

How Science Can Improve Teaching **Teachers need a trusted source to tell fads and fallacies from proved methods**

By Daniel T. Willingham *Scientific American* August 22, 2012

Most teachers would agree that it is important that students remember much of what they read. Yet one of the most common sights on high school and college campuses across the land is that of students poring over textbooks, yellow marker in hand, highlighting pertinent passages—which often end up including most of the page. Later in the semester, to prepare for their exams, students hit the textbooks again, rereading the yellow blocks of text.

Studies have shown that highlighting and rereading text is among the least effective ways for students to remember the content of what they have read. A far better technique is for students to quiz themselves. In one study, students who read a text once and then tried to recall it on three occasions scored 50 percent higher on exams than students who read the text and then reread it three times. And yet many teachers persist in encouraging—or at least not discouraging—the techniques that science has proved to fall short.

This is just one symptom of a general failure to integrate scientific knowledge of the mind into schooling. Many commonly held ideas about education defy scientific principles of thinking and learning. For example, a common misconception is that teaching content is less important than teaching critical thinking skills or problem-solving strategies. Scientists have also long known that kids must be explicitly taught the connections between letters and sounds and that they benefit most when such instruction is planned and explicit. Yet some reading programs, even those used in large school districts, teach this information only if an instructor sees the need.

It is easy to argue that teachers ought to do a better job of keeping up with science, but teaching is already a labor-intensive profession. And it is difficult for the nonspecialist to separate scientific research from the usual flood of quackery and pseudoscience. Peddlers of expensive and supposedly research-based nostrums lobby school districts. Other products that may have scientific validity have not yet been thoroughly tested. For example, theories of mathematical learning suggest that linear (but not circular) board games may boost math preparedness in preschoolers, but the idea needs large-scale testing.

How are educators supposed to know which practices to use? An institution that vets research and summarizes it for educators could solve the problem. Medicine provides a precedent. Practicing physicians do not have the time to keep up with the tens of thousands of research articles published annually that might suggest a change in treatment. Instead they rely on reputable summaries of research, published annually, that draw conclusions as to whether the accumulated evidence merits a change in medical practice. Teachers have nothing like these authoritative reviews. They are on their own.

The U.S. Department of Education has, in the past, tried to bring some scientific rigor to teaching. The What Works Clearinghouse, created in 2002 by the DOE's Institute of Education Sciences, evaluates classroom curricula, programs and materials, but its standards of evidence are overly stringent, and teachers play no role in the vetting process. Teachers also play no role in the evaluation, and their participation is crucial. Researchers can evaluate research, but teachers understand education. The purpose of this institution would be to produce information that can be used to shape teaching and learning.

It is also important that insights provided by a clearinghouse come from basic science. Many teachers, for instance, need to be disabused of the notions children have different “learning styles” and that boys' brains are hardwired to be better at spatial tasks than girls'. This job of bringing accurate scientific information about thinking and learning to teachers might arguably fall to schools of education, states, districts and teachers' professional organizations, but these institutions have shown little interest in the job. A neutral national review board would be the simplest and quickest answer to a problem that is a big obstacle to broad improvement across many schools.

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