

Overview

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In classrooms here and there, students are beginning to ask "What strategy did you use?" instead of "What's the right answer?" Frances Link reports that this encouraging development results from using *Instrumental Enrichment*, a program we discussed with her in April 1980.

Instrumental Enrichment is one of many programs being used by schools in an effort to improve intellectual performance. Some, perhaps most, may be of little value, their authors' intentions notwithstanding. Nevertheless, interest in such programs seems to be increasing.

Instrumental Enrichment, for example, is now taught to 23,000 students in 300 school systems. Do those students really become better thinkers? That's difficult to say because the issues are murky and evidence is conflicting. In Ann Arbor, Michigan, 32 IE students made much greater gains (1½ years) on a standardized reading test than comparable students in remedial reading classes—but it's risky to generalize from such a small number.

Students who take the course often increase their IQ scores by an average of 10 to 20 points—but detractors say they haven't become more intelligent; they have simply learned to respond more accurately to items appearing on mental ability tests. And of course Reuven Feuerstein, inventor of the program, developed it precisely because he contends that intelligence tests don't really measure aptitude for learning.

In this issue John Bransford and Nancy Vye compare Instrumental Enrichment with two other leading programs, *Philosophy for Children* and *Analytical Reasoning*. What interests me is not the effectiveness of particular programs but what they represent: the idea that we may be learning how to teach cognitive skills directly, rather than relying on the circuitous methods that have been used with varying effectiveness for centuries.

One reason for suggesting this pos-

sibility is the progress being made by "information processing" psychologists in understanding cognition. Robert Sternberg summarizes their work, contending that "intelligence consists of a set of developed thinking and learning skills" that can—to some degree, at least—be taught. He lists nine such skills, including problem identification and strategy selection.

Another source of knowledge about thinking is the tradition begun by Jean Piaget. Mary Carol Day explains how schools may be able to use recent developmental research. Many adolescents and adults don't demonstrate formal operational thinking even though Piaget insisted they had the capability to do so. The reason appears to be that some people lack experience in particular content areas and strategies applicable to those areas. In other words, all of us may think more concretely in areas we know little about and more abstractly in areas we are familiar with. If so, schools can do something about that.

A third way of learning about thinking is through technology. Raymond Nickerson observes that most of our knowledge about aerodynamics came from the attempt to build flying machines. Now, scientists are deciphering mental processes by trying to build thinking machines. For example, Marcel Just (1981) of Carnegie-Mellon University is working with machines that can read: not just distinguish letters, but "understand" the meaning of words and sentences. Hand in hand with development of such sophisticated tools will surely come more information about the workings of that most remarkable tool, the human mind.

Still another source with fascinating implications for education is research on the human brain. Studies using animals have provided much useful information about how brains work, but they don't fully explain the complexity of the human cerebral

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OVERVIEW (continued from page 3)

cortex. In the last 20 years, medical research with humans has produced new findings on hemispheric differences, memory, language production, and so on, much of it in connection with attempts to help patients with diseased or damaged brains. We asked four authorities—Robert Sylwester, Jeanne Chall, Merle Wittrock, and Leslie Hart—to comment briefly on implications for education.

We must not, of course, overstate what we know or can do. In a recent conversation Nickerson reminded me that each time we learn something more about the brain, "we also discover a little more about the depth of our ignorance of it." Most schools have trouble teaching some of their students the fundamentals of reading and writing, so it might seem presumptuous for them to take on thinking too. On the other hand it is probably sensible to put thinking skills first because thinking is basic to everything we teach. ■

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