Studies Find 'Desirable Difficulties' Help Students Learn
When learning seems "easy" students pick wrong study strategies
By Sarah D. Sparks
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Emerging research suggests that, contrary to what students may think, material that’s easy to understand is not always easy to learn—and working harder can help them hold on to what they’ve learned.

It’s a typical school scenario: A student strolls into class on test day, telling classmates he cramme the night before and certain he will ace the exam, only to be confounded by how little he actually remembers from hours of studying.

The cause of that pitfall is something cognitive researchers call the “stability bias,” which means that people rely too much on current memory to predict how well they will learn and remember something in the future. In other words, people think they will remember material better if it is initially easy to understand.

“When people make these judgments about how well they know something, they tend to think about how easy it is to process the information presented to them,” said Nate Kornell, the lead researcher on a study of stability bias scheduled to be published in an upcoming issue of Psychological Science and an assistant psychology professor at Williams College in Williamstown, Mass.

“Usually, that’s a good judgment; if it comes to mind quickly, that does tend to mean you know it well,” he added.

But that’s not always the case. A growing body of cognitive research, including Mr. Kornell’s study and a series of experiments presented at the American Educational Research Association conference earlier this month, suggests challenging material and study strategies—called “desirable difficulties”—help students remember material better and longer. Trying to take the route that feels easier can lead students to develop study habits that interfere with learning.

The findings suggest that it may not be enough to teach students study strategies. Students also must think about why and how they learn while studying, researchers say.

“It is counterintuitive for teachers in many instances, but I would rely on the findings rather than intuition to guide practice,” said Grover J. “Russ” Whitehurst, the director of the Brown Center on Education at the Washington-based Brookings Institution and the former director of the federal Institute of Education Sciences. “These findings deal with a pedagogical issue that’s ... missing in the curriculum materials given to teachers, and that’s a tremendous insight.”

While learning certainly does take place in the classroom via instruction and other kinds of guided activities, “as students progress from elementary school through secondary school and into college, an increasing amount of learning is expected to take place outside of the classroom via independent study,” said Katherine A. Rawson, an assistant professor of psychology at Kent State University, in Kent, Ohio. “So increasingly, a Memory Misperceived
In a series of experiments, students were asked to study lists of words and predict how many they could recall later on. Researchers found that students tend to overestimate how easy it is to learn material that seems easy to understand, such as text written in a large type font, and underestimate the value of study strategies that can appear more difficult, such as studying material four times vs. just once.
student’s academic success is going to depend on how well they can effectively regulate study."

That's because the same study strategies that have been found to be the most effective in helping students remember material longterm—among them self-testing long chunks of material and spacing out study sessions over days or weeks before the final exam—don't make students feel they've mastered the material. A student has to think harder to recall the definition of a word in a list of 30 than in a list of five, and it's also easier to remember material during the course of one long study session than to recall material studied several days earlier.

As a result, studies show a student will feel more confident that he or she has “mastered” material after using study strategies that are less mentally difficult: studying short chunks of material rather than the whole batch, or cramming in one long session before the test.

Unfortunately, those strategies don't work, according to a series of studies presented at the AERA meeting in New Orleans. For her studies, Ms. Rawson asked college-aged students to study a pack of 35 flashcards that paired Swahili vocabulary words with their English translations. The students were asked to practice until they got the vocabulary correct using either the entire stack or five stacks of seven cards each. They studied the cards until they had gotten each translation correct either once, five, or 10 times, before taking a quiz a week later.

There was no real contest in the most effective strategy, Ms. Rawson found. "There was substantial effect in increasing from practicing until correct once to five times correct, almost a three-fold improvement in performance,” she said. Also, “one big stack is better than five little ones.”

Yet test-takers didn’t predict that. Before the test, students predicted studying smaller groups of flashcards would be more helpful than studying the big stack, and they expected no benefit from studying more cards at once. They remembered about as many words as they expected to recall when studying the entire pack, 43 percent to 46 percent. Those who had studied the small stacks expected to remember nearly 60 percent of words but recalled only 17 percent.

“The less accessible something is, the more you learn when you encounter it, but the more accessible something is, the better you think you know it,” Mr. Kornell said.

In replication studies, Ms. Rawson found that students would give up early on effective study strategies, such as spacing out study sessions, because they did not see them as helpful.

**Bigger Isn't Better**

The stability bias works both ways: Not only do students give too little credit to effective study strategies that feel more difficult, but they can give more weight to ineffective strategies that make content feel easier to learn.

In the Psychological Science study, Mr. Kornell and researchers from Colorado State University in Fort Collins, Kent State, and the University of California, Los Angeles, asked online participants to predict how easily they would remember vocabulary words after studying them once or multiple times. Some of the words were presented in the standard font size, while others were shown four times larger—something that makes the text feel easier to process but prior research shows does not improve memory. In addition, for some words,
participants were told they would be allowed to study more than once.

The participants all predicted that studying the words in larger font would help them remember more than studying them multiple times. In fact, studying even once more improved word recall, while increased font size did not.

“For a teacher trying to design an assignment, the ideal thing is to put your students in a situation where they are challenged,” Mr. Kornell said. “You want them to eventually feel something is easy to process, but only because they’ve worked through it.”

Robert A. Bjork, the director of the Learning and Forgetting Lab at UCLA, calls this sort of challenge “desirable difficulties.” The more students have to exert their mental muscles to learn a concept or recall an idea, the stronger their memory and learning will become. Mr. Whitehurst cautioned, however, that researchers need to look at how students learn and remember in real classrooms. Word lists, as were used in Mr. Kornell’s and Ms. Rawson’s experiments, represent “a pretty artificial task that is far removed from actual learning in the classroom,” he added.

Mr. Kornell warned, also, that challenging students “leads to a lot more errors and makes people feel they are doing worse.”