RON BRANDT

# On Knowledge and Cognitive Skills: A Conversation with David Perkins

A founding member of Project Zero, David Perkins has also served as co-director of this Harvard project since 1971. He has conducted long-term programs of research in the areas of creativity, problem solving and reasoning, and learning in the arts, the sciences, and everyday life. Here he discusses a new program designed to help teachers "connect" thinking strategies with subject matter instruction so that students become better managers of their thinking and learning.

ASCD Photograph

**David, some researchers are doubtful that schools should even try to teach general thinking skills. Why?**

One reason for this skepticism is a large body of research on "expertise." Investigators have studied people who are experts in a particular domain—playing chess, doing physics, writing novels. This research has established that good thinking in a domain depends on a very rich knowledge base in that specific domain. Therefore, the question arises, "What good are general skills if so much depends on all this specific knowledge?"

**But some people who know that research—including you—think that general skills are also important?**

Yes. There's an interesting record of efforts to teach general thinking skills, and I would say there have been some

significant successes. But I can understand the skeptics. There have certainly been many instances where an intervention didn't have much effect. This is particularly true in mathematical problem solving, where we saw a number of efforts, most of them prior to about five years ago, to teach people strategies like "break the problem into parts." By and large, attempts to teach kids strategies like that had very little impact on their problem-solving competence in mathematics.

**I'm wondering where cognitive psychologists agree and where they disagree?**

There is broad agreement, I would say, that it's important to teach the subject matters in a thoughtful way. We can't simply go on dumping facts and algorithms into people. There's broad agreement that students need to become reflective about their subject matter learning and their subject matter skills. They need to become strategic learners: strategic in their mathematical problem solving, strategic in their reading, strategic in their thinking about literature.

But there is disagreement on the utility of general skills, such as "breaking problems into parts" or "thinking on the other side of the case."

**I know lots of classroom teachers who are doing things they consider teaching thinking. The students do what they're asked to do, and they seem to be thinking. Aren't they learning to think?**

Well, that relates to what I call "the central myth of teaching thinking," which says that to get students to think better, you get them to think more. Now, many teachers who become interested in teaching thinking do get kids to think more: they have more dialogue in the classroom; they try to ask higher-order questions; they raise complex problems. And that's good as far as it goes. But often these teachers don't discuss the thinking strategies explicitly, so the kids don't become aware of them. And often the teachers are doing all the questioning, so the kids don't develop self-control of their thinking. The result? Students who are thinking more—with the teacher's leading—but who aren't learning to think better in any real sense.

**Psychologists surely wouldn't think it pointless for a history teacher to ask, for example, "What are some ways the Vietnam War was similar to and different from the American Revolution?" That's an example of using what some people call a thinking skill—comparing and contrasting—in the context of academic subject matter.**

I'm sure most psychologists would think it's fine to ask questions comparing and contrasting revolutions. However, some would be skeptical about teaching a specific strategy for comparing and contrasting in a separate course, and then expecting students to apply it spontaneously in social studies class.

**And they might question the assumption that once the students had the experience of comparing those two situations, they would be better at comparing other things.**

That's an important point. They would indeed doubt whether the kids were learning anything beyond comparing and contrasting revolutions. Moreover, they'd point out—and I'd agree—that thinking strategies often fall flat because the students lack the subject matter knowledge to apply them. Yes, in a social studies class, a lot of kids can say something when you ask for comparisons and contrasts about revolutions. But in a math class if you put a problem on the blackboard and ask, "How can we break this problem into parts?" most of the kids probably won't come up with anything. The kids don't have a deep enough understanding of the math concepts involved to be able to intelligently break the problem into parts.

**Is it simply a matter, then, of just teaching the content better?**

A good number of people put it that way, but some people put it that way in a much more reductive fashion than others. When some people say, "We simply need to teach content better," what they mean is (to caricature just a little bit) more homework, longer school hours, and long lists of facts and rules to commit to memory, in the spirit of "cultural literacy."

When other people say we need to teach content better, what they mean is to go for conceptual understanding: to go for reflection and strategizing. That's a very different vision of "just teaching content."

