-five students that meets twice a week for fourteen weeks, minus midterms and a final exam. She gives a four-item quiz in the last three to five minutes of every class. The questions hit the high points of the lecture, the readings, or both. If students have understood the material, they will get all four answers right, but they'll have to think in order to do it. Anything covered in the course to date is fair game for a quiz, and she will sometimes draw from past material that she feels the students haven't fully grasped and need to review. McDermott sets the ground rules very clearly at the start of the term. She lays out the research on learning and the testing effect and explains why the quizzes are helpful, even if they don't feel helpful. Students are allowed to drop four quizzes across the semester. In exchange, absences need not be justified, and no missed quizzes will be made up. Students initially are not happy about the quiz regime... By the end of the semester, her students say that the quizzes have helped them keep up with the course and discover when they are getting off track and need to bone up.

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