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### Testing Can Be Useful for Students and Teachers

ScienceDaily (Oct. 5, 2012) — Pop quiz! Tests are good for: (a) Assessing what you've learned; (b) Learning new information; (c) a & b; (d) None of the above.

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The correct answer?

According to research from psychological science, it's both (a) and (b) -- while testing can be useful as an assessment tool, the actual process of taking a test can also help us to learn and retain new information over the long term and apply it across different contexts.

New research published in journals of the Association for Psychological Science explores the nuanced interactions between testing, memory, and learning and suggests possible applications for testing in educational settings.

#### Appropriate Multiple-Choice Tests Can Foster Test-Induced Learning

One of the criticisms of multiple-choice tests is that they expose test takers to the correct answer among the available options. This means that you only have to recognize the correct answer, you don't have to rely on retrieval processes that are known to enhance later recall. Psychological scientist Jeri Little and her colleagues investigated whether multiple-choice tests could actually be designed to call upon these

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retrieval processes. If the alternative answers are all plausible enough, they hypothesized, test takers would have to retrieve information about why correct alternatives are correct and also about why incorrect alternatives are incorrect in order to be able to distinguish between the two. In two experiments, the researchers found that properly constructed multiple-choice tests can, in fact, trigger productive retrieval processes. They also found that multiple-choice tests had one potentially important advantage over tests in which only the question is presented. Both kinds of tests helped test takers remember the information they been tested on, but only the multiple-choice tests helped them recall information related to incorrect alternatives. These findings suggest that multiple-choice tests can be constructed in ways that exercise the very retrieval processes they have been accused of bypassing.

Jeri L. Little of Washington University in St. Louis was one of the authors. Published online October 3, 2012 in *Psychological Science*.

#### Testing Enhances the Transfer of Learning

Many studies have shown that having to retrieve information during a test helps you remember that information later on. But most research on this "testing effect" has measured the ability to recall information in the form of a final test that's similar to the initial test. Much less is known about the whether testing might also promote the application -- or *transfer* -- of learning. In this article, psychological scientist Shana Carpenter reviews recent studies that have begun to address this issue, especially as it relates to the benefits of testing on our ability to transfer information across multiple contexts, test formats, and knowledge domains. The few studies on this topic have, so far, reported robust benefits of testing on the transfer of learning. Carpenter highlights the need for research that explores the potential of tests to promote not just the direct retention of information, but also the application of knowledge to new

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Shana K. Carpenter of Iowa State University was one of the authors. Published in the October 2012 issue of *Current Directions in Psychological Science*.

### Testing Can Strengthen Short-Term Memory for Cross-Language Information

Researchers know that repeated testing leads to better long-term memory for information than does repeated study, but they're unsure of why this is the case. Psychological scientist Peter Verkoijen and his colleagues hypothesized that *studying* may strengthen the aspects of a memory trace that pertain to the way words look and sound, while *testing* may strengthen the aspects of a memory trace that have to do with the meaning of words. The researchers had Dutch-English bilingual participants learn several lists of words in Dutch. In some instances they were tested after an initial study period (*test* condition), and in others they were told to study the list again (*restudy* condition). Participants' memory for the words was then tested in Dutch or English. The main finding shows that participants in the test condition were better at recognizing the words they had been told to learn when they took the final test in English (across-language) but not when they took the final test in Dutch (within-language). These results suggest that using a test as a method of learning -- strengthening the meaning of words -- was useful for the participants when they weren't able to rely on the visual or phonological familiarity of words because the words were presented in different languages. The results lend support to the researchers' hypothesis that restudying and testing strengthen memory in different ways.

Peter Verkoijen of Erasmus University Rotterdam was among the authors. Published in the June 2012 issue of *Psychological Science*.

### Active Retrieval Promotes Meaningful Learning

When researchers think about the retrieval of information from memory, they often focus on retrieval as a way to figure out what people have already learned. But psychological scientist Jeffrey Karpicke argues that retrieval processes play a central role in the active process of learning as it happens. Karpicke outlines the retrieval-based learning perspective and discusses the role of retrieval in learning, the means by which it can enhance learning over the long-term, and the ways in which it can help to promote meaningful learning.

Jeffrey D. Karpicke of Purdue University published the article in the June 2012 issue of *Current Directions in Psychological Science*.

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