

Thank your teachers: test-takers remember more

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We expect that the majority of those reading this piece are all too familiar with the tests and quizzes that fill the academic landscape. Although most view these as (at best) a necessary evil—people need some way of tracking academic progress—it turns out that they actually play a useful pedagogical function: an array of studies show that people who have undergone testing perform significantly better than those who simply attempted to study but weren't quizzed on the results.

Even though the benefits of testing are apparently widely known to those in the field, there was no obvious mechanism linking a quiz to improved performance. A paper in today's issue of *Science* provides a pretty compelling case for the ability of testing to improve mnemonic techniques.

Meet my friend Roy

A mnemonic is simply a mental trick that aids recall; often they're acronyms or phrases that contain the first letters of a set of technical information, like "Roy G. Biv" to represent the order of colors in the spectrum.

In the *Science* study, the mnemonics were pretty simple, as the task at hand was memorizing Swahili vocabulary. In an example given by the authors, the term "wingu" translates as "cloud." A simple mnemonic might be to have "wingu" prompt for "wing," which then evokes a cloud-filled sky. In the authors' terminology, "wing" acts as a mediator, enabling the rapid recall of the correct English term.

The authors hypothesize that testing helps users generate more effective mediators, explaining at least some of its impact on improved performance. To test this, they put 118 individuals through a crash course in Swahili vocabulary, dividing them up into a number of groups. One group simply had the chance to study terms, and then repeat the study process. A second was introduced to the terms, and then promptly given a quiz; a restudy period followed the quiz. All participants were asked to report any mediators they used to aid recall.

When the serious testing began, the groups were split into three. One subset of the participants were simply given Swahili terms; a second had their own mediators reported back to them; the third was told to recall whatever mediator they had used.

If the authors' hypothesis was right, then we'd expect that the test-restudy portion of the recall-only group would outperform the peers who had simply studied. This would indicate that testing helped store a memory of the mediator. The same should apply to those who had their mediators provided to them during recall, which would indicate that testing helps encode the association between a mediator and the target term.

When the final tests were administered, the benefits of the earlier quizzes were readily apparent: the scores of the test-restudy group increased by three-fold compared to their study-only peers, and the improvement showed up in all three test formats.

More significantly, both of the research predictions held true. Testing produced a significant improvement in recall when a mediator was read back to the participants, and an even bigger boost (17 percent) when the participants were simply asked to recall their mediators.

The authors also checked the impact of mediator recall by asking the participants whether they remembered it. Not surprisingly, performance plunged if the mediator couldn't be recalled.

So, testing seems to enhance both the memory of the mediator and its ability to prompt the recall of the term it's associated with. Why would that be the case? The authors suspect that the process of taking a test causes test takers to identify poor mediators and replace them with improved versions. The study's participants reported that this replacement process occurred at a slightly elevated rate among test takers (25 vs. 19 percent).

The big limitation of this study seems to be that it applies to rote memorization; that may help with subjects that are a bit more complex than vocabulary, but it may not explain all of the impacts of test taking. Regardless, the results indicate that the next time you get hit with a surprise quiz, you should recognize that it's being done for your own good.

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