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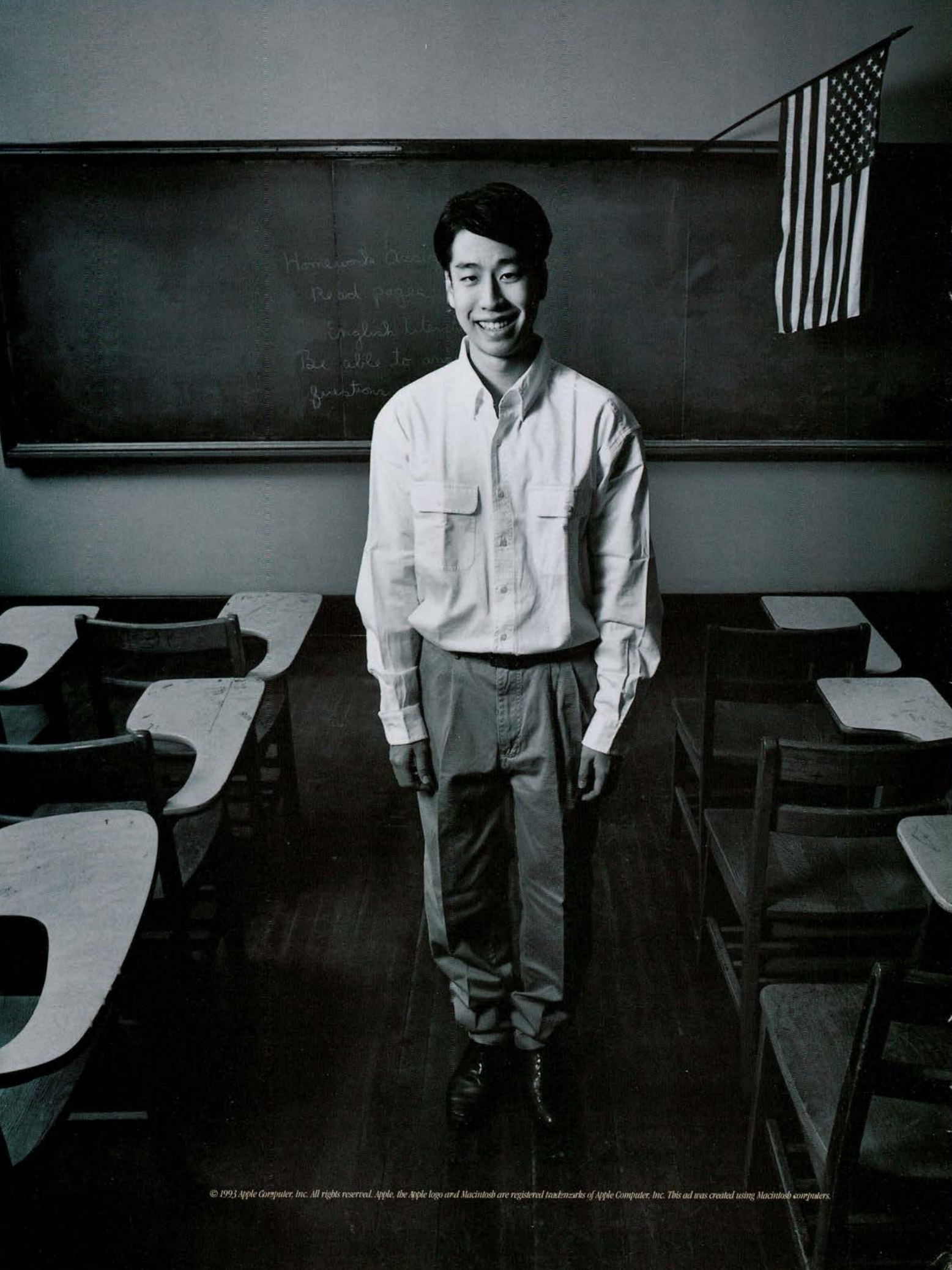
SUMMER 1993

AMERICAN Educator

Teaching methods based on research in cognitive science are the educational equivalents of polio vaccine and penicillin. Yet few outside the educational research community are aware of these breakthroughs or understand the research that makes them possible.

The Mind's Journey from Novice to Expert
By John T. Bruer



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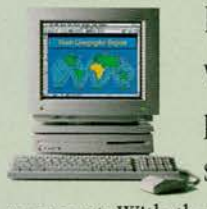

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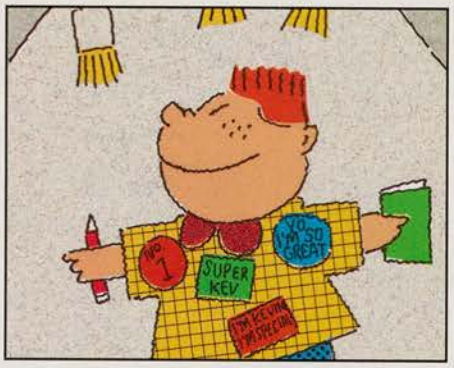

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AMERICAN Educator

LETTERS

A History of Us

How refreshing and exciting to know that at last American history will be palatable. "A History of Us," by Joy Hakim (as excerpted in your Spring 1993 issue) demonstrates a new and fascinating approach to our American past.

Children will inhale it. The narrative concept is wonderful and will give youngsters a new respect for our country's past. *Now* they will understand American history, absorb it, and most of all enjoy it.

—Diane Smith Leiderman
Virginia Beach, Virginia

P.S. I teach in the literacy program and predict Hakim's book will prove an invaluable aid in teaching history to adults.

* * *

I am writing to express concern about Joy Hakim's account of the literary value of *Uncle Tom's Cabin* as quoted in the excerpt from *A History of Us,* which was so lavishly praised in the Spring 1993 issue of *American Educator.* Hakim writes "Most critics say it [*Uncle Tom's Cabin*] is not great literature, as are the writings of 19th century authors like Herman Melville or Nathaniel Hawthorne."

First, the statement is quite simply false. Even a cursory reading of Elizabeth Ammons's carefully researched book, *Critical Essays on Harriet Beecher Stowe* would reveal that many of the most famous literati both in America and abroad have considered *Uncle Tom's Cabin* not only a good novel but a great novel. I include George Eliot, Henry James, George Sand, Lev Tolstoi, and William Dean Howells, who called *Uncle Tom's Cabin* "a very great novel . . . still perhaps our chief fiction." Howells was quite familiar with both *Moby Dick* and *The Scarlet Letter* when he wrote these words in 1895. For further documentation, I refer Hakim to my own chapter on Harriet Beecher Stowe in my book *Unlikely Heroines: Nineteenth-Century American Women Writers and the Woman Question.*

Secondly, and perhaps even more to the point, the kind of false statement denigrating the achievement of a woman writer in favor of male authors "like Melville or Nathaniel Hawthorne" conveys the same misrepresentation of the achievements of women that history books have long perpetrated. Had Hakim been interested in ascertaining the facts, she would have found that *Uncle Tom's Cabin* has been the center of controversy for generations. It was hated by white supremacists because of its sympathy to blacks and then hated by blacks, especially James Baldwin, because of what they felt was a misrepresentation of the Negro. Its feminism has been perceived from its first publication to the present, and it has been both praised and damned for its celebration of female rebelliousness. Finally, during the 1930s, 1940s, and 1950s when literary historians mainly ignored women's writing, *Uncle Tom's Cabin* was notable because of its omission from the large literary histories of the time.

History is not the story of us if it continues to trivialize the achievements of women. Our children deserve better.

—Ann R. Shapiro
Professor of English
State University of New York
Farmingdale, New York

A Moral Curriculum

Congratulations and thanks to the authors of "Curriculum as a Moral Educator" (Spring 1993) and to *American Educator* for presenting a sane, sensible, and badly needed program for rescuing the moral character of our country. A nation that has replaced heroes with celebrities, integrity with image, and principles with public relations is on its way to oblivion. Professors Wynne and Ryan offer hope.

The task is a difficult one. It is much easier to remain supine, awash in drivel, than to rise up and stand against the tide. But if we do not bestir ourselves, the 21st century is going to be a nasty place to live out our lives.

One correction: Pope's lines should read "Hope springs eternal in the human breast; Man *never* is, but always to be blest."

—John Morressy
East Sullivan, New Hampshire

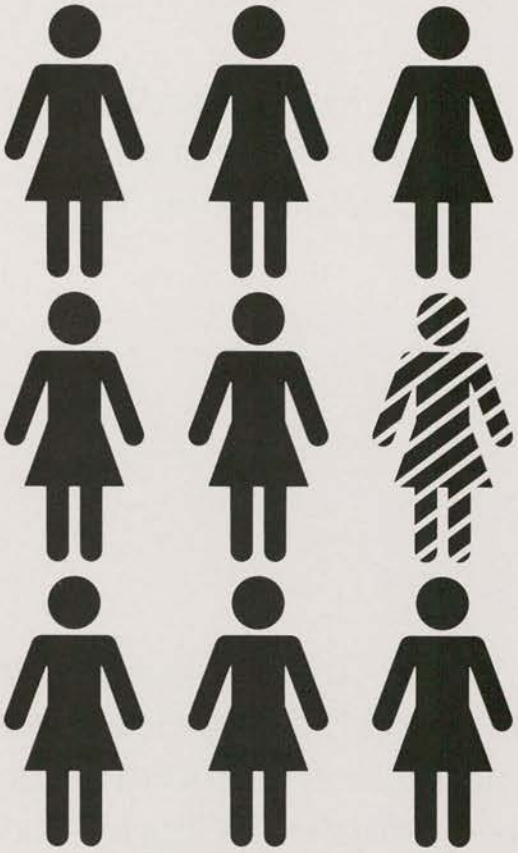
Edward Wynne and Kevin Ryan ("Curriculum as a Moral Educator," Spring, 1993) are to be applauded for their apt, albeit distressing, description of "the null curriculum" that places the study of facts, names, and dates above any thoughtful consideration of the implications of that knowledge base. As a nation, we would indeed be wise to reconsider a curriculum that overloads emphasis on the cognitive to the point that the likes of Prince and Arnold Schwarzenegger personae become the moral and heroic exemplars of our next generation of Americans.

However, I also hope that readers of "Curriculum as a Moral Educator" will build upon the sentiments expressed by Wynne and Ryan to include an even broader range of ideas for students' ethical explorations, as well as a systems approach to the teaching of morals that connects academics to the milieu of the larger "society as educator," to use Kenneth Benne and Steven Tozer's metaphor.

For example, one might work with the writings of St. Francis of Assisi or Chief Seattle to extend Wynne and Ryan's notion of "human kindness" to the treatment of *all* living entities, including animals and plants, forests and oceans. How does the ideal of "temperance" fare in juxtaposition to today's unbridled consumption of the world's natural resources? How does one's sense of "justice" mesh with the rights of all living beings (human and animal)? How can the ideal of "prudence" help us decide when, if at all, to choose violent over peaceful means in ending conflict or controversy? Might the heroic side of violence be contrasted with the heroic accomplishments of Mohandas

(Continued on page 48)

If you think your chance of getting breast cancer is one in a million, the fact is,



it's one in nine.

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The Mind's Journey from Novice to Expert

If We Know the Route, We Can Help Students Negotiate Their Way

By John T. Bruer

CHARLES IS in the seventh grade. He has an IQ of 70 and reads at the third-grade level. He has had several years of remedial reading instruction in a public school, but seems to make little progress. Charles has sufficient decoding skills to read aloud, but has almost no comprehension of what he reads. He is representative of many students who will fail—students whom our educational system can't reach.

Teachers report that they often see students who are unable to comprehend written language. What is odd is that these children can tell stories and often have no trouble understanding spoken language. This suggests they do have language comprehension skills and at least some background knowledge about the world, but cannot bring these skills and knowledge to bear on written language. Sometimes they can even read aloud, but still have difficulty understanding what they have read. Obviously, standard reading instruction has failed these students in a fundamental way.

On the first day of a new remedial reading program, the teacher asked Charles to read a short passage about reptiles. To see if he understood the passage, the teacher asked him to formulate a question based on the passage, a question that might appear on a test. Although he tried, he couldn't think of a question and gave up. He had not understood and retained enough of what he had just read to frame a question about it.

After 15 days in the new remedial program, the teacher and Charles repeated this exercise. After Charles had read a passage about Antarctic research, he immediately offered the question "Why do scientists come to the South Pole to study?" By this time he also had raised his comprehension scores on the reading passages from 40 to 75 percent, an average performance level for a seventh-grader. On comprehension tests given in his regular classroom, he improved from the 25th to the 78th percentile in social science and from the 5th to the 69th percentile in science. At the end of the 20-day program he had gained 20 months on standardized reading com-

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John T. Bruer is president of the James S. McDonnell Foundation, St. Louis, Missouri. *This article is adapted, with permission, from his recently published book* Schools for Thought: A Science of Learning in the Classroom *(The MIT Press: A Bradford Book).*

ILLUSTRATED BY BRU ASSOCIATES

prehension tests, and he maintained this improvement long after his remedial instruction ended.

Charles was the beneficiary of *reciprocal teaching,* a method that applies results of cognitive research to reading instruction. To understand what lies behind this method, we have to go back more than three decades to the beginning of what has come to be called the cognitive science revolution.

In 1956, a group of psychologists, linguists, and computer scientists met at the Massachusetts Institute of Technology for a symposium on information science (Gardner 1985). This three-day meeting was the beginning of the cognitive revolution in psychology, a revolution that eventually replaced behaviorist psychology with a science of the mind. In essence, the revolutionaries claimed that human minds and computers are sufficiently similar that a single theory—the theory of computation—could guide research in both psychology and computer science. "The basic point of view inhabiting our work," wrote two of the participants, "has been that the programmed computer and human problem solver are both species belonging to the genus IPS" (Newell and Simon 1972, p. 870). Both are species of the genus *information-processing system;* both are devices that process symbols.

That scientific revolution became a movement, and eventually a discipline, called cognitive science. Cognitive scientists study how our minds work—how we think, remember, and learn. Their studies have profound implications for restructuring schools and improving learning environments. Cognitive science—the science of mind—can give us an applied science of learning and instruction. Teaching methods based on this research—methods that result in some sixth-graders' having a better understanding of New-

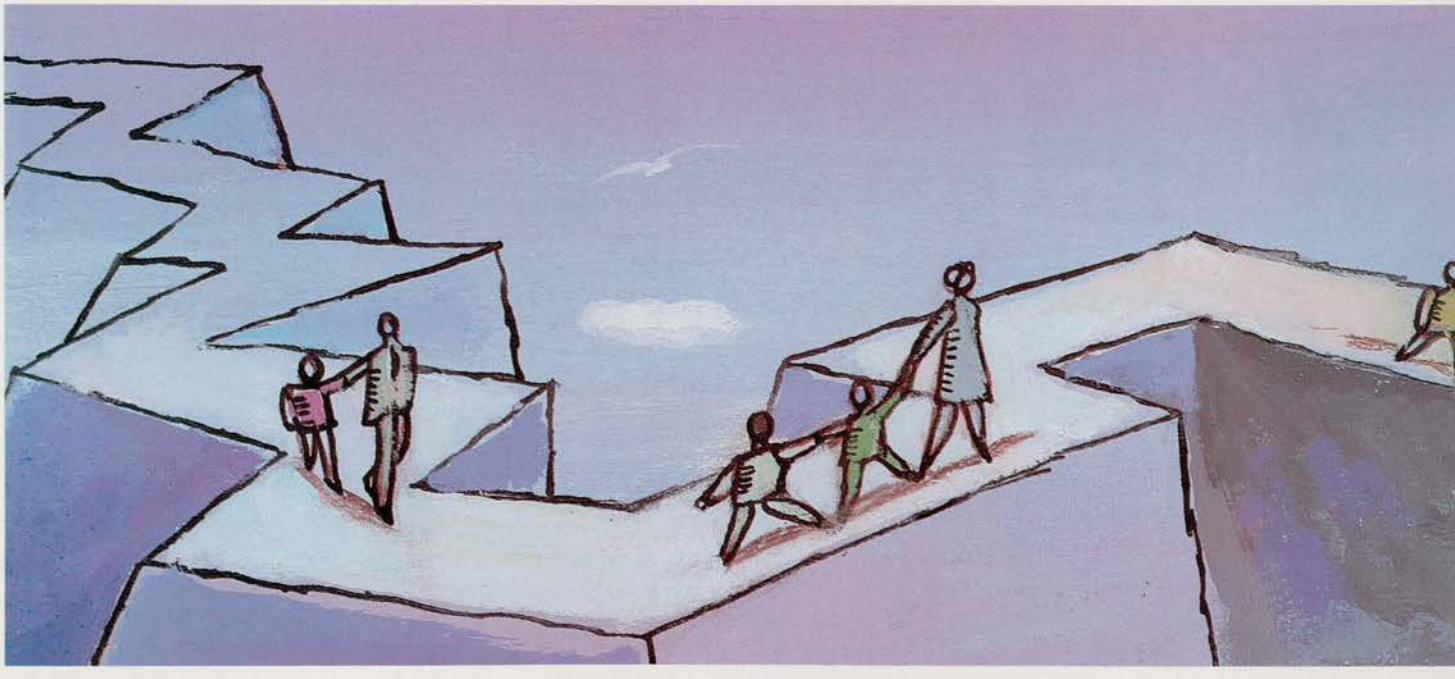
tonian physics than most high school students, or that, as recounted above, help remedial students raise their reading comprehension scores four grade levels after 20 days of instruction—are the educational equivalents of polio vaccine and penicillin. Yet few outside the educational research community are aware of these breakthroughs or understand the research that makes them possible.