**What do *you* think?**

It seems to me that there are two fundamental challenges. One is conceptual understanding of the subject matter—there are profound problems of conceptual understanding of everything from fractions to the Bill of Rights. The other is thinking skills, or cognitive skills, or whatever you want to call them. I think we need to bring those together at one and the same time. We need to teach for better comprehension of core concepts in the subject matter, *and* we need to equip kids with the kinds of patterns

**Thinking strategies often fall flat because the students lack the subject matter knowledge to apply them.**

of thinking—thinking organizers, if you like—that help them to manage their thinking and their learning.

For example, imagine a kid facing a fractions problem who doesn't understand fractions and who's weak in general problem-solving skills. Well, this kid is in trouble! And that's the typical case, because most kids don't understand fractions and most kids aren't strong on their general mental management either. We have to work on both fronts in a coordinated and integrated way.

**Are these patterns you're talking about what you sometimes refer to as *frames*?**

Yes. You know, it's hard to find the right words for what we sometimes call "thinking skills." I don't like the word skills very much, partly because it sounds like something you can get better at through drill and practice. But because better thinking seems to be mostly a matter of reorganizing your thinking, I sometimes refer to "thinking organizers." On the other hand, organizers sounds too linear and systematic when sometimes the organization you want to adopt is strategic *dis*organization. So sometimes I use my own phrase, *thinking frames*. A thinking frame is anything you use to guide, direct, or shape your thinking, including things like "hang loose for five minutes." *Frame* may not be the best term, but the English language doesn't seem to give us just the right words.

**In the ASCD book, *Dimensions of Thinking*,[1] we listed what we thought were some of the thinking skills schools should teach. We did our best, but I was uneasy about it. For example, we listed *representing*. Now, there's a skill people need; we do have to be able to represent information in various ways—but I asked myself, "Is *representing* a single skill or a whole class of things?"**

Well, on the one hand, it certainly seems reductive to call *representing* a single skill. The art of representing involves facility with many different kinds of representations: with language, with pictures, with various

**A thinking frame is anything you use to guide, direct, or shape your thinking, including things like "hang loose for five minutes."**

types of graphs. There's a different craft to each of these. In that sense, the language is unfortunate.

However, there's another sense in which the language is all right. We certainly do want to honor representation as terribly important. Representations are the vehicles of thought; they not only carry our thinking from one person to another, as when we make a graph, or write an essay, or give a speech, or have a public conversation like this, but also they are the vehicles for our private thinking. We think on paper to a considerable extent: writing equations, making notes, making concept networks. Even when we think in our heads, a lot of our thinking is mediated by talking to ourselves silently or by wielding mental images as in Einstein's famous thought experiment of riding on a light wave. I do think that students and teachers should learn to pay attention to the representations they are using, to try to choose representations well, to change representations when the going gets rough, to see if they can find a representation that opens a path.

**You seem to be saying that educators need to be searching for a handful of patterns—frames, skills, tactics, processes, strategies, whatever we call them—that we think are so important that people ought to be able to use them consciously. Then we should try to make sure that teachers become thoroughly familiar with these patterns as tools they and their students can use.**

That's a rather nice formulation, actually. Some of these tools, like comparison and contrast, are in fairly common use already, but it's often not self-conscious, deliberate use. We need much more awareness on the part of the kids that a certain move is being made here, that it's a good move to make, and that you, the learner, should be able to make that move yourself autonomously.

Other tools are also very important but aren't in common use in much subject matter instruction. For instance, the simple tool of "pro'ing and con'ing" is not seen all that often, except perhaps in subject matters like health education. My favorite, "knowledge as design," where you ask about the purposes of things, is rarely seen. Teachers seldom talk about the purpose of a scientific theory. They just say, "This is the way the world is." So we need to raise con-

**"Connections"**

"Connections," a program for integrating the teaching of thinking with subject matter instruction, is being developed collaboratively by groups at The Regional Laboratory for Educational Improvement of the Northeast and Islands and the Harvard Graduate School of Education, under the directorship of David Perkins. Some details of "Connections" are described in "Infusing Thinking Through 'Connections'," an article by J. Mirman and S. Tishman in the April 1988 issue of *Educational Leadership*. Parts of "Connections" are expected to be available for general use in late 1990 or early 1991.

