# 2. Pretesting As a Key to Learning

In this *New York Times Magazine* article, Benedict Carey asks us to imagine that on the first day of a difficult college course, before we had studied anything, we were able to see the actual questions on the final exam. “Would that help you study more effectively?” he asks. “Of course it would. You would read the questions carefully. You would know exactly what to focus on in your notes. Your ears would perk up anytime the teacher mentioned something relevant to a specific question. You would search the textbook for its discussion of each question.” But that would be considered cheating!

What if you actually *took* the final exam at the beginning of the course? You would do terribly, of course, but the experience would have many of the same positive effects as the “cheating” scenario, sharply improving your overall performance.   
 How can doing badly on a test produce positive results? It’s because of what psychologists call the pretest effect – “the attempts themselves change how we think about and store the information contained in the question,” says Carey. Answering incorrectly primes our brain for what’s coming later. Failing the pretest provides more learning benefits than conventional studying. In other words, “Testing might be the key to studying, rather than the other way around,” he says. “As it turns out, a test is not only a measurement tool. It’s a way of enriching and altering memory… The test, that is, becomes an introduction to what students should learn, rather than a final judgment on what they did not.”

Why is conventional studying – reading, re-reading, highlighting – less effective? Psychologists believe it’s because we tend to misjudge and overestimate our knowledge and skills. “We are duped by a misperception of ‘fluency,’” says Carey, “believing that because facts or formulas or arguments are easy to remember *right now*, they will remain that way tomorrow or the next day. This fluency illusion is so strong that, once we feel we have some topic or assignment down, we assume that further study won’t strengthen our memory of the material. We move on, forgetting that we forget.” Fluency creates overconfidence and plays tricks on our judgment.

This insight about learning goes back to 1620, when Francis Bacon wrote, “If you read a piece of text through twenty times, you will not learn it by heart so easily as if you read it ten times while attempting to recite it from time to time and consulting the text when your memory fails.” In 1916, Columbia University psychologist Arthur Gates conducted experiments and found that the best way to memorize a Shakespeare sonnet was to spend a third of the time trying to memorize it and two-thirds of the time trying to recite it from memory. In effect, testing was a form of studying and constant improvement.

In the 1930s, Herman Spitzer, a doctoral student at the University of Iowa, wondered, if testing is so helpful, when is the best time to do it? He had 3,500 sixth-graders read an age-appropriate article and then divided them into groups, giving them quizzes at different time intervals and then measuring long-term retention. The students who were quizzed earliest had by far the best recall of the material they’d studied, even through all the students had studied for the same amount of time.

What’s going on here? “Retrieving a fact is not like opening a computer file,” says Henry Roediger III of the University of St. Louis. “It alters what we remember and changes how we subsequently organize that knowledge in our brain.”

Elizabeth Ligon Bjork and Nicholas Soderstrom at UCLA explored this idea further, giving some students pretests at the beginning of lectures and comparing long-term retention with students who didn’t take pretests. Pretested students did poorly on the tests, but as long as they were given the right answers and explanations soon afterward, the long-term result was significantly higher retention than the control group. Bjork and others have pondered why this happens. Here are some possible explanations:

• First, students get a glimpse of what the teacher intends to teach, which helps them see where instruction is headed and how the information fits into the course narrative. Students who get the pretest preview are more confident in judging what’s important and what isn’t. Teachers always try to signal this as they teach, but pretested students are more attentive and hear what they’re saying better. “Taking a practice test and getting wrong answers seems to improve subsequent study,” says Bjork, “because the test adjusts our thinking in some way to the kind of material we need to know.”

• Second, wrong guesses puncture students’ overconfidence about what they know. A student might be sure he knows that Canberra is the capital of Australia, but when confronted by a multiple-choice item with Sydney, Melbourne, and Adelaide as alternative answers, he’s suddenly not so sure. “If you’re studying just the correct answer, you don’t appreciate all the other possible answers that could come to mind or appear on the test,” says Robert Bjork, another UCLA professor. Pretesting is a kind of “fluency vaccine.”

• Third, retrieving is a different mental process than straight studying. The brain is digging out information, along with a network of associations, and that alters and enriches how the network is re-stored. Guessing operates in similar fashion. “Even if the question is not entirely clear and its solution unknown,” says Carey, “a guess will in itself begin to link the question to possible answers. And those networks light up like Christmas lights when we hear the concepts again.”

This suggests a limit on the usefulness of pretesting: quizzing students in Arabic or Chinese when they have no prior knowledge or associations won’t be helpful. “The research thus far,” says Carey, “suggests that pre-finals will be much more useful in humanities courses and social-science disciplines in which unfamiliar concepts are at least embedded in language we can parse.”

“Exams Measure What We Know, But They’re Also One of the Best Ways to Learn” by Benedict Carey in *The New York Times Magazine*, September 7, 2014, <http://nyti.ms/1B2o4Sy>;

Carey’s new book is *How We Learn: The Surprising Truth About When, Where and Why It Happens* (Random House, 2014)

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