Certainly cognitive science, or even educational research in general, isn't the sole answer to all our educational problems. Yet it has to be part of any attempt to improve educational practice and to restructure our schools. The science of mind can guide educational practice in much the same way that biology guides medical practice. There is more to medicine than biology, but basic medical science drives progress and helps doctors make decisions that promote their patients' physical well-being. Similarly, there is more to education than cognition, but cognitive science can drive progress and help teachers make decisions that promote their students' educational well-being.

In the years following the MIT symposium, cognitive scientists worked to exploit the similarities between thinking and information processing. Allen Newell and Herbert Simon developed the first working artificial intelligence computer program, called the Logic Theorist. It could prove logical theorems using methods a human expert might use. Besides logic, Newell and Simon studied problem solving in other areas, ranging from tic-tac-toe to arithmetic puzzles to chess. Problem solving in each of these areas depends on learning facts, skills, and strategies that are unique to the area. As cognitive scientists say, expertise in each area requires mastery of a distinct knowledge *domain.* Cognitive research began to have relevance for education as scientists gradually started to study knowledge domains that are included in school instruction—math, science, reading, and writing.

In their 1972 book *Human Problem Solving,* Newell and Simon summarized the results of this early research program and established a theoretical outlook and research methods that would guide much of the work that now has educational significance. Newell and Simon argued that if we want to understand learning in a domain, we have to start with a detailed analysis of how people solve problems in that domain. The first step is to try to discover the mental processes, or programs, that individuals use to solve a problem. To do this, cognitive scientists give a person a problem and observe everything the subject does and says while attempting a solution. Newell and Simon prompted their subjects to "think aloud"—to say everything that passed through their minds as they worked on the problems. Cognitive psychologists call these "think-aloud" data *protocols.* Analysis of the protocols allows cognitive scientists to form hypotheses about what program an individual uses to solve a problem. Cognitive scientists can test their hypotheses by writing computer programs based on their hypotheses to simulate the subject's problem-solving performance. If the scientists' analysis is correct, the computer simulation should perform the same way the human did on the problem. If the simulation fails, the scientists revise their hypotheses accordingly and try again. After studying and simulating performances from a variety of subjects, Newell and Simon could trace individual differences in problem-solving performance to specific differences in the mental programs the subjects used.

To be sure they could find clear-cut differences among individual programs, Newell and Simon initially compared the problem-solving performances of experts and novices—which were almost certain to be different—in a variety of domains. In such studies (now a mainstay of the discipline), cognitive scientists consider any individual who is highly skilled or knowledgeable in a given domain to be an "expert" in that domain. The domains can be ordinary and commonplace; they don't have to be arcane and esoteric. In the cognitive scientists' sense of the word, there are experts at tic-tac-toe, third-grade arithmetic, and high school physics. Comparing experts with novices makes it possible to specify how experts



and novices differ in understanding, storing, recalling, and manipulating knowledge during problem solving.

Of course Newell and Simon knew that experts in a domain would be better at solving problems in that domain than novices, but it was not always obvious how experts and novices actually differed in their problem-solving behavior. In one early expert-novice study, Simon and Chase (1973) looked at chess players. One thing we do when playing chess is to choose our next move by trying to anticipate what our opponent's countermove might be, how we might respond to that move, how the opponent might counter, and so on. That is, we try to plan several moves ahead. One might think that experts and novices differ in how far ahead they plan: a novice might look ahead two or three moves, an expert ten or twelve. Surprisingly, Simon and Chase found that experts and novices both look ahead only two or three moves. The difference is that experts consider and choose from among vastly superior moves. When expert chess players look at a board, they see configurations and familiar patterns of pieces; they see "chunks" of relevant information. Novices, in contrast, see individual pieces. The experts' more effective, more information-rich chunks allow them to see superior possible moves and choose the best of these. Chunking, rather than planning farther ahead, accounts for the experts' superiority. Experts process more and better information about the next few moves than novices.

Newell and Simon's emphasis on problem-solving performance and expert-novice differences was a first step toward a new understanding of learning. In short, learning is the process by which novices become experts. As one learns chess, math, or physics, one's problem-solving performance in the domain improves as the programs one uses to solve problems improve. If we know what programs a person first uses to solve problems in a domain, and if we can compare them with the programs the person eventually constructs, we have a measure and a description of what the person learned. We can study learning by tracing changes in the mental processes students use as they progress from novice to higher levels of proficiency. If we have detailed knowledge of these processes, such as the computer simulations give us, we can know not only that learning has occurred but also *how* it has occurred.

Other investigators joined in the program that Newell and Simon had outlined, and the research developed and expanded along two dimensions.

First, the kinds of problems and tasks the scientists studied became more complex. To play games and solve puzzles, even in logic and chess, one has to know a few rules, but one doesn't need much factual knowledge about the world. As cognitive scientists honed their methods on puzzle problems and accumulated insights into how people solve them, they became more ambitious and began applying their methods to more knowledge-rich domains. They started to study problem solving in physics, mathematics, and medical diagnosis. They began to study language skills, such as reading and writing, and how students use these skills to acquire more knowledge. Extending their research into these domains made it applicable to understanding expert and novice performance in school subjects.

Second, the research evolved from merely comparing novices against experts to studying the process by which novices *become* experts. Psychologists began to develop intermediate models of problem-solving performance in a variety of domains. The intermediate models describe how domain expertise *develops* over time and with experience. If learning is the process by which novices become experts, a sequence of intermediate models in a domain traces the learning process in that domain. The intermediate models describe the stages through which students progress in school.

By the mid 1970s, cognitive scientists were studying school tasks over a range of competencies—from novice to expert, from pre-school through college. In many subject areas, our knowledge of students' cognitive processes is now sufficiently detailed that we can begin to describe their performance at every level of competence, from novice to expert. We can describe the normal trajectory of learning in these subject areas. If we understand the mental processes that underlie expert performance in school subjects, we can ask and answer other questions that are important for education. How do students acquire these processes? Do certain instructional methods help students acquire these processes more quickly or more easily? Can we help students learn better? Answers to these questions can guide educational practice and school reform. For example, research in science learning shows that novices—and all beginning students are novices—hold naive theories about how the physical world works. These theories so influence how the students interpret school instruction that the instruction is often ineffective. Curricula based on cognitive research that build from and correct these naive theories can overcome this problem.

Later in this article, we will see how researchers and teachers are applying the new learning theory to create classroom environments in which students are successfully moving along the path from novice to expert. But first let's look at how cognitive scientists work and how their results can contribute to better instructional methods.

II.

Balance-Scale Problems: A Classic Study of Novice-to-Expert Performance

Research on how children learn to solve balance-scale problems illustrates the main ideas, methods, and instructional applications of cognitive science.

Try to solve the balance-scale problem shown in Figure 1. Assume the scale's arm is locked so that it can't rotate around the fulcrum. If I were to unlock the arm, what would happen? Would the scale tip left, tip right, or balance?

This is a tricky problem. Rule IV in Figure 1 gives a set of rules one might use to solve it. Each rule has an IF clause that states the conditions under which the rule is applicable and a THEN clause that states what to do under those conditions. To use these rules, find the rule whose conditions fit the pattern of weights and distances in the problem. You find that P4 is the only rule whose IF clause fits the problem. Its THEN clause tells you to compute torques for each side; that is, for each side, multiply the number of weights by their distance from the fulcrum. Doing that gives $t_1 = 5 \times 3 = 15$ for the left side and $t_2 = 4 \times 4 = 16$ for the right. These new data satisfy the condition for P7; executing its THEN clause gives the correct answer, "Right side down." Some readers might remember the THEN clause in P4 from high school physics as a version of the law of torques: Multiply weight by distance on each arm to find the torque, or rotational force; the side with the larger torque goes down. This simple law solves all balance-scale problems.

The set of rules is an English-language version of a computer program for solving balance-scale problems. It takes as input data about the weight on each side of the scale and the distance of the weight from the fulcrum. The output is the answer for a balance-scale problem: tip left, tip right, or balance. The program is a series of IF-THEN rules. Computer scientists call the IF clauses *conditions,* the THEN clauses *actions,* and the entire IF-THEN statement a *production rule.* They call computer programs written using only production rules *production systems.* Computing devices that execute production systems efficiently have a specific internal structure (or *architecture,* as computer scientists say).

Cognitive scientists claim that the human mind can be described as a computing device that builds and executes production-system programs. In fact, rule IV is a production system an expert would use to solve balance-scale problems. Robert Siegler, a cognitive psychologist, showed that production systems can simulate human performance on such problems (Siegler 1976; Klahr and Siegler 1978; Siegler and Klahr 1982). He also showed that a series of increasingly complex production systems can model the way in which children gradually develop expertise on balance-scale problems from ages 5 through 17. Children learn, says Siegler, by adding better rules to their production systems. Proper instruction, he goes on to show, can help children acquire these better rules.

The beauty of the balance-scale task for developmental psychology is that it is complex enough to be interesting but simple enough for exhaustive task analysis. Two variables are relevant: the amount of weight on each arm and the distance of the weight from the fulcrum. There are three discrete outcomes: tip left, tip right, and balance. There is a simple law, the law of torques, that solves all balance-scale problems, though few of us discover this law on our own. If weight and distance are the only two relevant variables and if the scale either tips or balances, there are only six possible kinds of balance-scale problems:

- balance problems—equal weight on each side and the weights at equal distances from the fulcrum;
- weight problems—unequal weight on each side and the weights at equal distance from the fulcrum;
- distance problems—equal weight on each side and the weights at unequal distances from the fulcrum;
- conflict-weight—one side has more weight, the other side has its weight at a greater distance from the fulcrum, and the side with greater weight goes down;
- conflict-distance—one side has more weight, the other side has its weight at a greater distance from the fulcrum, and the side with greater distance goes down;
- conflict-balance—one side has more weight, the other side has its weight at a greater distance from the fulcrum, and the scale balances.

Siegler called the last three types "conflict" problems, because when one side has more weight but the other side has its weight farther from the fulcrum one can have conflicting intuitions about which variable dominates. (The problem illustrated in Figure 1 is a conflict-distance problem: there is more weight on the left side, the weight is farther from the fulcrum on the right side, and the right side goes down.)

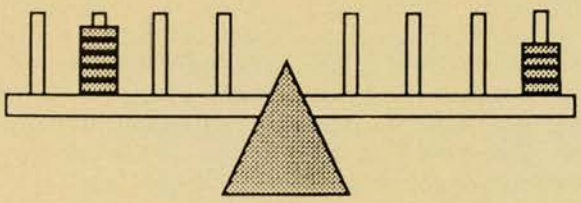
These six possibilities cover all possible cases for how weight and distance influence the action of the scale. The six cases provide a complete theory, or task analysis, of the balance scale. Notice that the six problem types place varying demands on the solver. For a balance problem or a weight problem, a solver need only consider weight. For the conflict problems, a solver has to pay attention to weight, distance, and the ways in which weight and distance interact.

Siegler formulated some psychological hypotheses about how people might solve balance-scale problems. Using the information from the task analysis, he could test his hypotheses by giving subjects problems and observing their performance. Siegler called his hypotheses "rules" and formulated them as four production-system programs (see Figure 1).

The rules make different assumptions about how and when people use weight or distance information to solve the problems. Rule I considers only weight. Rule II considers distance, but only when the weights on the two sides are equal (P3). Rule III attempts to integrate weight and distance information (P4 and P5). Rule IV introduces the law of torques (P4) when one side has more weight but less distance.

If children use Siegler's rules, then the pattern of a child's responses to a set of balance-scale problems that contains all six types will reveal what rule that child uses. Children's responses will tell us what they know about the balance-scale task, including what information—

WILL THE SCALE TIP LEFT, TIP RIGHT, OR BALANCE?



The 5-year-old—who considers only weight—says the left side will go down. The 13-year-old—who understands there's a conflict here but doesn't know how to figure it out—makes an educated guess. The expert, invoking the law of torques, says the right side will go down.

This is a classic example of novice-to-expert progression. Young children develop simple rules that will work with simple problems. Some children modify those rules when they encounter problems their current rules can't solve. Other children don't. By knowing in some detail what stages children typically pass through on their mental journeys from novice to expert—including the roadblocks and deadends—we can help them progress along the path.

RULE I

P1 **IF** weight is the same **THEN** say "balance."

P2 **IF** side X has more weight **THEN** say "X down."

} This is the rule that 5-year-olds most often use—for *all* problems. They only consider weight; they don't really notice the distance the weight is from the fulcrum.

RULE II

P1 **IF** weight is the same **THEN** say "balance."

P2 **IF** side X has more weight **THEN** say "X down."

P3 **IF** weight is the same **AND** side X has more distance **THEN** say "X down."

} As children progress, they begin to consider distance, but only when the weights on the two sides are equal.

RULE III

P1 **IF** weight is the same **THEN** say "balance."

P2 **IF** side X has more weight **THEN** say "X down."

P3 **IF** weight is the same **AND** side X has more distance **THEN** say "X down."

P4 **IF** side X has more weight **AND** side X has less distance **THEN** make an educated guess.

P5 **IF** side X has more weight **AND** side X has more distance **THEN** say "X down."

} By age 13, almost all are using this rule, and—with the proper kind of instruction—5 and 8-year olds can be taught to use it. Notice in P4 that the Rule III user can only make an educated guess when it comes to solving problems where one side has more weight but less distance.

RULE IV

P1 **IF** weight is the same **THEN** say "balance."

P2 **IF** side X has more weight **THEN** say "X down."

P3 **IF** weight is the same **AND** side X has more distance **THEN** say "X down."

P4 **IF** side X has more weight **AND** side X has less distance **THEN** compute torques: $t_1 = w_1 \times d_1$; $t_2 = w_2 \times d_2$.

P5 **IF** side X has more weight **AND** side X has more distance **THEN** say "X down."

P6 **IF** the torques are equal **THEN** say "balance."

P7 **IF** side X has more torque **THEN** say "X down."

} This is the set of rules an expert might use. Now P4 has progressed from an educated guess to the law of torques: Multiply weight by distance on each arm to find the torque; the side with the larger torque goes down. The expert doesn't always use P4; only when the easier rules won't suffice. Almost no one progresses to Rule IV spontaneously, that is, without being taught.

Figure 1

Siegler's rules I-IV for the balance-scale task. (From Siegler and Klahr 1982, p. 198. Used with permission of Lawrence Erlbaum Associates.) Commentary by John T. Bruer.

weight, distance, or both—they use to solve the problem. Siegler tested his hypotheses and predictions by giving a battery of 30 balance-scale problems (five of each of the six kinds) to a group of 40 children that included equal numbers of 5-year-olds, 9-year-olds, 13-year-olds, and 17-year-olds. He showed each child a balance scale that had weights placed on it and asked the child to predict what the scale would do. As soon as the child made a prediction, Siegler rearranged the weights for the next problem. He did not let the children see if their predictions were correct, because he wanted to find out what they knew initially. He wanted to avoid giving the students feedback on their performance so he could be sure they weren't learning about the task during the experiment. He wanted to look at their learning, but only after he assessed their initial understanding.

