



## The Best Ways to Make Schoolchildren Learn? We Just Don't Know

By Sharon **Begley**  
10 December 2004

HELEN NEVILLE HAD never heard of "visual math," and even after her seventh-grade son, Justin, tried to explain that it had something to do with imagining squares and cubes of different sizes, the better to grasp number systems not based on 10, she was still perplexed. So she marched down to the middle school Justin attended in Eugene, Ore., and confronted the math teacher.

"What are you trying to teach them?" Prof. Neville, a neuroscientist at the University of Oregon, recalls asking. "What's the evidence it works?" The teacher said she had read that Einstein "visualized mathematics," so this is what she had come up with. "It made no sense,"

latter approach did not give kids a deeper, more enduring knowledge. Those who learned the one-variable- at-a-time idea through direct instruction extended and applied their newfound knowledge just as well as those few who discovered it by themselves.

"I'm not saying kids never benefit from discovering something on their own," says Prof. Klahr. "But especially for complicated, multi-step procedures, there are just no data that discovery learning offers any benefit."

Supporters of discovery learning say that Prof. Klahr's study was too extreme, and that in real life students doing discovery learning get more guidance from their teachers. But that just raises another question: What ratio of discovery learning to direct instruction is ideal?

Once again, no one knows for sure.

The mismatch between claims about the best way to get kids to learn and what well-designed scientific studies show is striking. Recognizing that, in 2001 the U.S. Education Department called for making education "evidence-based." Like evidence-based medicine, it means using only teaching methods that are shown to work in solid studies (analogous to clinical trials of new drugs). Or, as Prof. Neville says, "we need the education equivalent of an FDA that would not allow schools to implement a practice unless it had empirical support."

As I'll discuss next week, we're a long way from that.

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