

Cognition Studies Offer Insights on Academic Tactics

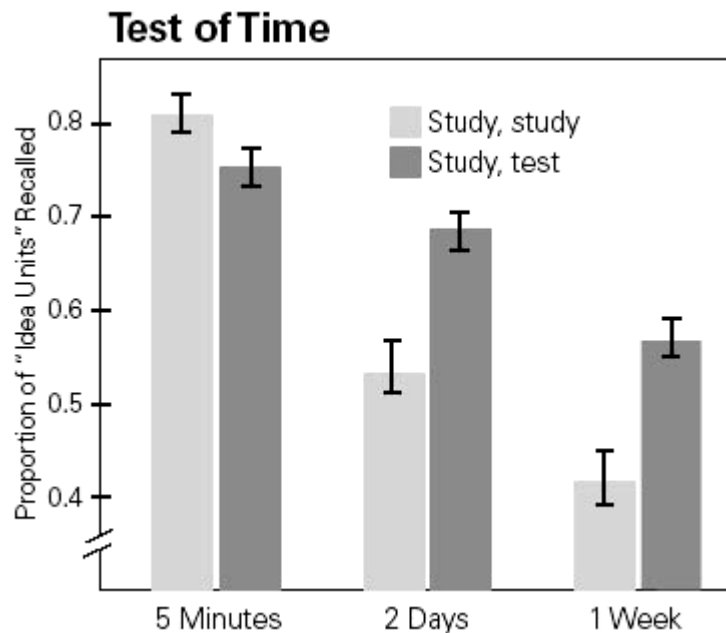
U.S.-funded projects eye ways of helping students remember more material.

By Debra Viadero

Most textbooks present learning material in the same sequence: A chapter followed by a practice test, then another chapter, and so on. But what if practice tests were given weeks later? Would students retain more of what they had learned?

Probably, according to scientists taking part in a 4-year-old research program on cognition and learning that is being financed by the U.S. Department of Education's Institute of Education Sciences. The program's aim is to translate basic research in the cognitive sciences into practical applications for education.

"Over the past 30 years, we have learned an enormous amount through the cognitive sciences about how people think, or process information, and how we learn new information," said Lynn Okagaki, the commissioner of the institute's National Center for Education Research, which oversees the grant program. "For the most part," she added, "the knowledge that has been gained has not made it into classroom practice."



But a common thread among several of the programs is their focus on the role of memory in learning, noted Harold E. Pashler, a psychology professor at the University of California, San Diego.

The questions such studies address include: Is cramming a good study strategy? Does it hurt or help to guess at answers? How critical is it to give students feedback on wrong answers? Can just taking a test improve learning?

At Washington University in St. Louis, one group of IES-funded researchers has learned that taking a test, in and of itself, can bolster learning.

Psychology professor Henry L. Roediger III and his research partners had college students read prose passages covering general scientific topics. Afterward, some students were given from one to three tests with open-ended questions in which they were asked to recall what they had read. Other groups restudied the material, but were not given tests.

Five minutes after the study or test sessions ended, all the students were tested. The study-only group did better, recalling more of what they had read than the quiz-only group. A week later, though, the test-taking group had the better grasp of the material—even though they had had fewer opportunities to restudy the original material.

"I usually think of my tests as being for assessment purposes, but giving someone a memory test and having them retrieve information from memory actually changes memory," said Mr. Roediger.

Mr. Roediger's colleagues have also found that the learning benefits are greatest when the tests are composed of short-answer rather than multiple-choice questions. That's a point on which several of the studies converge: Learning seems to stick when students are forced to generate their own answers to questions or their own definitions of words and concepts.

When to Review?

The students who had reviewed the material at the one-month point remembered three times more than those whose practice sessions took place a day or a week later.

Feedback Proves Key

The students, most of whom were considered at risk for academic failure, learned four times more than peers who were given flashcards, papers, and other supplies and told to study the same material themselves.

But which cognitive-science-inspired component, the researchers wanted to know, had been most successful? They wondered, too, whether students' learning suffered when they made incorrect guesses to the questions posed in the tutoring program.

In a paper due to be published in a forthcoming special issue of *Psychonomic Bulletin and Review*, the researchers say the answer to the second question is no. Students who guessed incorrectly as part of the tutoring program performed on par with those who got the answers right the first time. The key was to provide corrective feedback. In fact, among all the program's experimentally driven components, feedback turned out to be most important for learning.