The children's performance confirmed Siegler's hypotheses. Ninety percent of them made predictions that followed the pattern associated with one of the four rules. There was also a strong developmental trend. The 5-year-olds most often used rule I. The 9-year-olds used rule II or rule III. The 13- and 17-year-olds used rule III. Only two children, a 9-year-old and a 17-year-old, used rule IV.

Some children can build better rules when challenged with hard problems. Other children can't.

Taken together, Siegler's four rules constitute a developmental theory that explains development in terms of changes in children's knowledge structures and how they initially encode, or as cognitive psychologists say, *represent* problems. By age 5, most children are using rule I. By age 13, almost all are using rule III. Few children spontaneously progress to rule IV, the expert-level rule for the balance scale. Thus, the rules chart a course of normal development on the task, from novice to expert performance.

Siegler's rules also tell us what cognitive changes underlie the transition from novice to expert. On tasks like the balance scale, children progress through a series of partial understandings that gradually approach mastery. Performance improves, or learning occurs, when children add more effective production rules to the theories they have stored in their long-term memories. If we know what the developmental stages are and how they differ at the level of detail provided by a cognitive theory, we ought to be able to design instruction to help children advance from one stage to the next.

To investigate how children learn about the balance scale, Siegler conducted a training study. Working with 5-year-olds and 8-year-olds, all of whom used rule I, he had each child make predictions for 16 problems. After each prediction, Siegler released the lock on the balance scale and let the child see if his or her prediction was correct. This feedback experience gave the children an opportunity to learn about the balance scale. Two days later, the children had a retest with no feedback to see if they had learned anything from the training.

In this experiment, there were three training groups. One group of 5- and 8-year-olds served as a control group. Their training session consisted only of balance and weight problems—problems they could solve using rule I. A second group had training on distance problems, where rule II, but not rule I, would work. A third group had training on conflict problems, which require at least rule III for performance even at chance levels. With this training, would the children learn anything? Would they progress from rule I to a more advanced rule?

As expected, the children in the control group made no progress. They learned nothing from training on problems they already knew how to solve. The children in the second group, both 5- and 8-year-olds trained on distance problems, did learn something. Feedback from 16 problems was enough for these children to advance from rule I to rule II. The surprise came with the third group, the children who had training on conflict problems. The 8-year-olds in this group advanced two levels in their mastery of the balance scale, from rule I to rule III. *The 5-year-olds in this group either stayed at rule I or became so confused and erratic that it appeared they were no longer using a rule.*

To find out why the 8-year-olds learned and the 5-year-olds didn't, Siegler and his collaborators selected several children between 5 and 10 years old for in-depth study (Klahr and Siegler 1978). Each child had a training session with the balance scale that included conflict problems. In the training session the child was asked to make a prediction for each problem and to state his or her rea-

sons for the prediction. The experimenter then unlocked the scale's arm and the child observed the result. If the prediction was not borne out, the experimenter asked "Why do you think that happened?" The researchers videotaped the entire session with each child and transcribed all the children's verbal responses, which provided data for protocol analysis.

Lisa, a typical 5-year-old, took 30 minutes to do 16 problems. Protocols like Lisa's suggested that the younger children were not encoding or representing distance in their initial interpretations of balance-scale problems. For example, when Lisa was given a distance problem (on the left side, one weight on peg 3; on the right side, one weight on peg 1), she predicted the scale would balance—"They would both stay up," she said. Asked why she thought this she answered "'Cause they are both the same." When she saw the left side tip down, she was genuinely puzzled: "Well, why are they both the same thing and one's up and one's down?" Lisa did not see any difference between the two sides. She was not including distance information in her initial representation of the problem. She simply did not notice and encode distance information.

An 8-year-old's protocol gave very different data. Jan was given a conflict-distance problem: on the left side, three weights on the first peg; on the right side, two weights on the third peg. She predicted incorrectly that the left side would go down. When shown what really happens (right side down) and asked for an explanation, she gave one involving both weight and distance. For her, pegs 1 and 2 on each side were "near" the fulcrum and pegs 3 and 4 were "far" from the fulcrum. She stated a rule: "If far pegs have weights, then that side will go down." She then pointed out that in this problem the far pegs on the right side had weights but the far pegs on the left had none, so the right side would go down. Jan's is not a perfect explanation, nor is her rule always true. Her protocol shows, though, that she, unlike Lisa, had noticed and encoded both weight and distance information in her representation of the problem.

On the basis of the protocols, the difference between 5-year-olds and 8-year-olds seemed to be that the younger children saw the problems in terms of weight only, whereas the older children could see the problems in terms of weight at a distance from the fulcrum. If the younger children were not encoding distance, they could not learn from training on conflict problems that differences in distance sometimes overcome differences in weight. They could not develop the concepts or—similar to the chess expert—build the chunks they needed for the conditions of P4 and P5 in rule III. On the other hand, the older children, even if they were using rule I, appeared to encode distance. They could learn from training on conflict problems how to use that information to build new productions and progress to rule III.

Can 5-year-olds learn to encode both weight and distance, or is it beyond their level of cognitive development? Siegler found that giving 5-year-olds more time to study the configurations or giving them more explicit instructions ("See how the weights are on the pegs? See how many are on each side and how far they are from the center on each side?") made no difference in their ability to reproduce the configurations from memory.

Only one intervention seemed to work. *The 5-year-olds had to be told explicitly what to encode and how to encode it.* The instructor had to tell them what was important and teach them a strategy for remembering it. The instructor taught the children to count the disks on the left side, count the pegs on the left side, and then rehearse the result (i.e., say aloud "three weights on peg 4"); to repeat this process for the right side; and then to rehearse both results together ("three weights on peg 4 and two weights on peg 3"). The instructor then told the children to try to reproduce the pattern their statement described. The instructor guided each child through this strategy on seven problems. With each problem, the children took more responsibility for executing the strategy.

After this training, the 5-year-olds' performance on reconstructing distance information from memory improved. They now correctly reproduced weight information 52 percent of the time, and distance information 51 percent of the time. Although they now apparently encoded the information, they, like the 8-year-old rule I users, did not spontaneously start using it. They continued to use rule I. However, when these 5-year-olds were given training on conflict problems, they too progressed from rule I to rule III. They had to be taught explicitly what representation, or encoding, to use in order to learn from the training experience.

The results of this study exemplify features of learning that are common to almost all school subjects. Students learn by modifying long-term memory structures, here called production systems. They modify their structures when they encounter problems their current rules can't solve. Some children modify their structures spontaneously; that is how children normally develop through Siegler's four rules. But by giving appropriate training we can facilitate children's development. For some children, presenting anomalous problems is enough. Like the 8-year-olds confronted with conflict problems, some children can build better rules when challenged with hard problems. Other children can't. Some children have inadequate initial representations of the problem. Children have to notice the information they need and encode it if they are to build better rules.

Students who can't learn spontaneously from new experiences need direct instruction about the relevant facts *and* about the strategies to use. Teaching just facts or teaching strategies in isolation from the facts won't work. To know when and how to intervene, we have to understand, in some detail, what stages children pass through on their mental journeys from novice to expert. Cognitive science tells us how we can then help children progress from relative naivete through a series of partial understandings to eventual subject mastery.

The difficulties children have in learning about the balance scale are highly similar to the difficulties they encounter in learning mathematics, science, and literacy skills. The tasks, representations, and production systems will become more complex—the progression from novice to expert can't be captured by four rules in every domain. However, our innate cognitive architecture remains the same no matter what domain we try to master, and the methods of cognitive science yield detailed information about how we think and learn. The lessons learned on the simple balance scale apply across the curriculum.

III.

What Does Expertise Consist Of?

Imagine that a small, peaceful country is being threatened by a large, belligerent neighbor. The small country is unprepared historically, temperamentally, and militarily to defend itself; however, it has among its citizens the world's reigning chess champion. The prime minister decides that his country's only chance is to outwit its aggressive neighbor. Reasoning that the chess champion is a formidable strategic thinker and a deft tactician—a highly intelligent, highly skilled problem solver—the prime minister asks him to assume responsibility for defending the country. Can the chess champion save his country from invasion?

This scenario is not a plot from a Franz Lehar operetta, but a thought experiment devised by David Perkins and Gavriel Salomon (1989). As they point out, our predictions about the chess champion's performance as national security chief depend on what we believe intelligence and expertise are. If the goal of education is to develop our children into intelligent subject-matter experts, our predictions about the chess champion, based on what we believe about intelligence and expertise, have implications for what we should do in our schools.

Since the mid 1950s cognitive science has contributed to the formulation and evolution of theories of intelligence, and so to our understanding of what causes skilled cognitive performance and what should be taught in schools. In this section, we will review how our understanding of intelligence and expertise has evolved over the past two decades and see how these theories have influenced educational policy and practice.

Four theories will figure in this story.

The oldest theory maintains that a student builds up his or her intellect by mastering formal disciplines, such as Latin, Greek, logic, and maybe chess. These subjects build minds as barbells build muscles. On this theory the chess champion might succeed in the national security field. If this theory is correct, these formal disciplines should figure centrally in school instruction.

At the turn of the twentiety century, when Edward Thorndike did his work, this was the prevailing view. Thorndike, however, noted that no one had presented scientific evidence to support this view. Thorndike reasoned that if learning Latin strengthens general mental functioning, then students who had learned Latin should be able to learn other subjects more quickly. He found no evidence of this. Having learned one formal discipline did not result in more efficient learning in other domains. Mental "strength" in one domain didn't transfer to mental strength in others. Thorndike's results contributed to the demise of this ancient theory of intelligence and to a decline in the teaching of formal disciplines as mental calisthenics.

In the early years of the cognitive revolution, it appeared that general skills and reasoning abilities might be at the heart of human intelligence and skilled performance. If this is so, again the chess champion might succeed, and schools should teach these general thinking and problem-solving skills—maybe even in separate critical-thinking and study-skills classes.

But by the mid 1970s, cognitive research suggested that general domain-independent skills couldn't adequately account for human expertise. Research shows that either the teaching of traditional study skills has no impact on learning or else the skills fail to transfer from the learning context to other situations. Either way, teaching these general skills is not the path to expertise and enhanced academic performance.

A wide variety of books and commercially available courses attempt to teach general cognitive and thinking skills. (For reviews and evaluations see Nickerson et al. 1985, Segal et al. 1985, and Chipman et al. 1985.) Analysis and evaluation of these programs again fail to support the belief that the teaching of general skills enhances students' overall performance.

Most of these programs teach general skills in standalone courses, separate from subject-matter instruction. The assumption is that students would find it too difficult to learn how to think and to learn subject content simultaneously. Like the early artificial intelligence and cognitive science that inspire them, the courses contain many formal problems, logical puzzles, and games. The assumption is that the general methods that work on these problems will work on problems in all subject domains.

A few of these programs, such as the Productive Thinking Program (Covington 1985) and Instrumental Enrichment (Feuerstein et al. 1985), have undergone extensive evaluation. The evaluations consistently report that students improve on problems like those contained in the course materials but show only limited improvement on novel problems or problems unlike those in the materials (Mansfield et al. 1978; Savell et al. 1986). The programs provide extensive practice on the specific kinds of problems that their designers want children to master. Children do improve on those problems, but this is different from developing *general* cognitive skills. After reviewing the effectiveness of several thinking-skills programs, one group of psychologists concluded that "there is no strong evidence that students in any of these thinking-skills programs improved in tasks that were dissimilar to those already explicitly practiced" (Bransford et al. 1985, p. 202). Students in the programs don't become more intelligent generally; the general problem-solving and thinking skills they learn do not transfer to novel problems. Rather, the programs help students become experts in the domain of puzzle problems.

Researchers then began to think that the key to intelligence in a domain was extensive experience with and knowledge about that domain.

One of the most influential experiments supporting this theory was William Chase and Herb Simon's (1973) study of novice and expert chess players, which followed on earlier work by A.D. De Groot (1965). Chase and Simon showed positions from *actual* chess games to subjects for 5 to 10 seconds and asked the subjects to reproduce the positions from memory. Each position contained 25 chess pieces. Expert players could accurately place 90 percent of the pieces, novices only 20 percent. Chase and Simon then had the subjects repeat the

experiment, but this time the "positions" consisted of 25 pieces placed randomly on the board. These were generally not positions that would occur in an actual game. The experts were no better than the novices at reproducing the random positions: both experts and novices could place only five or six pieces correctly.

Other researchers replicated the Chase-Simon experiment in a variety of domains, using children, college students, and adults. The results were always the same: Experts had better memories for items in their area of expertise, but not for items in general. This shows, first, that mastering a mentally demanding game does not improve mental strength in general. The improved memory performance is domain specific. Chess isn't analogous to a barbell for the mind. Second, it shows that if memory *strategies* account for the expert's improved memory capacity, the strategies aren't general strategies applicable across all problem-solving domains. Chess experts have better memories for genuine chess positions, but not for random patterns of chess pieces or for strings of words or digits. Thus, experts aren't using some general memory strategy that transfers from chess positions to random patterns of pieces or to digit strings.

From long experience at the game, chess experts have developed an extensive knowledge base of perceptual patterns, or chunks. Cognitive scientists estimate that chess experts learn about 50,000 chunks, and that it takes about 10 years to learn them. Chunking explains the difference between novice and expert performance. When doing this task, novices see the chessboard in terms of individual pieces. They can store only the positions of five or six pieces in their short-term, or working, memory—numbers close to what research has shown our working memory spans to be. Experts see "chunks," or patterns, of several pieces. If each chunk contains four or five pieces and if the expert can hold five such chunks in working memory, then the expert can reproduce accurately the positions of 20 to 25 individual pieces. Chase and Simon even found that when experts reproduced the positions on the board, they did it in chunks. They rapidly placed four or five pieces, then paused before reproducing the next chunk.

Expertise, these studies suggest, depends on highly organized, domain-specific knowledge that can arise only after extensive experience and practice in the domain. Strategies can help us process knowledge, but first we have to have the knowledge to process. This suggested that our chess expert might be doomed to failure, and that schools should teach the knowledge, skills, and representations needed to solve problems within specific domains.

In the early 1980s researchers turned their attention to other apparent features of expert performance. They noticed that there were intelligent novices—people who learned new fields and solved novel problems more expertly than most, regardless of how much domain-specific knowledge they possessed. Among other things, intelligent novices seemed to control and monitor their thought processes. This suggested that there was more to expert performance than just domain-specific knowledge and skills.

Cognitive scientists called this new element of expert performance *metacognition*—the ability to think about thinking, to be consciously aware of oneself as a problem solver, and to monitor and control one's mental processing.

As part of an experiment to see which metacognitive skills might be most helpful when learning something new, John Bransford, an expert cognitive psychologist, tried to learn physics from a textbook with the help of an expert physicist. He kept a diary of his learning experiences and recorded the skills and strategies most useful to him (Brown et al. 1983). Among the things he listed were (1) awareness of the difference between understanding and memorizing material and knowledge of which mental strategies to use in each case; (2) ability to recognize which parts of the text were difficult, which dictated where to start reading and how much time to spend; (3) awareness of the need to take problems and examples from the text, order them randomly, and then try to solve them; (4) knowing when he didn't understand, so he could seek help from the expert; and (5) knowing when the expert's explanations solved his immediate learning problem. These are all metacognitive skills; they all involve awareness and control of the learning problem that Bransford was trying to solve. Bransford might have learned these skills originally in one domain (cognitive psychology), but he could apply them as a novice when trying to learn a second domain (physics).

Strategies can help us process knowledge, but first we have to have the knowledge to process.

This self-experiment led Bransford and his colleagues to examine in a more controlled way the differences between expert and less-skilled learners. They found that the behavior of intelligent novices contrasted markedly with that of the less skilled. Intelligent novices used many

(Continued on page 38)

LESSONS FROM ABROAD

BY PAUL E. BARTON

The Learning Gap: Why Our Schools Are Failing and What We Can Learn From Japanese and Chinese Education
by Harold W. Stevenson and James W. Stigler. New York: Summit Books, 1992, 236 pp., $22.

