Thinking about Learning

A psychology professor offers suggestions as to how teachers can make learning more meaningful.

By Daniel T. Willingham

Teachers make assumptions all day long about how students best comprehend, remember, and create. These assumptions — and the teaching decisions that result — are based on a mix of theories learned in teacher education, trial and error, craft knowledge, and gut instinct.

Such gut knowledge often serves us well. But is there anything sturdier to rely on? Cognitive science is an interdisciplinary field of researchers from psychology, neuroscience, linguistics, philosophy, computer science, and anthropology who seek to understand the mind.

Cognitive science has shown that what ends up in a learner's memory is not simply the material presented. Rather, it is the product of what the learner thought about when he or she encountered the material. If students think about the meaning of material, it will end up in memory.

This principle illuminates the fleeting nature of material that has been learned by rote and also suggests how to help students develop deep and inter-connected knowledge. How can teachers be sure that students are thinking about meaning?

Anticipate what the lesson will lead students to think about.

This may make it clear that some assignments designed with one purpose in mind will achieve another.

- A teacher who has students bake biscuits so that they will appreciate what escaped slaves ate will have students who think for 30 seconds about the relation of the baking to the course material and then 30 minutes thinking about measuring flour, mixing dough, etc.
- A teacher who asks students to draw posters depicting the events in the book they have just read will have students who spend much more time thinking about how to draw things than about the plot of the book.

Use discovery learning carefully.

Considerable care must be taken to ensure that the path of students' thoughts will be a profitable one, as students will remember incorrect "discoveries" just as well as correct ones.

Advocates of discovery learning often point out that children learn to use some computer software rapidly and effectively merely by "playing around with it". This may be true, but that learning environment is also quite structured in that profitless actions are immediately discouraged.

Few classroom activities can achieve this kind of structure. How much anatomy, for example, will students learn by "playing around" with frog dissection?

Design reading assignments that require students to actively process the text.

Techniques such as writing outlines, self-examination during learning, review questions, and previews can encourage or require students to integrate the material and to thereby process (i.e., think about) meaning.

These different techniques are more or less effective in different situations, dependent on the specific materials being studied. However, using any strategy that encourages the processing of meaning is almost always better than not using one.

Design lessons so that students can't avoid thinking about the lesson's goal.

Since the goal of the biscuit baking lesson was not really about biscuits but to encourage students to consider the experience of escaped slaves, a more effective starting point for that lesson would be to ask students leading questions that encourage consideration of what escaped slaves' experiences would be like — how they would obtain food, what the constraints were, and so on.

The book report poster would have been more likely to achieve the teacher's goal (the connection among the book's events) if the students had been asked to isolate the events and connections among the book's events (e.g., this event moves the character towards his goal).

Design tests that lead students to think about and integrate the most important material.

Simply announcing the general topics to be covered on an exam leaves the specifics of what to learn up to the student. Even if the teacher emphasizes that deep understanding will be tested, most students will study only factual information.

Suppose, however, that the teacher provides a list of integrative questions for the students to study from, such as "Describe why the attack on Pearl Harbor was a strategic mistake by Japan, given its war aims." Suppose further that the students know that the examination will consist of five questions from the 30-question list that they have been given, with an essay to be written on each of the five questions.

Students will very likely restrict their studying to the 30-question list, but that might be just fine with a teacher who feels that any student who can answer those 30 questions has mastered the material.

In summary, in the early stages of learning students may acquire bits of knowledge that aren't well-integrated into a larger picture. Research tells us that deep, connected knowledge can be encouraged by getting students to think about the interrelation of the various pieces of knowledge that they have acquired.

(Adapted with permission from* "American Educator, Summer 2003. *Dr. Willingham is associate professor of cognitive psychology and neuroscience at the University of Virginia.)