For more information, contact either the author (at the address given at the end of this article) or The Regional Laboratory, 290 S. Main St., Andover, MA 01810; (508) 470-1080.

sciousness about the tools that are commonly used and put in place other tools that we don't see very often.

**I'd like to ask how this applies to the everyday world. One common situation is problem solving. For example, suppose I go to a meeting at a place I've never been before and I can't find the meeting room. That's a relatively small problem, and I go about dealing with it, I hope successfully. But what about much bigger problems? I'm told that thousands of acres of rain forest are being denuded every day, disappearing forever, and I'd like to help solve that problem somehow. If I've learned to solve problems in general, does that mean I can do a better job of helping solve a big, complex problem like that?**

In my view, assuredly yes. However, it's also important that you know a lot about rain forests and about politics and a few other relevant domains, or that you have access to that knowledge. It's often the case that you can do very effective group problem solving by having an expert problem solver in the group, but also having people who have expertise in particular facets of the problem.

**"Connections" is an effort to try to confront the need for conceptual understanding of subject matter on one hand and the need for general thinking skills on the other.**

**So having in our heads certain patterns, frames, that we can consciously call upon will help us be better thinkers.**

In my view.

**You've been working for several years on a new program, "Connections." I assume that it's an attempt to put in practice your current view of how thinking can best be taught.**

Yes, "Connections" is an effort to try to confront the need for conceptual understanding of subject matter on one hand and the need for general thinking skills on the other. It's a program designed to help teachers integrate the teaching of particular thinking strategies with their subject matter instruction. The strategies are designed to deepen subject matter understanding as well as improve decision making, problem solving, and so on. The teacher gets guidelines and examples to work with and very quickly moves into looking at history, say, from the standpoint of decision making, or looking at math from the standpoint of design. It's getting the two together; that's why we call it "Connections."

**David, will you try to summarize the highlights of what you've said about teaching general thinking skills?**

To me, it all boils down to the interconnectedness of subject matter and general thinking skills and to the culture of the classroom.

Any subject matter has a particular content, involves some strategies and skills specific to it, and invites application of some thinking organizers that cut across different subject matters—looking for the other side of the case, breaking a problem into parts, comparing and contrasting, and so on. Now these general thinking organizers won't be very useful without some specific knowledge to operate on. But the specific knowledge won't serve the learner very flexibly or generatively unless the learner has general thinking organizers that help in applying it—unless the learner knows to ask powerful questions like, "What's the other side of the case?" or "What's the analogy with current events?"

In other words, these levels of generality in knowledge, all the way from a fact like "1492" to a general thinking organizer like "What's the other side of the case?" form a team. They function together, in an interconnected way. And we as educators need to work harder to get that team in place.

The challenge is not particularly in the laboratory; the challenge is in the classroom. Now certainly there are very important issues we need to look at in the laboratory. But I think we know enough now to do some wonderful things in schools. Certain interventions have already produced impressive results in classrooms. The greatest challenge, though, is to find practices that work on a wide scale for real schools and real teachers and real kids, that aren't a big hassle to implement, that don't fall afoul of community politics, or if they do, make such a good case that they win.

It's time to work very hard to use what we know on a wide scale in the real world. I think we'll see a lot of that in the next decade, and I feel confident that it can make a big difference, both in students' thinking and their subject matter understanding.□

[1]R.J. Marzano et al., (1988), *Dimensions of Thinking: A Framework for Curriculum and Instruction* (Alexandria, Va.: Association for Supervision and Curriculum Development).

**David Perkins** is Co-Director, Project Zero and the Educational Technology Center, Harvard University, Graduate School of Education, 315 Longfellow Hall, Cambridge, MA 02138. **Ron Brandt** is ASCD's Executive Editor.

**What Would You Ask David Perkins?**

If you have follow-up questions to this conversation, send them to *Educational Leadership* by March 1. We'll refer selected questions to David Perkins and publish his answers in a forthcoming issue. Please include your name, address, and phone number and address your envelope:

Questions—Ron Brandt
ASCD
1250 N. Pitt St.
Alexandria, VA 22314-1403

Copyright © 1990 by the Association for Supervision and Curriculum Development. All rights reserved.