LEARNING IN the elementary grades in the United States contrasts starkly with learning in Asia. That is the message Harold Stevenson has been bringing us from his five studies spanning more than a decade, studies drawn on in this book, *The Learning Gap,* written with James Stigler. His studies, combined with other international studies, are creating a widespread awareness that the United States lags behind Asia in learning, and—from other studies—behind a lot of other nations as well.

These comparisons, or cross-cultural studies, reported by Stevenson and Stigler, are not based on superficial surveys. They are in-depth studies based on many hours of observing classes; talking with teachers; and probing students, teachers, and parents through questionnaires. Their tests have been constructed to be fair measures of achievement, based on what is taught in classrooms in Chicago, Beijing, Taipei, and Sendai.

The authors point out the differences in cultures. They do not suggest that we can—or should—simply copy the approaches used in Asia. What they suggest is that we can learn more about *ourselves* by being aware of what Asian parents and schools do to educate their children. We have become so accustomed to how we do things, they are so much a part of our daily lives, that we scarcely see them: "We do not know what it means to work hard until we see how hard others work. . . . Cross-cultural comparisons can help us discover characteristics of our own culture that we fail to notice because we are so familiar with them. Through such comparisons, our perceptions become clearer and sharper."

Over the years the authors have encountered a lot of the stereotypes Americans have about Asians, and the dodges they use to avoid the conclusion that we have anything to learn from such comparisons. Defensive we usually are; these defenses are undercut early in the book.

■ No, Asian children are not under great stress from all that is expected of them. "Although pressure builds during the high school years, when concerns about university entrance examinations intensify, such pressure is not evident during the preschool or elementary years, a time when levels of achievement are already high."

■ No, Asian children do not have higher intelligence. The authors administered culturally fair intelligence tests and found little difference.

■ No, Asian children are not easier to teach because they are "innately docile."

■ No, Asian teachers do not stress rote learning, "relying on endless, mindless drill of basic skills."

■ No, Asian children do not do well because "parents push them, training them in academic skills beginning in early childhood." Actually, there is an "age of innocence" until about six, when children's lives are carefree.

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■ No, the Asian elementary school teachers are not authoritarian purveyors of information.

■ No, youth suicide rates are not higher in Japan.

As attention has focused more and more on such international comparisons, and as awareness of shortcomings in the achievement of American students has spread, criticisms of such studies have emerged. Having heard the debates, I have concluded that we do have a lot to learn from such studies, although we should be ever mindful of what they cannot tell us. One reassuring fact is there have now been many international studies, and they have a similar story to tell concerning the U.S. ranking low in achievement.

The Learning Gap is not a technical report; methodology has been the focus of earlier reports and this one is for the purpose of presenting the findings and conclusions to a wide audience. The book is a condensation of the findings of five major studies made over more than a decade, and is tightly packed with information and conclusions. However, it is exceedingly readable. In fact, it is riveting and fascinating. But it is not possible for a reviewer to condense its messages into one review. It would not do justice to them. What I will present is a sampling to convey the nature of the book.

Achievement

In studies both in 1980 and in 1987 of first- and fifth-grade students, "American children were far below their Japanese and Chinese peers." While the mathematics scores of first graders in the different countries overlap somewhat, by the fifth grade, "The highest-scoring American schools fall below the lowest-scoring Asian schools." Of the 100 students who made the highest scores in the fifth grade, only one was an American student. The advantage was not just in computational skills, but across all tasks; they were also successful in "applying what they know" as well as in "performing what they have learned." In reading, American children did considerably better, but they were overrepresented among the poor performers. (Other comparisons have found American students lagging in science as well.)

Home and Parents

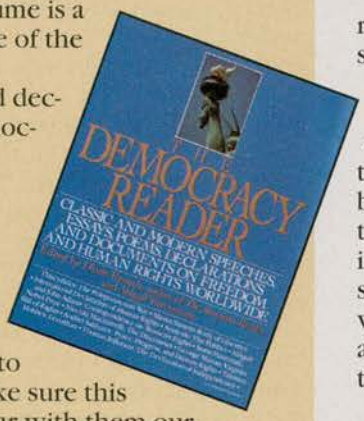
Asian parents make efforts to organize the home environment to make it conducive to study. Even though space is cramped, most families will provide space for study, and will buy the student a desk, not simple tables, but "expensive, efficient units with shelves, drawers, and lights." Asian children spend "vastly" more time on school work and are more likely to have workbooks they use at home. A notebook goes back and forth to school each day, with the parents and teachers writing comments to each other in it. In the cities where the studies were conducted, American children were not watching more television, and the authors dismiss this as a factor. American children do more chores at home: the job of the Asian student is being a good student.

The Japanese and Chinese parents studied differentiate sharply between the functions of school and the home. "Schools are primarily held responsible for developing academic skills, and the social skills required for

(Continued on page 47)

have a clear, accessible summary of the groundbreaking research in this field over the last 30 years and how it translates to the classroom. The lead article in this issue of *American Educator* will give you a taste of the power of this book. But don't stop there. *Schools for Thought* includes a host of examples of what this important research means for the teaching of math, science, reading, and writing. There are also sections on testing and motivation. (*Schools for Thought* by John T. Bruer: The MIT Press, $29.95.)

■ This book is not just for summer; it's a forever book. Edited by Diane Ravitch and Abigail Thernstrom, this volume is a marvelous collection of some of the world's greatest documents, speeches, essays, poems, and declarations on the topic of democracy, freedom, and human rights. From Aristotle and Thomas Aquinas to Susan B. Anthony, Vaclav Havel, Gibson Kamau Kuria, and the petitions of the students at Tiananmen Square—these are words that truly deserve to live forever. We can help make sure this happens by becoming familiar with them ourselves and passing them on to the next generation. (*The Democracy Reader*: Harper Collins, $35.)



All About Me

Are We Developing Our Children's Self-Esteem or Their Narcissism?

By Lilian G. Katz

DEVELOPING AND strengthening young children's self-esteem typically is listed as a major goal in state and school district kindergarten curriculum guides. Early childhood education has long been blessed with a variety of curriculum approaches that emphasize and advocate diverse goals and methods. In spite of this diversity, the one goal all the approaches agree is important is that of helping children to "feel good about themselves." The terms applied to this goal include: self-esteem, self-regard, self-concept, feelings of self-worth, self-confidence, and often, "feeling good about oneself."

For example, in a 1990 document titled "Early Childhood Education and the Elementary School Principal," the National Association of Elementary School Principals issued "Standards for Quality Programs for Young Children." The first of twelve characteristics given for "quality early childhood programs" is that they "develop a positive self-image."[1]

Many other books, kits, packets, and newsletters urge teachers to help children gain positive self-concepts. Here's a typical example of this view:

> . . . the basis for *everything we do* is self-esteem. Therefore, if we can do something to give children a stronger sense of themselves, starting in preschool, they'll be [a lot wiser] in the choices they make.[2]

Along similar lines, the prestigious Corporation for Public Broadcasting issued a twenty-page pamphlet, directed to teenagers, entitled "Celebrate Yourself. Six Steps to Building Your Self-Esteem."[3] The first main section, "Learn to Love Yourself Again," asserts that, as babies, we all loved ourselves, but as we grew up, "we found that not everyone liked everything we did," so we "started picking on ourselves." The pamphlet lists six steps toward self-celebration: The first is "Spot Your Self-Attacks"; The second step, "See What Makes You Special," includes a recommended "Celebration List," suggesting that the reader compile a 22-item list of all the "good things about me." The twenty-two items recommended under the heading "My Talents" include: thinking fast, playing trivia, and babysitting. The twelve items under "My Body" include physical attributes such as smile, hair, strength, legs, etc. Among eight items under "My Achievements" are: something special I made; a grade I got; a compliment I got; an award I won; and so forth. The third step of the celebration is "Attack your Self-Attacks." The fourth, "Make Loving Yourself a Habit," is illustrated by a cartoon character admiring itself in a mirror. The final two steps are "Go for the Goal" and "Lend a Hand to Others." This last step is subtitled "Love Grows When You Give It Away."

It is perhaps just this kind of literature that accounts for a large poster I came across in the entrance hall of a suburban school: Pictures of clapping hands surround the title, "We Applaud Ourselves." While the sign's probable purpose is to help children "feel good about themselves," it does so by directing their attention inward. The poster urges self-congratulation; it makes no reference to other possible ways of earning applause—by consider-

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ILLUSTRATED BY GUY SCHUM


NO. 1
SUPER KEV
YO I'M SO GREAT
I'M KEV I'M SPECIAL
KEVIN'S SPECIAL PLACE
KEVIN

ing the feelings or needs of others, for example. Many schools display posters that list the Citizen of the Week, Person of the Week, Super Spellers, Handwriting Awards, and other such honors that seem to encourage showing off.

I also noted a sign over an urban elementary school principal's office that says: "Watch your behavior, you are on display!" Although its purpose may be to encourage appropriate conduct, it does so by directing children's attention to how they *appear* to others rather than to any possible functions of appropriate behavior. What I am suggesting by these examples is, that as commendable as it is for children to have high self-esteem, many of the practices advocated in pursuit of this goal may instead inadvertently develop narcissism in the form of excessive preoccupation with oneself.

It was while observing a first-grade class in an affluent suburb of a large midwestern city that I first became aware of the ways in which self-esteem and narcissism can be confused. Working from dittoed pages prepared by the teacher, each student had produced a booklet called "All about Me." The first page asked for basic information about the child's home and family. The second page was titled "What I like to eat"; the third was called "What I like to watch on TV"; the next was "What I want for a present," and another was "Where I want to go on vacation," and so forth.

On each page, attention was directed toward the child's own inner gratifications. Each topic put the child in the role of consumer—of food, entertainment, gifts, and recreation. Not once was the child asked to assume the role of producer, investigator, initiator, explorer, experimenter, wonderer, or problem-solver.

These booklets, like many others I have encountered around the country, never had pages with titles such as "What I want to know more about," or "What I am curious about," or ". . . want to explore, . . . to find out, . . . to solve, . . . to figure out" or even "to make." Instead of encouraging children to reach out in order to investigate or understand phenomena around them worthy of their attention, the headings of the pages turned their attention inward.

Since first encountering these booklets, I have learned from teachers that the "All about Me" exercise is intended to make children "feel good about themselves" and to motivate them by beginning "where they are." The same intentions, however, could be satisfied in other, better ways. Starting "where children are" can be accomplished by providing topics that (1) encourage children to be curious about others *and* themselves, and, (2) reduce the emphasis on consummatory activities, and (3) at the same time, strengthen the intellectual ethos of the classroom.

Indeed, starting "where the children are" can just as easily be satisfied by pooling class data in a project entitled "All about *Us*." The individual data can be collected, summarized, graphed, compared, and analyzed in a variety of ways that minimize focusing the children's attention exclusively on themselves.

Several years ago, I saw this kind of project put into practice in a rural British infant school. The title of a large display on the bulletin board was: "We Are a Class Full of Bodies"; just below the main heading was "Here Are the Details." The display space was filled with bar graphs showing birth dates, current weight and height, eye color, number of lost teeth, shoe sizes, etc., in which data from the entire class were pooled. The data started "where the children were." As the children worked in small groups to take measurements, prepare graphs, help one another to post displays of their analyses of the students' individual characteristics, the teacher was able to create an ethos of a community of researchers looking for averages, trends, and ranges.

I observed another example of practices intended to foster self-esteem that may instead contribute to self-preoccupation in a suburban kindergarten in which the comments made by the children about their visit to a dairy farm were displayed on a bulletin board. Each of the forty-seven children's sentences listed on the bulletin

Why should children's attention so insistently be turned inward?

board began with the words "I liked. . . ." For example, "I liked the cows," ". . . the milking machine," ". . . the chicks," etc. There were no sentences that began "What surprised me was. . .," "What I want to know more about is. . .," or "What I am curious about. . . ."

The children's sentences can be analyzed on many levels. For the purposes of this article, their salient characteristic is the exclusive focus on gratification and the missed opportunity to encourage the natural inclination of children to examine worthwhile phenomena in the world around them. Surely there were features of the farm visit that might have aroused some children's curiosity and sparked further investigations of the real world. Such responses were not solicited and were therefore unlikely to have been appreciated and strengthened.

Another common example of a practice intended to enhance self-esteem but unlikely to do so, was a display of kindergartners' work that consisted of nine large identical paper-doll figures, each having a balloon containing a sentence stem that began "I am special because. . . ." The children completed the sentence with the phrases: ". . . I can color," ". . . I can ride a bike," ". . . I like to play with my friends," ". . . I know how to play," ". . . I am beautiful," ". . . I am learning to read," ". . . I can cut," ". . . everybody makes me happy." These children surely are not likely to believe for very long that they are special because they can color, ride a bike, or like to play. What might these children think when they discover just how trivial these criteria for being special are? The examples described above are not unusual; similar work can be found in schools all over the country.

WHY SHOULD children's attention so insistently be turned inward? Can such superficial flattery really boost self-esteem; and are young children's minds being intellectually engaged by such exercises? Can a child's propensity to explore and investigate worthwhile topics be strengthened by such activities? Is it possible the cumulative effect of such practices, when used frequently, undermines children's perceptions of their teachers as being thoughtful adults, worthy of respect?

Many books and kits for teachers recommend similar exercises that help children "feel good about themselves." One typical example is a booklet with tear-out worksheets called *Building Self-Esteem with Koala-Roo.*[4] One page is bordered by the phrase "YOU ARE SPECIAL!", which appears fourteen times, in capital letters. In the page's upper left-hand corner is a drawing of a smiling koala bear waving one paw, while holding a heart that says "I love you" in the other. The heading on the page is "You Are Special." Below the heading is a line for a child's name following the phrase "You are Special!" again. This is followed by "I am very glad that I have been your X grade teacher." No space is provided for the teacher's own name. This line is followed by text that reads "There's no one else quite like you," "You're one of a kind," "unique," and so forth.

I doubt whether the complete text of the page just described meets the readability index for kindergartners, first graders, or any children young enough to be taken in by such excessive pandering. It would be surprising (and disappointing) if children old enough to read these pages are inspired by their content.

Another example of the genre can be found advertised in a popular teachers' magazine. Titled "Excellence in Early Childhood," the ad promotes a unit of activities called "I Am Special" for 3-, 4- and 5- year-olds. The kit being offered includes a student activity book filled with colorful hands-on projects and illustrated stories, and a teacher guide for twenty-nine lesson plans, stories, and finger plays designed to promote "feeling good abut oneself." In answer to the question of what children will learn from the "I Am Special" kit, the advertisement claims that children "become aware that they are created in a very special and unique way," and "see themselves as good and worthwhile individuals." These illustrations are just two examples from among many similar teaching aids I have seen in early childhood classrooms all over the U.S.

The concept of specialness expressed in these activities seems, by definition, contradictory: If everybody is special, nobody is special. Furthermore, frequent feedback about how special a child is might even raise some doubt along the lines of "Methinks thou dost protest too much"!

In similar fashion, it is not clear whether the traditional "show-and-tell" (or "bring and brag") activity used in traditional early childhood programs does as much to enhance self-esteem as it does to encourage children to be unduly concerned about the impressions they make on others or to learn the techniques of one-upmanship. Many early childhood specialists justify the practice on the grounds that it gives children a chance to practice an early form of public speaking and thereby to strengthen their verbal expressive skills. Some teachers also hope children will sharpen their listening skills as they watch their peers show and tell. However, it is not clear what happens to children who feel that what they have to show and tell cannot compete with their peers' contributions. Furthermore, my observations of such group sessions suggest that more than a few children seem to be tuning out their peers rather than learning to listen to them.

I believe there are other more meaningful and intellectually defensible ways for children to speak to groups of their peers. For example, children can report discoveries and experiences derived from their own efforts, ideas, and real accomplishments.[5]

THE TREND toward overemphasizing self-esteem and self-congratulation may be due to a general desire to correct earlier traditions of eschewing compliments for fear of making children conceited. However, the current practices described above seem to me to be over-corrections of such traditions.

Although there is little doubt that many children arrive at preschool and school with less than optimum self-esteem, telling them otherwise is not likely to have much effect. Feelings cannot be learned from direct instruction. Furthermore, constant messages about how wonderful one is may raise doubts about the credibility of the message and the messenger.

Self-esteem is most likely to be fostered when children have challenging opportunities to build self-confidence and esteem through effort, persistence, and the gradual accrual of skills, knowledge, and appropriate behavior. In addition, adults can show their esteem for children in more significant ways than the awarding of gold stars and happy faces. Esteem is conveyed to children when adults

and peers treat them with respect, ask them for their views and preferences (even if they are not acceded to), and provide opportunities for real decisions and choices about those things that matter to the children. Young children's opinions, suggestions, and preferences should be solicited respectfully and considered seriously. To be sure, some children come up with wild or silly notions, and their peers will quickly tell them so. In the course of discussion, however, teachers can gain insight into how children understand the matters at hand and can make sound decisions about which children need their help.

Cheap success in a succession of trivial tasks most likely will not foster self-esteem. Young children are more apt to benefit from real challenge and hard work than from frivolous one-shot activities.

For example, in many early childhood programs, the amount of time and effort given to activities related to holidays seems excessive. Although festive occasions alleviate the routine of daily life, like anything else, they can be overdone. Early childhood educators traditionally have emphasized that play is children's natural way of learning.[6] Indeed, a large body of research and years of practical experience attest to the powerful role of play in all facets of learning in the early years.

It is just as natural, however, for young children to learn through investigation. Children are born natural- and social scientists. Like anthropologists, they devote much time and energy to investigating and making sense of their environments. During the preschool and early school years, teachers can capitalize on this in-born disposition by engaging children in investigations through project work. In-depth investigations of real topics, real environments, events, and objects are worthy of children's attention and understanding.

In the course of such undertakings, children negotiate with their teachers to determine the questions to be answered, the studies to be undertaken, and ways to represent their findings in media such as paintings, drawings, and dramatic play. Project work provides children with ample opportunity for real discussion, decision making, cooperation, initiative, negotiation, compromise, and evaluation of the outcomes of their efforts. In this way, children learn the criteria of self-esteem. This self-esteem can be related to their contribution to the work of the group, to the quality of the effort, and its results.

Most of the tasks offered to young children in early childhood classes allow for individual effort and achievement. However, the interpersonal processes that foster healthy self-esteem require the amount of individual work to be balanced with group work in which each child can contribute to the total group effort through cooperation with other students.

EARLY CHILDHOOD practitioners are right to be diligent in encouraging children through the use of frequent positive feedback. The distinction between praise and flattery is often blurred however. Gushing over a child's fingerpainting may be accepted by the child with pleasure. But, it is difficult to know when frequent praise begins to lose its value and is dismissed by children as empty teacher talk. If children become accustomed to frequent praise, some of them will think its inevitable occasional absence is a rebuke—even when this is not intended. It is difficult for adults to maintain a constant flow of meaningful praise. And, if a child's sense of self-worth can be raised by simple flattery from one person, it just as easily can be deflated by another.

Cheap success in a succession of trivial tasks most likely will not foster self-esteem.

A large body of evidence indicates that children benefit from positive feedback. But, praise and rewards are not the only methods of reinforcement. Another kind of positive feedback is *appreciation.* By appreciation I mean positive reinforcement related explicitly and directly to the *content* of the child's interest and effort. If a child poses a thoughtful question, a teacher might, for example, come to class the next day with a new reference book. Or, she might share with the children ideas generated from reflecting on problems they had raised concerning procedures to try. In these ways, the teacher treats children's concerns with respect, thereby deepening interest in the issues they have raised and providing positive feedback without deflecting children from

the content. The important point here is that the teacher shows in a positive way that she appreciates their concerns *without taking their minds off the subjects at hand or directing their attention inwards.* When children see that their concerns and interests are being taken seriously, they are more likely to raise them in the next discussion, and to take their own ideas seriously. Teachers can strengthen children's disposition to wonder, reflect, raise questions, and generate alternative solutions to practical and intellectual problems. Certificates, gold stars, stickers, and trophies also provide children with positive feedback, but the salience of such devices is likely to deflect the children's and teacher's attention from the content of the work at hand.

Another form of frequent praise stems from teachers' eagerness to reinforce cooperative behavior among young children. Teachers often praise children's efforts by saying such things as "I was really glad when you used your words to get your turn. . . ." or "It made me happy to see you share your wagon with Sally." Such strategies may be helpful when first teaching children how to use verbal strategies for conflict resolution. But, like all strategies, they can be overdone, especially as children reach the preschool years. At issue here is the hypothesis that frequent praise can be taken by children to mean that the praised behavior is not expected—as though the unspoken end of these kinds of elliptical sentences is ". . . because I never expected you to." It may be that children sense our unspoken expectations, and will, indeed, frequently live up to them. Such teacher responses also may imply that the rationale for the desirable behavior is to please the teacher.

It would seem more appropriate for teachers to exercise a quiet and calm authority by stating clearly and respectfully precisely what behavior is expected as occasions arise. Because young children are in the early stages of acquiring interactive and conflict-resolution skills, teachers will have to exercise patience in using this strategy.

ANOTHER APPROACH that teachers might use to make children less dependent upon praise from others is to help them develop and apply their own evaluation criteria.

For example, rather than have children take their work home every day, encourage them to collect it in a special folder or portfolio for a week or so. Then at some point, encourage children to select an item they want to take home and discuss with them the criteria for selection they might apply. The emphasis should not be on whether a child likes a piece of work, or whether it is good or bad. Instead, guide children to think about whether a piece of work includes all they want it to, or whether it is sufficiently clear or accurate, or whether it shows progress compared to the last item they took home, and so forth. At first, parents might be disappointed when the flow of paintings, collages, and worksheets is interrupted; but teachers can help parents to engage their children in fruitful discussion about the criteria of selection used, thus encouraging children to take seriously their own evaluations of their work.

Similarly, when children are engaged with others in project work, they can evaluate the extent to which they have answered the questions they began with, and assess the work accomplished on criteria developed with their teacher concerning the accuracy, completeness, and interest value of their final products.[7] The children should be encouraged to discuss what they might do the next time they undertake an investigation, thus strengthening the propensity to vary their strategies and use their own experience as a source from which to improve their next undertakings. Applying such criteria to their own efforts helps children to become engaged in their work. It also helps them to gain understanding and competence rather than drawing their attention toward themselves or to the image they project to others.

When children are engaged in challenging and significant activities, they are bound to experience some failures, reverses, and rebuffs. Parents and teachers have an important role to play—not in avoiding such events—but in helping children cope constructively when they fail to get what they want—whether it's a turn with a toy or success at a task. In such incidents, the teacher can say something like "I know you're disappointed, but there's tomorrow, and you can try again." As long as the teacher accepts a child's feelings and responds respectfully, the child is more likely to learn from the incident than to be harmed by it. Children are able to cope with rebuffs, disappointments, and failures when adults acknowledge and accept their feelings of discouragement and at the same time tell children they can try again another time.

Another approach is to teach children how to use what they have learned from their own experiences as a source of encouragement. A teacher might, for example, help a child recall an earlier incident when he or she struggled with a task or situation and eventually mastered it.

Learning to deal with setbacks, and maintaining the persistence and optimism necessary for childhood's long and gradual road to mastery: These are the real foundations of lasting self-esteem. Children who are helped to develop these qualities will surely respect themselves—though they probably will have better things to think about. □

REFERENCES

[1] National Association of Elementary School Principals. 1990. *Early Childhood Education and the Elementary School Principal. Standards for Quality Programs for Young Children.* Arlington, Va.: NAESP.

[2] Sandy McDaniel quoted in "Political Priority #1: Teaching Kids to Like Themselves," *New Options,* issue no. 27, April 28, 1986.

[3] Corporation for Public Broadcasting. 1991. *Celebrate Yourself. Six Steps to Building Your Self-Esteem.* Washington, D.C.: Corporation for Public Broadcasting.

[4] Femdel, L. and B. Ecker. 1989. *Building Self-Esteem with Koala-Roo.* Glencoe, Ill.: Scott, Foresman and Co.

[5] Katz, L.G. and S.C. Chard. 1989. *Engaging Children's Minds: The Project Approach.* Norwood, N.J.: Ablex Publishing Corp.

[6] Isenberg, J. and N.L. Quisenberry. 1988. *Play: A Necessity for All Children.* A position paper of the Association for Childhood Education International. Wheaton, Md.: Association for Childhood Education International.

[7] Katz and Chard, op. cit.

The Moral Power of Good Stories

By William Kilpatrick

One of the simplest but most important things we can do to encourage character development in youngsters is to acquaint them with stories and histories that can give them a common reference point and supply them with a stock of good examples.

Stories help to make sense of our lives. They also create a desire to be good. Plato, who thought long and hard about the subject of moral education, believed that children should be brought up in such a way that they would fall in love with virtue. And he thought that stories and histories were the key to sparking this desire. No amount of discussion or dialogue could compensate if that spark was missing.

Yet today very little attention is paid to this aspect of a child's development. Contemporary educators have for too long assumed that the desire to be good will just be there. But we have learned in recent years that this is not the case. The desire has to be instilled by caring parents and thoughtful teachers. As Plato understood, one of the best ways to do it is with stories. They allow us to identify with models of courage and virtue in a way that "problem solving" or classroom discussion does not.

Stories have always been an important way of transmitting values and wisdom. They become all the more important in a society that, like ours, has experienced so much disruption in the family and in the community. The lessons contained in good stories are lessons the child might not otherwise get in a world of harried adults and fractured social institutions.

One of the early calls for returning stories to the curriculum was made by William Bennett in a speech before the Manhattan Institute:

> Do we want our children to know what honesty means? Then we might teach them about Abe Lincoln walking three miles to return six cents and, conversely, about Aesop's shepherd boy who cried wolf.
>
> Do we want our children to know what courage means? Then we might teach them about Joan of Arc, Horatius at the Bridge, Harriet Tubman and the Underground Railroad.
>
> Do we want them to know about kindness and compassion, and their opposites? Then they should read *A Christmas Carol* and *The Diary of Anne Frank* and, later on, *King Lear.*

It's a long list and one that no doubt would have horrified Rousseau. Among the reasons Bennett puts forward in arguing for the primacy of stories are that "unlike courses in moral reasoning," they provide a "stock of examples illustrating what we believe to be right and wrong," and that they "help anchor our children in their culture, its history and traditions. They give children a mooring." "This is necessary," he continues, "because morality, of course, is inextricably bound both to the individual conscience and the memory of society . . . We should teach these accounts of character to our children so that we may welcome them to a common world . . ."

Bennett's concern over character was not simply a conservative phenomenon. Liberals too were having second thoughts about a moral education that relied on moral reasoning. In a 1988 speech that could easily have been mistaken for one of Bennett's, Derek Bok, the president of Harvard University stated:

> Socrates sometimes talked as if knowledge alone would suffice to ensure virtuous behavior. He did not stress the value of early habituation, positive

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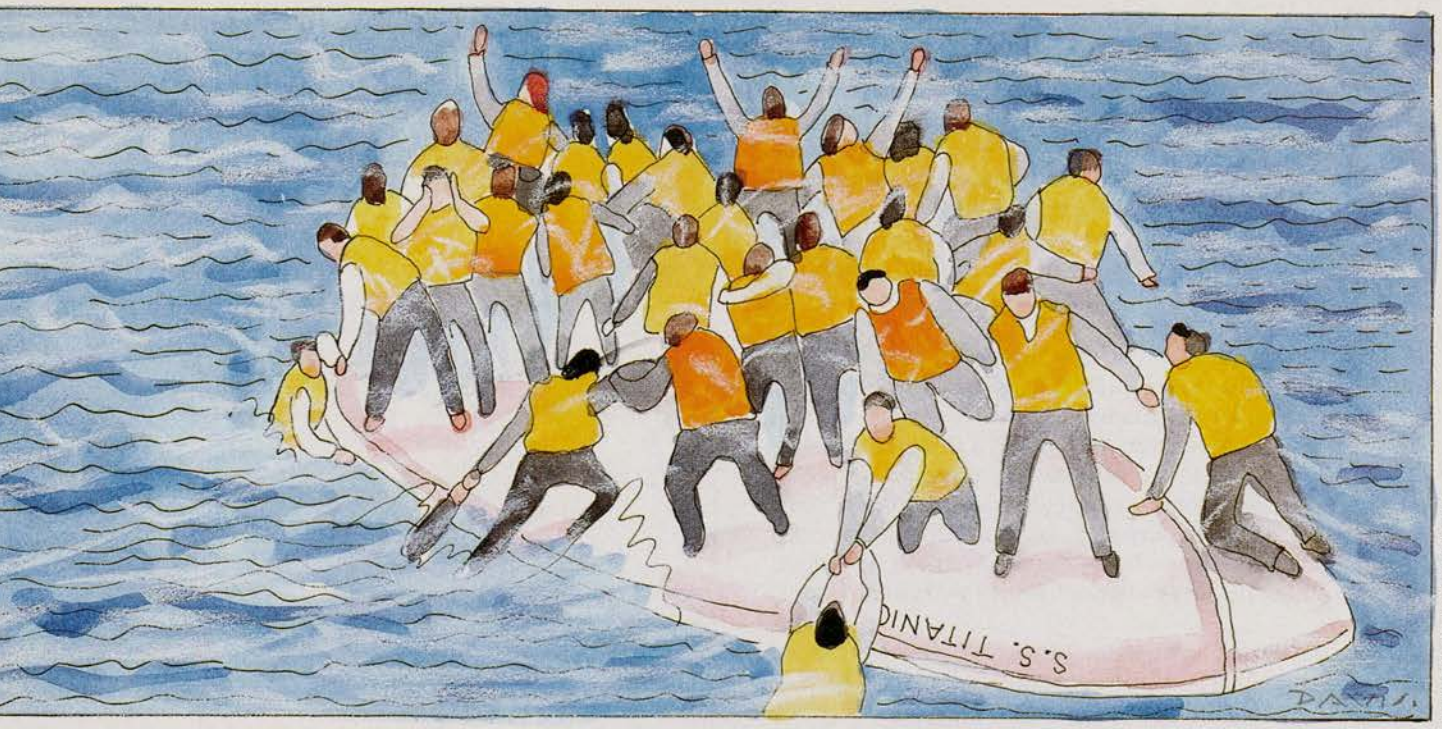


ILLUSTRATED BY SUSAN DAVIS

example and obedience to rules in giving students the desire and self-discipline to live up to their beliefs and to respect the basic norms of behavior essential to civilized communities.

Bok went on to call for "a broader effort to teach by habit, example and exhortation," and unlike Bennett, he was speaking not of the elementary or high school but of the university level.

Nevertheless, one still finds a resistance among many educators toward the kind of stories Bennett recommends—stories that teach by example. I don't mean this in a conspiratorial sense. I find this reaction in student teachers who have never heard of Bennett. Moreover, as far as I know, no committee of educators ever came together to promulgate an anti-story agenda. It has been more a matter of climate, and of what the climate would allow. In my conversations with teachers and would-be teachers, one of the most common themes I hear is their conviction that they simply don't have the right to tell students anything about right and wrong. Many have a similar attitude toward literature with a moral; they would also feel uneasy about letting a story do the telling for them. The most pejorative word in their vocabulary is "preach." But the loss of stories doesn't strike them as a serious loss. They seem to be convinced that whatever is of value in the old stories will be found out anyway. Some are Rousseauians and believe it will be found out through instinct; others subscribe to some version or other of critical thinking and believe it will be found out through reason.

The latter attitude is a legacy of the Enlightenment, but it is far more widespread now than it ever was in the eighteenth century. The argument then and now is as follows: Stories and myth may have been necessary to get the attention of ignorant farmers and fishermen, but intelligent people don't need to have their ethical principles wrapped in a pretty box; they are perfectly capable of grasping the essential point without being charmed by myths, and because they can reach their own conclusions, they are less susceptible to the harmful superstitions and narrow prejudices that may be embedded in stories. This attitude may be characterized as one of wanting to establish the moral of the story without the story. It does not intend to do away with morality but to make it more secure by disentangling it from a web of fictions. For example, during the Enlightenment the Bible came to be looked upon as an attempt to convey a set of advanced ethical ideas to primitive people who could understand them only if they were couched in story form. A man of the Enlightenment, however, could dispense with the stories and myths, mysteries and miracles, could dispense, for that matter, with a belief in God, and still retain the essence—the Christian ethic.

The decision-making approach to moral education—which relies on students to discover values for themselves—is in this tradition. It presents dilemmas that are stories of a sort, but they are stories with the juice squeezed out of them. Once you've thought your way through to a position on the issue, you can forget about the characters. The important thing is to understand the principles involved. Moreover, a real story with well-defined characters might play on a child's emotions and thus intrude on his or her thinking process.

But is it really possible to streamline morality in this way? Can we extract the ethical kernel and discard the rest? Or does something vital get lost in the process? As the noted short story writer Flannery O'Connor put it, "A story is a way to say something that can't be said any other way . . . You tell a story because a statement would be inadequate." In brief, can we have the moral of the story without the story? And if we can, how long can we hold it in our hands before it begins to dissolve?

The danger of such abstraction is that we quickly tend to forget the human element in morality. The utilitarian system of ethics that was a product of the English Enlight-

enment provides a good illustration of what can happen. It was a sort of debit-credit system of morality in which the rightness or wrongness of acts depended on their usefulness in maintaining a smoothly running social machine. Utilitarianism oiled the cogs of the Industrial Revolution by providing reasonable justifications for child labor, dangerous working conditions, long hours and low wages. For the sake of an abstraction—"the greatest happiness for the greatest number"—utilitarianism was willing to ignore the real human suffering created by the factory system.

Some of the most powerful attacks on that system can be found in the novels of Charles Dickens. Dickens brought home to his readers the human face of child labor and debtors' prison. And he did it in a way that was hard to ignore or shake off. Such graphic "reminders" may come to us through reading or they may come to us through personal experience, but without them, even the most intelligent and best-educated person will begin to lose sight of the fact that moral issues are human issues.

I USE the words "lose sight of" advisedly. There is an important sense in which morality has a visual base—or, if you want, a visible base. In other words, there is a connection between virtue and vision. One has to see correctly before one can act correctly. This connection was taken quite seriously in the ancient world. Plato's most famous parable—the parable of the cave—explains moral confusion in terms of simple misdirected vision: the men in the cave are looking in the wrong direction. Likewise, the Bible prophets regarded moral blindness not only as a sin but as the root of a multitude of sins.

The reason why seeing is so important to the moral life is that many of the moral facts of life are apprehended through observation. Much of the moral law consists of axioms or premises about human beings and human conduct. And one does not arrive at premises by reasoning. You either see them or you don't. The Declaration of Independence's assertion that some truths are "self-evident" is one example of this visual approach to right and wrong. The word "evident" means "present and plainly visible." Many of Abraham Lincoln's arguments were of the same order. When Southern slave owners claimed the same right as Northerners to bring their "property" into the new territories, Lincoln replied: "That is to say, inasmuch as you do not object to my taking my hog to Nebraska, therefore I must not object to your taking your slave. Now, I admit this is perfectly logical, if there is no difference between hogs and Negroes."

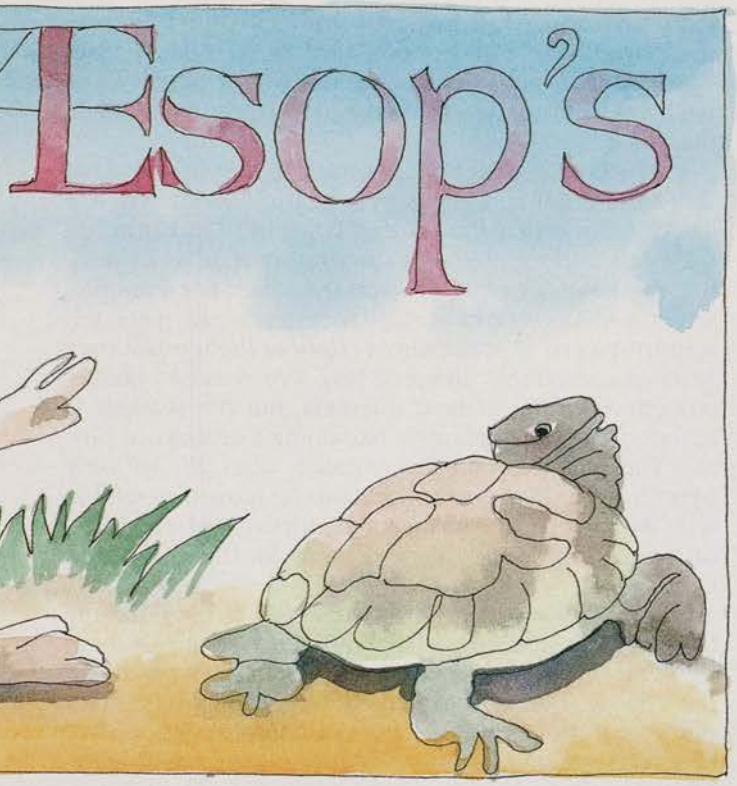
Lincoln's argument against slavery is not logical but definitional. It is a matter of plain sight that Negroes are persons. But even the most obvious moral facts can be denied or explained away once the imagination becomes captive to a distorted vision. The point is illustrated by a recent Woody Allen film, *Crimes and Misdemeanors.* The central character, Judah Rosenthal, who is both an ophthalmologist and a philanthropist, is faced with a dilemma: What should he do about his mistress? She has become possessive and neurotic and has started to do what mistresses are never supposed to do: she has begun to make phone calls to his office and to his home, thus threatening to completely ruin his life—a life that in many ways has been one of service. Judah seeks advice from two people: his brother Jack, who has ties to the

underworld, and a rabbi, who tries to call Judah back to the vision of his childhood faith. The rabbi (who is nearly blind) advises Judah to end the relationship, even if it means exposure, and to ask his wife for forgiveness. Jack, on the other hand, having ascertained the woman's potential for doing damage and her unwillingness to listen to reason, advises Judah to "go on to the next [logical] step," and he offers to have her "taken care of." The interesting thing is that Jack's reasoning powers are just as good as the rabbi's; and based on his vision of the world, they make perfect sense. You simply don't take the chance that a vindictive person will destroy your marriage and your career. And indeed, Jack finally wins the argument. In an imagined conversation, Judah tells the rabbi, "You live in the Kingdom of Heaven, Jack lives in the real world." The woman is "taken care of."

Jack's reasoning may be taken as an example of deranged rationality or—if you change your angle of vision—as the only smart thing to do. Certain moral principles make sense within the context of certain visions of life, but from within the context of other visions, they don't make much sense at all. From within the vision provided by the rabbi's faith, all lives are sacred; from Jack's viewpoint, some lives don't count.

Many of the moral principles we subscribe to seem reasonable to us only because they are embedded within a vision or worldview we hold to be true—even though we might not think very often about it. In the same way, a moral transformation is often accompanied by a transformation of vision. Many ordinary people describe their moral improvement as the result of seeing things in a different light or seeing them for the first time. "I was blind but now I see" is more than a line from an old hymn; it is the way a great many people explain their moral growth.

If we can agree that morality is intimately bound up with vision, then we can see why stories are so important for our moral development and why neglecting them



is a serious mistake. This is because stories are one of the chief ways by which visions are conveyed (a vision, in turn, may be defined as a story about the way things are or the way the world works). Just as vision and morality are intimately connected, so are story and morality. Some contemporary philosophers of ethics—most notably, Alasdair MacIntyre—now maintain that the connection between narrative and morality is an essential one, not merely a useful one. The Ph.D. needs the story "part" just as much as the peasant. In other words, story and moral may be less separable than we have come to think. The question is not whether the moral principle needs to be sweetened with the sugar of the story but whether moral principles make any sense outside the human context of stories.

In recent years a number of prominent psychologists and educators have turned their attention to stories. In *The Uses of Enchantment* (1975), child psychiatrist Bruno Bettelheim argued that fairy tales are a vital source of psychological and moral strength; their formative power, he said, had been seriously underestimated. Robert Coles of Harvard University followed in the 1980s with three books *(The Moral Life of Children, The Spiritual Life of Children,* and *The Call of Stories),* which detailed the indispensable role of stories in the life of both children and adults. Another Harvard scholar, Jerome Bruner, whose earlier *The Process of Education* had helped stimulate interest in critical thinking, had, by the mid-eighties, begun to worry that "propositional thinking" had been emphasized at the expense of "narrative thinking"—literally, a way of thinking in stories. In *Actual Minds, Possible Worlds,* Bruner suggests that it is this narrative thought, much more than logical thought, that gives meaning to life.

A number of other psychologists had arrived at similar conclusions. Theodore Sarbin, Donald Spence, Paul Vitz, and others have emphasized the extent to which individuals interpret their own lives as stories or narratives. "Indeed," writes Vitz, "it is almost impossible not to think this way." According to these psychologists, it is such narrative plots more than anything else that guide our moral choices. Coles, in *The Moral Life of Children,* observes how the children he came to know through his work not only understood their own lives in a narrative way but were profoundly influenced in their decisions by the stories, often of a religious kind, they had learned.

By the mid-eighties a similar story had begun to unfold in the field of education. Under the leadership of Professor Kevin Ryan, Boston University's Center for the Advancement of Character and Ethics produced a number of position papers calling for a reemphasis on literature as a moral teacher and guide. Meanwhile, in *Teaching as Storytelling* and other books, Kieran Egan of Canada's Simon Fraser University was proposing that the foundations of all education are poetic and imaginative. Even logico-mathematical and rational forms of thinking grow out of imagination, and depend on it. Egan argues that storytelling should be the basic educational method because it corresponds with fundamental structures of the human mind. Like Paul Vitz, he suggests that it is nearly impossible not to think in story terms. "Most of the world's cultures and its great religions," he points out, "have at their sacred core a story, and we indeed have difficulty keeping our rational history from being constantly shaped into stories."

In short, scholars in several fields were belatedly discovering what Flannery O'Connor, with her writer's intuition, had noticed years before: "A story is a way to say something that can't be said any other way . . ."

THIS RECENT interest in stories should not, however, be interpreted as simply another Romantic reaction to rationalism. None of the people I have mentioned could be classified as Romanticists. Several of them (including Flannery O'Connor) freely acknowledge their indebtedness to Aristotle and Aquinas—to what might be called the "realist" tradition in philosophy. Although literature can be used as an escape, the best literature, as Jacques Barzun said, carries us back to reality. It involves us in the detail and particularity of other lives. And unlike the superficial encounters of the workaday world, a book shows us what other lives are like from the inside. Moral principles also take on a reality in stories that they lack in purely logical form. Stories restrain our tendency to indulge in abstract speculation about ethics. They make it a little harder for us to reduce people to factors in an equation.

I can illustrate the overall point by mentioning a recurrent phenomenon in my classes. I have noticed that when my students are presented with a Values Clarification strategy and then with a dramatic account of the same situation, they respond one way to the dilemma and another to the story. In the Values Clarification dilemma called "The Lifeboat Exercise," the class is asked to imagine that a ship has sunk and a lifeboat has been put out from it. The lifeboat is overcrowded and in danger of being swamped unless the load is lightened. The students are given a brief description of the passengers—a young couple and their child, an elderly brother and sister, a doctor, a bookkeeper, an athlete, an entertainer, and so on—and from this list they must decide whom to

Not All Stories Inspire Us to Be Better Than We Are

GOOD LITERATURE doesn't introduce a child to "kids like me" but to others who are better than himself—who are just like he might become if he fulfills his potential for goodness. "When we read," writes novelist John Gardner, "we ingest metaphors of goodness, wordlessly learning to behave more like Levin than like Anna (in *Anna Karenina*), more like the transformed Emma (in Jane Austen's novel) than like the Emma we first meet in the book." We can easily add more examples: learning to behave more like the transformed boy in *Captains Courageous* than the boy we first meet, more like Portia than Shylock, more like the younger brother in *King of the Golden River* than the older brothers (he gives water to a thirsty man; they refuse). When fiction works for us, observes critic Wayne Booth, we have been—at least for the duration—that kind of person.

But not all stories inspire us to be better than we are. By the decade of the seventies, a new type of story was coming into vogue. Psychologist David Elkind refers to it as the "therapeutic" story:

> Previously in much of children's literature, the goals were often to help or to please others—parents, friends, pets—who were needy or endangered. A boy took risks to save a dog, or a girl worked hard to get a desired gift for a sick friend. In children's fiction today, however, the goals are often therapeutic and rehabilitative. Heroes and heroines are healing themselves rather than helping others.

Healing themselves—or increasingly, it appears, simply accepting themselves. The best examples of this literature of self-acceptance are the stories of Judy Blume. Blume, far and away the most successful author of books for young adults, writes: "When I was young I could never find any books about kids like me, and that's what I wanted to read about." The "kids like me" she writes about are self-obsessed, sexually absorbed, shallow, sullen, emotionally numb, contemptuous of adults, and relentlessly materialistic. Youngsters of this sort have, of course, appeared before in fiction: the character of Nellie from *Little House on the Prairie* comes to mind. The novel thing about the Blume books is that her non-judgmental prose contains no suggestion that such children should mend their ways. The main characters in stories such as *Blubber* and *Then Again Maybe I Won't* are nasty and meanspirited—but "so what?" as they might say. "That's the way kids are, and it's okay" seems to mark the limit of the Blume philosophy. There is in her stories no encouragement to look outside the self, and thus, as Michelle Landsberg, a Canadian writer, observes of Blume, no "enlargements of the self." Rather, her books consistently endorse narcissistic self-centeredness. Children didn't exactly stop reading books in the seventies and eighties, but more and more of what they were reading resembled nothing so much as junior versions of Rousseau's *Confessions.* □

throw overboard. Consistent with current thinking, there are no right and wrong answers in this exercise. The idea is to generate discussion. And it works quite well. Students are typically excited by the lifeboat dilemma.

This scenario, of course, is similar to the situation that faced the crew and passengers of the *Titanic* when it struck an iceberg in the North Atlantic in 1912. But when the event is presented as a story rather than as a dilemma, the response evoked is not the same. For example, when students who have done the exercise are given the opportunity to view the film *A Night to Remember,* they react in a strikingly different way. I've watched classes struggle with the lifeboat dilemma, but the struggle is mainly an intellectual one—like doing a crossword puzzle. The characters in the exercise, after all, are only hypothetical. They are counters to be moved around at will. We can't really identify them, nor can we be inspired or repelled by them. They exist only for the sake of the exercise.

When they watch the film, however, these normally blasé college students behave differently. Many of them cry. They cry as quietly as possible, of course: even on the college level it is extremely important to maintain one's cool. But this is a fairly consistent reaction. I've observed it in several different classes over several years. They don't even have to see the whole film. About twenty minutes of excerpts will do the trick.

What does the story do that the exercise doesn't? Very simply, it moves them deeply and profoundly. This is what art is supposed to do.

If you have seen the film, you may recall some of the vivid sketches of the passengers on the dying ship as the situation becomes clear to them: Edith Evans, giving up a place on the last boat to Mrs. Brown, saying, "You go first; you have children waiting at home." Harvey Collyer pleading with his wife, "Go, Lottie! For God's sake, be brave and go! I'll get a seat in another boat." Mrs. Isidor Straus declining a place in the boats: "I've always stayed with my husband, so why should I leave him now?"

The story is full of scenes like this: Arthur Ryerson stripping off his life vest and giving it to his wife's maid; men struggling below-decks to keep the pumps going in the face of almost certain death; the ship's band playing ragtime and then hymns till the very end; the women in boat 6 insisting that it return to pick up survivors; the men clinging to the hull of an overturned boat, reciting the Lord's Prayer; the *Carpathia,* weaving in and out of ice floes, racing at breakneck speed to the rescue. But there are other images as well: the indolence and stupidity of the *California*'s crew, who, only ten miles away, might have made all the difference, but did nothing; the man disguised in a women's shawl; the panicked mob of men rushing a lifeboat; passengers in half-empty lifeboats refusing to go back to save the drowning.

The film doesn't leave the viewer much room for ethical maneuvering. It is quite clear who has acted well and who has not. And anyone who has seen it will come away hoping that if ever put to a similar test, he or she will be brave and not cowardly, will think of others rather than of self.

Not only does the film move us, it moves us in certain directions. It is definitive, not open-ended. We are not being asked to ponder a complex ethical dilemma;

rather, we are being taught what is proper. There are codes of conduct: women and children first; duty to others before self. If there is a dilemma in the film, it does not concern the code itself. The only dilemma is the perennial one that engages each soul: conscience versus cowardice, faith versus despair.

This is not to say that the film was produced as a moral fable. It is, after all, a true story and a gripping one, the type of thing that almost demands cinematic expression—hardly a case of didacticism. In fact, if we were to level a charge of didacticism, it would have to be against "The Lifeboat Exercise." It is quite obviously an artificially contrived teaching exercise. But this is didacticism with a difference. "The Lifeboat Exercise" belongs to the age of relativism, and consequently, it has nothing to teach. No code of conduct is being passed down; no models of good and bad behavior are shown. Whether it is actually a good thing or bad thing to throw someone overboard is up to the youngster to decide for himself. The exercise is designed to initiate the group into the world of "each man his own moral compass."

Of course, we are comparing two somewhat different things: a story, on the one hand, and a discussion exercise, on the other. The point is that the logic of relativism necessitates the second approach. The story of the *Titanic* was surely known to the developers of "The Lifeboat Exercise." Why didn't they use it? The most probable answer is the one we have alluded to: The story doesn't allow for the type of dialogue desired. It marshals its audience swiftly and powerfully to the side of certain values. We feel admiration for the radio operators who stay at their post. We feel pity and contempt for the handful of male passengers who sneak into lifeboats. There are not an infinite number of ways in which to respond to these scenes, as there might be to a piece of abstract art. Drama is not the right medium for creating a value-neutral climate. It exerts too much moral force.

Drama also forces us to see things afresh. We don't always notice the humanity of the person sitting next to us on the bus. It is often the case that human beings and human problems must be presented dramatically for us to see them truly. Robert Coles relates an interesting anecdote in this regard about Ruby Bridges, the child who first integrated the New Orleans schools. Ruby had seen *A Raisin in the Sun,* and expressed to Coles the wish that white people would see it: "If all the [white] people on the street [who were heckling her mercilessly] saw the movie, they might stop coming out to bother us." When Coles asked her why she thought that, she answered, "Because the people in the movies would work on them, and maybe they'd listen." Ruby knew that whites who saw her every day didn't really see her. Maybe the movie would make them see.

ADMITTEDLY, I have been mixing media rather freely here, and this raises a question. Films obviously have to do with seeing, but how about books? The paradoxical answer is that the storyteller's craft is not only a matter of telling but also of showing. This is why writing is so often compared to painting, and why beginning writers are urged to visualize what they want to say. So, even when a writer has a moral theme, his work—if he is a good writer—is more like the work of an artist than a moralist. For example, C.S. Lewis's immensely popular children's books have strong moral and religious themes, but they were not conceived out of a moral intent. "All my seven Narnian books," Lewis wrote in 1960, "and my three science fiction books, began with seeing pictures in my head. At first they were not a story, just pictures. *The Lion [The Lion, the Witch and the Wardrobe]* all began with a picture of a faun carrying an umbrella and parcels in a snowy wood."

Stories are essentially moving pictures. That is why they are so readily adaptable to the screen. And a well-made film, in turn, needs surprisingly little dialogue to make its point. When, in *A Night to Remember,* the shawl is torn away from the man's head, we do not have to be told anything. We *see* that his behavior is shameful; it is written on his face.

On the simplest level the moral force of a story or film is the force of example. It shows us examples of men and women acting well or trying to act well, or acting badly. The story points to these people and says in effect, "Act like this; don't act like that." Except that, of course, nothing of the kind is actually stated. It is a matter of showing. There is, for instance, a scene in *Anna Karenina* in which Levin sits by the side of his dying brother and simply holds his hand for an hour, and then another hour. Tolstoy doesn't come out and say that this is what he ought to do, but the scene is presented in such a way that the reader knows that it is the right thing to do. It is, to use a phrase of Bruno Bettelheim's, "tangibly right."

"Do I have to draw you a picture?" That much-used put-down implies that normally intelligent people can do without graphic illustration. But when it comes to moral matters, it may be that we do need the picture more than we think. The story suits our nature because we think more readily in pictures than in propositions. And when a proposition or principle has the power to move us to

action, it is often because it is backed up by a picture or image. Consider, for example, the enormous importance historians assign to a single book—*Uncle Tom's Cabin*—in galvanizing public sentiment against slavery. After the novel appeared, it was acted out on the stage in hundreds of cities. For the first time, vast numbers of Americans had a visible and dramatic image of the evils of slavery. Lincoln, on being introduced to author Harriet Beecher Stowe, greeted her with the words "So this is the little lady who started the big war." In more recent times the nation's conscience has been quickened by photo images of civil rights workers marching arm in arm, kneeling in prayer, and under police attack. It is nice to think that moral progress is the result of better reasoning, but it is naive to ignore that role of the imagination in our moral life.

The more abstract our ethic, the less power it has to move us. Yet the progression of recent decades has been in the direction of increasing verbalization and abstraction, toward a reason dissociated from ordinary feelings and cut off from images that convey humanness to us. "At the core of every moral code," observed Walter Lippmann, "there is a picture of human nature." But the picture coming out of our schools increasingly resembles a blank canvas. The deep human sympathies—the kind we acquire from good literature—are missing.

Perhaps the best novelistic portrait of disconnected rationalism is that of Raskolnikov in *Crime and Punishment.* Raskolnikov has mastered the art of asking the question "Why not?" What is wrong with killing a repulsive old woman? he asks himself. What is wrong with taking her money and using it for a worthy cause—namely, to pay for his own education? With that education, Raskolnikov eventually plans to bring his intellectual gifts to the service of mankind. It is good utilitarian logic.

In commenting on *Crime and Punishment,* William Barrett observes that in the days and weeks after the killing, "a single image breaks into this [Raskolnikov's] thinking." It is the image of his victim, and this image saves Raskolnikov's soul. Not an idea but an image. For Dostoevsky the value of each soul was a mystery that could never be calculated but only shown.

The same theme recurs in *The Brothers Karamazov.* At the very end of the book, Alyosha speaks to the youngsters who love him: "My dear children . . . You must know that there is nothing higher and stronger and more wholesome and useful for life in after years than some good memory, especially a memory connected with childhood, with home. People talk to you a great deal about your education, but some fine, sacred memory, preserved from childhood, is perhaps the best education. If a man carries many such memories with him into life, he is safe to the end of his days, and if we have only one good memory left in our hearts, even that may sometime be the means of saving us."

There is no point in trying to improve on this. Let us only observe that what Dostoevsky says of good memories is true also of good stories. Some of our "sacred" memories may find their source in stories.

We carry around in our heads many more of these images and memories than we realize. The picture of Narcissus by the pool is probably there for most of us; and the Prodigal Son and his forgiving father likely inhabit some corner of our imagination. Atticus Finch, Ebenezer Scrooge, Laura Ingalls Wilder, Anne Frank, David and Goliath, Abraham Lincoln, Peter and the servant girl: for most of us these names will call up an image, and the image will summon up a story. The story in turn may give us the power or resolve to struggle through a difficult situation or to overcome our own moral sluggishness. Or it may simply give us the power to see things clearly. Above all, the story allows us to make that human connection we are always in danger of forgetting. □

A Selection of Great Books for Children and Teens*

One of the difficulties in compiling a list of good books is that there are so many good ones to choose from. What follows is only a short representative list.

The books on the list have been chosen because they are the kinds of books that help youngsters to grow in courage, charity, justice, and other virtues. But they would not be included if they were not also good stories. These are not didactic or preachy books. On the contrary, they are exciting and compelling. They are the kind of stories that throw off sparks.

Since good books do their own work in their own way, it is not necessary or wise for adults to explain the "moral" in each story. Shared reading may prompt youngsters to ask questions about moral issues, but adults should be careful not to treat books like doses of moral medicine.

The three reading levels are only a rough guide. Children do not seem to have much respect for such age gradings, and tend to tramp back and fourth across them. Some middle readers (roughly eight to twelve years old) can read and enjoy Tolkien. Some children in the same age group may just be getting started on *Little House in the Big Woods.* And the youngster who can read novels may still delight in hearing fairy tales read to younger siblings. Likewise, beginning readers or nonreaders will often enjoy listening to read-alouds selected from a middle reading level.

A word of explanation is in order about the term "older readers." I have used it instead of the more common classification "young adult." Many of the young adult books aimed at teenagers tend to reflect back to them their own limited adolescent world, thus leaving the young reader with the impression that there is nothing more profound in life than the teenage view of things as seen through the lens of popular culture. If teenagers really are to be treated as young adults, then they deserve

* *From the author's annotated list of over 100 recommended books, space allows us to print only ten from each of the three age-group categories.*

acquaintance with books that offer a broader and deeper vision of life.

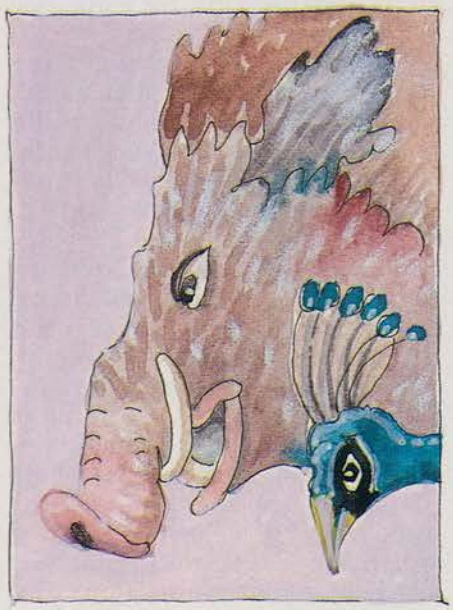
Picture Books, Story Books, Beginning Readers

Aesop's Fables. Illus. by Fritz Kredel. Grosset, 1947, 1983. 234 pp.

"The Fox and the Crow," "The Hare and the Tortoise," "The Wolf in Sheep's Clothing," "The Boy Who Cried Wolf": these little stories-with-a-moral go back at least 2,300 years, but their shrewd observations about human foibles are still timely. We still need to be reminded that we can't trust flatterers, that we can't please everyone, and that we shouldn't pretend to be what we're not. Listeners and readers of all ages will take pleasure in these pithy and entertaining lessons in living.

Beauty and the Beast. Retold and illus. by Jan Brett. Clarion, 1989, 1991. 31 pp.

Beauty and the Beast is just the right antidote to our modern obsession with looks, surface charm, and casual sex. It speaks volumes about the meaning of true love and true beauty, and about the importance of restraining our animal nature until love has had time to grow. Children will appreciate the mystery and romance of this story; adults will appreciate its depth and wisdom. Jan Brett's illustrations are elegant and enchanting, but older readers should be directed to Madame Leprince de Beaumont's longer version—especially for Beauty's observation that "handsome looks [may] hide a false and wicked heart."



Dogger. Shirley Hughes. Illus. by the author. Bodley Head, 1977. 32 pp. (First American edition published in 1978 by Prentice-Hall under the title *David and Dog*.)

This is a story about one of those small everyday sacrifices family members make for one another. David takes his worn, stuffed dog, "Dogger," everywhere; but one day on a walk with his mother, David manages to lose Dogger. The whole family joins in the search, but to no avail. The next day at the school fair, Dogger is found in the possession of a little girl who has just purchased him from a toy stall. In order to get Dogger back from the reluctant girl, Bella, David's older sister trades a large and beautiful stuffed bear she has just won.

The Door in the Wall. Marguerite De Angeli. Illus. by the author. Doubleday, 1949. 111 pp. Dell, 1990. 120 pp.

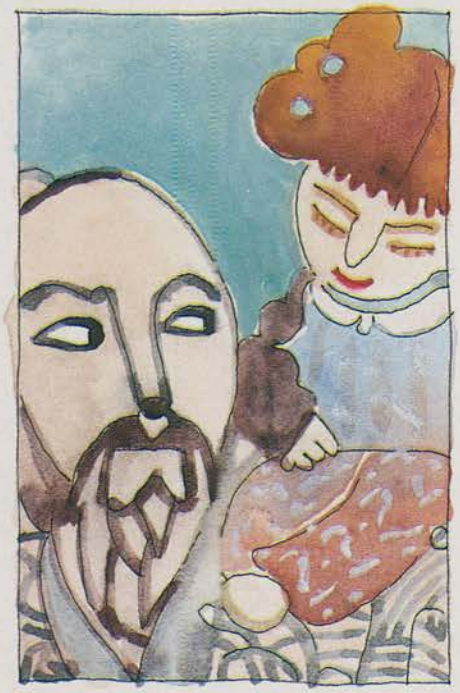
A heartwarming and inspiring tale of a young boy left crippled by illness, and of his victory over his seemingly hopeless situation. With the help of the monks who heal his broken spirit as well as his body, Robin learns that when the way to the future is blocked, there is always a "door in the wall" for those willing to look for it. Set in late-medieval England, this beautifully written tale brings alive the texture and richness of life in castles, monasteries, and market towns.

The Emperor and the Kite. Jane Yolen. Illus. by Ed Young. World, 1967. 31 pp. Philomel, 1988. 28 pp.

Set in ancient China, this simple yet powerful story tells of courage and loyalty. Djeou Seow's brothers are like "four rising suns" and her sisters like "midnight moons" in the eyes of her father, the emperor. But Djeou Seow is the youngest, and so insignificant the emperor often forgets he has a fourth daughter. When the emperor is kidnapped, his children flee and do nothing. All except Djeou Seow. She keeps him alive by using her kite to bring him food. And eventually, with the help of her kite, she effects his escape. Like King Lear, the emperor learns that a daughter's loyalty is shown by deeds, not words. The elegant illustrations are a perfect marriage to the text.

How Many Days to America? A Thanksgiving Story. Eve Bunting. Illus. by Beth Peck. Clarion, 1982, 1988. 32 pp.

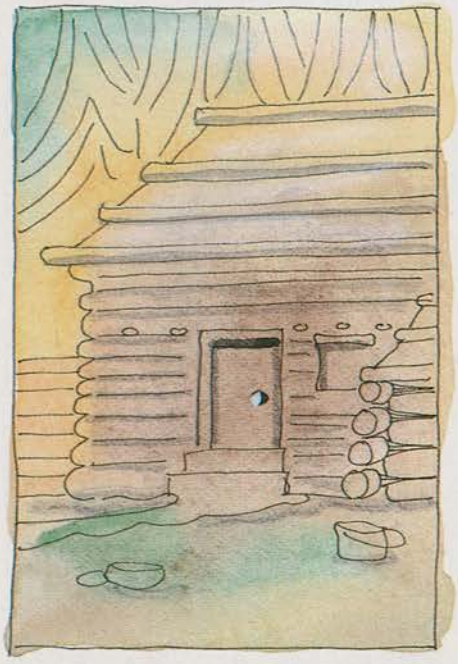
"Because we do not think the way they think, my son." In these words, a father explains to his son why they



must leave everything behind and flee their country. Together with other families, they make a perilous journey in a small boat in search of America. After encountering storms, pirates, sickness, and near starvation, they finally arrive in America. Unbeknownst to the refugees, it is Thanksgiving Day, and they find a welcoming dinner waiting for them. This powerful, nonpolitical story of modern-day pilgrims conveys courage, hope, and determination.

Keep the Lights Burning, Abbie. Peter and Connie Roop. Illus. by Peter E. Hanson. Carolrhoda, 1985. 40 pp. Houghton Mifflin, 1989. 40 pp.

Abbie's mother is sick, so her father, the lighthouse keeper, must take their small boat to get medicine and other supplies. "Keep the lights burning, Abbie!" is the last thing he says to his eldest daughter, who has never done so by herself. When her father's return is delayed for weeks by a mighty storm, Abbie takes charge of her sisters and keeps the light burning despite many obstacles. The lights give not only safety to ships but comfort to her father. "I was afraid for you," he says on his return. "Every night I watched for the lights. Every night I saw them. Then I knew you were all right." This true story, based in part on Abbie Burgess's own account, is accompanied by marvelous watercolor illustrations.



Little House in the Big Woods. Laura Ingalls Wilder. Illus. by Garth Williams. Harper, 1932. 237 pp. Cornerstone, 1989. 300 pp.

In a small log cabin in the deep woods of Wisconsin, little Laura Ingalls lived with her ma and pa and her sisters, far from other folk. In a style simple yet elegant, the story of Laura's life is told through the course of a year: harvesting and putting by for the winter, hunting and fishing for food, long winter evenings, warm shelter and family times. The description of the hard work involved in maintaining the home, the sense of a family all working together in harmony for a mutual goal, the shared play when work is done: all affirm traditional family roles and values. The most admirable quality of this book and its sequels—except for the last, *The First Four Years*—is its atmosphere of gentle affection among the family. (The last book does not share the harmonious flavor of the earlier volumes; published posthumously from a manuscript found among the author's papers, the story of the first four years of Laura's marriage, when every sort of disaster occurs, has a passive and resentful tone.) Note: boys enjoy the *Little House* series as much as girls do.

The Little Match Girl. Hans Christian Andersen. Illus. by Rachel Isadora. Grosset, 1944. 24 pp. Putnam, 1990. 32 pp.

If you want your children to feel compassion for the plight of the poor, you could belabor them with facts about poverty rates and homelessness, or—better—you could read *The Little Match Girl* to them. The spurt of the matches against the cold brick casts more light on the tragedy of poverty than any number of statistics or news reports. Moreover, the compassion the story evokes is based not on a sense of duty but on a sense of identity. We are brought too far inside the girl's rich imaginative life for it to be otherwise. Rachel Isadora's illustrations nicely capture the mystical quality of Andersen's vision.

A Tale of Three Wishes. Isaac Bashevis Singer. Illus. by Irene Lieblich. Farrar, Straus, 1975, 1976. 27 pp.

Nobel Prize-winner Isaac Bashevis Singer's tales for children are full of wisdom and wonderment, and this one is no exception. Three Jewish children who seek a miraculous shortcut to wisdom, learning, and love discover, by way of a mysterious encounter, that wishes must be earned by effort. When we next meet them, as grown-ups, we find that they have learned the lesson well, and that a much slower but still miraculous transformation has, indeed, taken place in each.

Middle Readers

The Chronicles of Narnia. C. S. Lewis. Illus. by Pauline Baynes. Macmillan, 1950-56, 1988.

Four children enter a wardrobe in an empty room and come out into a strange kingdom of never-ending winter populated by fauns, giants, dwarfs, talking animals, a singularly evil witch, and an extraordinary lion. Thus begins *The Lion, the Witch and the Wardrobe,* the first in the seven-book series that has commanded the loyalty of millions of children worldwide. It is difficult to pinpoint the source of Lewis's success, since he does so many things so well: he has created a thoroughly convincing secondary world, his plots are marvelously constructed, his characters (both human and nonhuman) are closely observed, and his stories are deeply moving. In addition, the *Chronicles* are packed with suspense, surprises, and adventure. As engrossing as the action is, the interior struggles of the several characters are just as compelling. The children battle recurring temptations to cowardice, meanness, pride, and even treachery. Although they don't win

all the battles, they do grow in goodness and nobility. Reading the *Chronicles* is, among other things, an education in virtue. It is also satisfying reading for adults. Readers who first chance upon the series at age twenty or thirty are as likely to become loyal subjects of Narnia as are nine- or ten-year-olds. Adult readers may also be interested to know some of the history behind the creation of the series. Together with other friends, Lewis and J. R. R. Tolkien met regularly at an Oxford pub to read aloud from works in progress, and to give and receive criticism. One result was the *Chronicles;* the other was Tolkien's *The Hobbit,* and its sequel, *The Lord of the Rings.* The other titles in the Narnia *Chronicles* are *Prince Caspian, The Voyage of the "Dawn Treader," The Silver Chair, The Horse and His Boy, The Magician's Nephew,* and *The Last Battle.*

The 18th Emergency. Betsy Byars. Illus. by Robert Grossman. Viking, 1973, 1988. 126 pp.

When Benjie, a slight sixth-grade boy whom everyone calls "Mouse," insults Marv Hammerman, the class tough guy, Benjie's first reaction is to flee. Benjie continues to run from his problem (and Marv's vengeance) until he finally realizes that, painful as it will be, the only honorable thing to do is face the consequences of his actions and confront Marv—even if it means getting beat up. In doing so, Benjie matures emotionally, demonstrated figuratively when his friend stops using his hated nickname. In this book, Byars has made the notion of honor comprehensible to young readers, while maintaining her lively, outrageously funny style.

A Girl Called Al. Constance C. Greene. Illus. by Byron Barton. Viking, 1969. 127 pp. Viking Penguin, 1991.

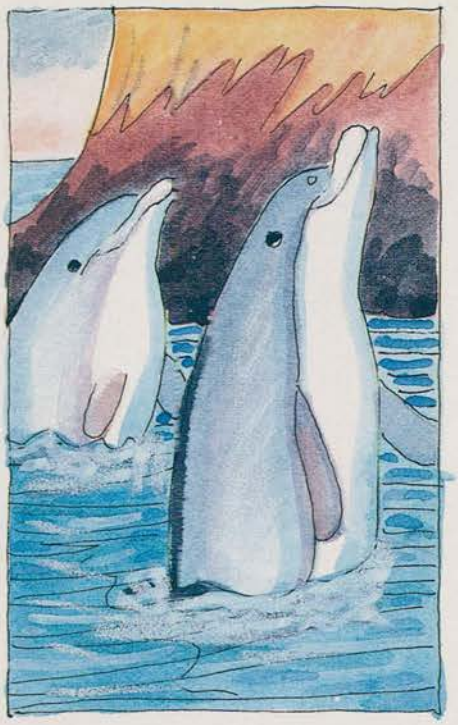
In this pert, sassy, and honest story of friendship across generations, our narrator (who never gives her name) makes friends with a new girl in her apartment building, a girl who calls herself "Al" rather than "Alexandra," who is too fat, and who literally refuses to let her hair down. Together the two girls befriend old Mr. Richards, the colorful-tattoo-bearing maintenance man who tends their building. This unlikely friendship between the girls and the kind, gentle, delightfully eccentric old fellow becomes especially important to Al, who masks her distress over her absentee father's neglect by gaining weight. The children's sorrow at Mr. Richards's death is touching, and yet entirely in keeping with the lively, clear-sighted, and unsentimental insights of the narrator. This story presents a blueprint of hope for children who might otherwise believe that the lack of an involved, loving father in their lives is an insurmountable handicap; it is also a perceptive tale of loneliness alleviated by loving friendship between old and young.

The Hundred Dresses. Eleanor Estes. Illus. by Louis Slobodkin. Harcourt, 1944, 1974. 80 pp.

Even though she knows it is wrong, Maddie goes along with her friends' daily teasing of Wanda, the daughter of Polish immigrants. The outcast girl's unexpected move to another city leaves Maddie resolved to stand up for others in the future, but it also leaves her smitten with the realization that it is too late to make amends to Wanda herself. As Michelle Landsberg points out, this complex, subtle story stands in refreshing contrast to Judy Blume's amoral treatment of the same theme in *Blubber.*

Island of the Blue Dolphins. Scott O'Dell. Houghton Mifflin, 1960, 1990. 181 pp.

A poignant and powerful story of a twelve-year-old Indian girl who is accidentally abandoned on a remote island. After sacrificing her safe passage to the mainland in an unsuccessful attempt to save her brother's life, Karana spends the next eighteen years in solitude. Relying on skill and inner strength, she manages not only to survive but to grow in serenity and charity (exemplified by her rescue of a wild dog that had previously attacked her). This *Robinson Crusoe*-like story is a tribute to human resilience. O'Dell is a skillful writer whose popularity with young readers is well deserved.



The Rabbi's Girls. Johanna Hurwitz. Illus. by Pamela Johnson. Morrow, 1982. 158 pp. Puffin, 1989. 158 pp.

Carrie Levin is proud to be one of "the rabbi's girls." Her father is rabbi to the small Jewish community in Lorain, Ohio; he is also father to six daughters. In an understated though intensely moving account, Carrie tells of her father's strength, love, and devotion, and of their life as observant Jews, during the year 1923. When the youngest daughter, a tiny baby, develops pneumonia, a terrible tornado devastates the town, and her father's health fails, Carrie learns that life is both bitter and good, that without the bitter, one would be unable to appreciate the good. Her father's death, shortly after the tornado, brings Carrie the realization of all he has given her, especially the knowledge that "the year is a circle, and that life goes on." The love and devotion of this father survives even death.

Roll of Thunder, Hear My Cry. Mildred Taylor. Dial, 1976. 276 pp. Puffin, 1991. 276 pp.

This powerful story of a black family's resistance to injustice and poverty is set during the Depression years in Mississippi, and is observed through the eyes of Cassie, a spirited nine-year-old. Cassie and her family have a strong sense of right and wrong, plus an abundant supply of courage and determination. They need every bit of it. The novel, drawn from stories the author heard as a child, attests to the importance of storytelling as a vehicle for transmitting family virtues.

The Sign of the Beaver. Elizabeth Speare. Houghton Mifflin, 1983. 135 pp. ABC-Clio, 1988. 146 pp.

This story, set in 1768, tells of a young boy's experience of self-discovery when he is left alone on the Maine frontier while his father travels back to Massachusetts to fetch his mother and sister. Young Matt has been left behind to tend the family's new homestead, and though he makes a diligent effort, he is not learned in forest ways, and minor carelessness and impulsiveness on his part result in major disaster. Matt's life is saved only by the intervention of Indians who live nearby. Gradually the boy is forced to acknowledge that the Indians are not brute savages but highly skilled, complex, worthy people from whom he has much to learn. Eventually Matt is able to earn the respect of his Indian friends, though in a totally unexpected way. Here is a well-written frontier survival story which provides much food for thought. A Newbery Honor winner.

Snow Treasure. Marie McSwigan. Dutton, 1942. 197 pp. Scholastic, 1986. 104 pp.

In 1940 the Nazis invaded Norway. This story, which has a basis in fact, tells how Norwegian schoolchildren smuggled $9 million of gold bullion past German sentries and onto a hidden ship bound for America. How did they do it? By sledding right under the noses of the unwitting Nazi guards. A suspenseful plot and a series of close calls make this a real page turner.

Tuck Everlasting. Natalie Babbitt. Farrar, Straus, 1975, 1991. 139 pp.

This profound tale of adventure leads Winnie Foster, an overprotected ten-year-old, into the forest where she encounters the Tuck family, who have received eternal life by drinking from a certain spring. A moral dilemma develops for the young girl as she is forced to choose between mortality and everlasting life. Just as Winnie is caught up in the rapture of the possibility of eternal life, she is sobered by the words of Pa Tuck, who knows the burden it carries: "Us Tucks are stuck. We ain't part of the wheel no more. Dropped off, Winnie. Left behind." A thought-provoking explanation of the meaning of life—and death—this book, like the Tucks, seems destined to last for a good long time.

Older Readers

Abraham Lincoln: From Log Cabin to White House. Sterling North. Random House, 1956, 1987. 184 pp.

This excellent introductory biography of our sixteenth president, by a well-known children's author, focuses on Lincoln's career prior to his presidency, and especially on his younger days on the frontier. North writes clearly and concisely, and does full justice to both the nobility and the complexity of Lincoln's character. He does not sentimentalize his subject, and his history is reliable. A memorable story of a man who was truly "self-made," and who overcame both poverty and ignorance.

April Morning. Howard Fast. Bantam, 1961, 1987. 202 pp.

Set in Lexington, Massachusetts, during the American Revolution, Fast's novel tells of a boy's rapid transformation from self-absorption to responsible manhood. While the nation wins its independence, Adam Cooper wins the approval and trust of his elders. Fast paints a detailed and dramatic portrait of the Revolution, and of the men and women who made it happen.

Cheaper by the Dozen. Frank Gilbreth, Jr., and Ernestine Gilbreth Carey. Crowell, 1948. 237 pp. Bantam 1988. 180 pp.

In one of the funniest books ever written, two of the Gilbreth children recall the adventures and high jinks of growing up in a family of twelve boisterous children, governed by a truly memorable father and an equally engaging mother. The family's best-developed trait is their sense of humor (who can forget the car horn incident?—and that's only the beginning). Underlying the fun and high spirits, however, is the father's dedication to the training and education of his children, in order that they may grow into competent, responsible, and fun-loving adults. This book is a happy memorial to an unforgettable father.

Their mother, Lilian Gilbreth, is the focus of the sequel *Belles on Their Toes* (Crowell, 1950. 237 pp.), also a lively and hilarious story, which tells of the family's struggles, joys, and sorrows after the death of the father.

The Chosen. Chaim Potok. Simon & Schuster, 1967. 284 pp. Knopf, 1992. 284 pp.

The Chosen is a book of a special kind: one of the few modern novels to concern itself with the life of the mind and the joy of intellectual discovery as well as the spiritual aspect of human nature. In form the novel is very simple. It tells of two Jewish

boys growing up in Brooklyn, their friendship, their relationships with their fathers, and the choices they face for the future. One boy, Reuven Malter, is Americanized, the son of a prominent Zionist professor. His friend, Danny Saunders, a brilliant young scholar, is the son of the leader of a strict Hasidic sect. As these unlikely friends grow up, they slowly learn to appreciate each other's worlds. *The Chosen* is more than a standard coming-of-age story; it is a story of spiritual and intellectual maturation, of the deepening of two young souls. A specifically Jewish story, its theme and implications are universal.

The Endless Steppe: A Girl in Exile. Esther Hautzig. Scholastic, 1968, 1970. 240 pp.

In June 1941, ten-year-old Esther's sheltered life in Vilna, Poland, was abruptly shattered when Russian soldiers arrested and deported her, her family, and other Polish Jews to work at forced labor in Siberia. The carefree life of Poland, the terror of arrest by the Russians, the grim journey by cattle car to unknown destinations far from home, and the struggle to keep body and soul together in an unfamiliar, hostile land are all vividly depicted in this true-life account. After the war's end, the family learned of the irony of their five years in exile: by removing the Polish Jews from the reach of the Germans, the Russians had unintentionally saved their lives. Those of Esther's large extended family who were not deported had been murdered by the Nazis. Esther's courage, resilience, and strength in the face of these hardships is an inspiring example, made all the more telling by the author's honest depiction of her own immaturities and moments of self-pity. The reader soon finds himself giving thanks for things taken for granted—peace, freedom, family.

The Hero and the Crown. Robin McKinley. Greenwillow, 1984. 246 pp. ABC-Clio, 1988. *The Blue Sword.* Robin McKinley. Greenwillow, 1982. 272 pp. Ace, 1987. 248 pp.

Fantasy lovers of all ages will appreciate these tales of romantic adventure. Both novels have richly detailed and masterfully crafted plots in which the struggle for adolescent identity is woven together with the battle between good and evil. In *The Hero and the Crown,* the unlikely heroine is Aerin, a Damarian princess. Totally lacking in courtly graces, she is nevertheless strong and independent, and proves her worth by freeing Damar from fire-breathing dragons and an evil wizard. This gracefully written fantasy offers a refreshing twist as the heroine performs the daring deeds. The action of *The Blue Sword* takes place 500 years later and concerns the exploits of another heroine, Harry Crew. Kidnapped by the magic-working Corlath, king of the Old Damarians, Harry soon discovers that she, too, possesses mysterious powers. Like the legendary Aerin who preceded her, Harry finds herself battling the evil forces that threaten the Damarians. McKinley has given us two utterly engrossing stories about heroines who display uncommon courage, ingenuity, and wit.

Narrative of the Life of Frederick Douglass. Frederick Douglass. Boston Anti-Slavery Office, 1845. 126 pp. Belknap, Harvard University Press, 1960. 163 pp.

The early life of one of the great heroes of the antislavery movement in America, as written by himself. Born a slave in Maryland before the Civil War, Douglass educated himself, escaped from bondage after several attempts, and went on to become the most powerful black politician in America. A moving record of one man's triumph over prejudice, ignorance, and oppression.

Old Yeller. Fred Gipson. Harper, 1956, 1990. 184 pp.

The story of a young boy on the Texas frontier and the big yellow dog who becomes his friend and helper. Written in a clear, unsentimental style, it offers a detailed picture of the constant dangers and difficulties of frontier life and the courage and unity with which frontier families confronted those hazards. Reminds us that boys and girls on the frontier had awesome responsibilities thrust on them at a very early age—responsibilities that they met.

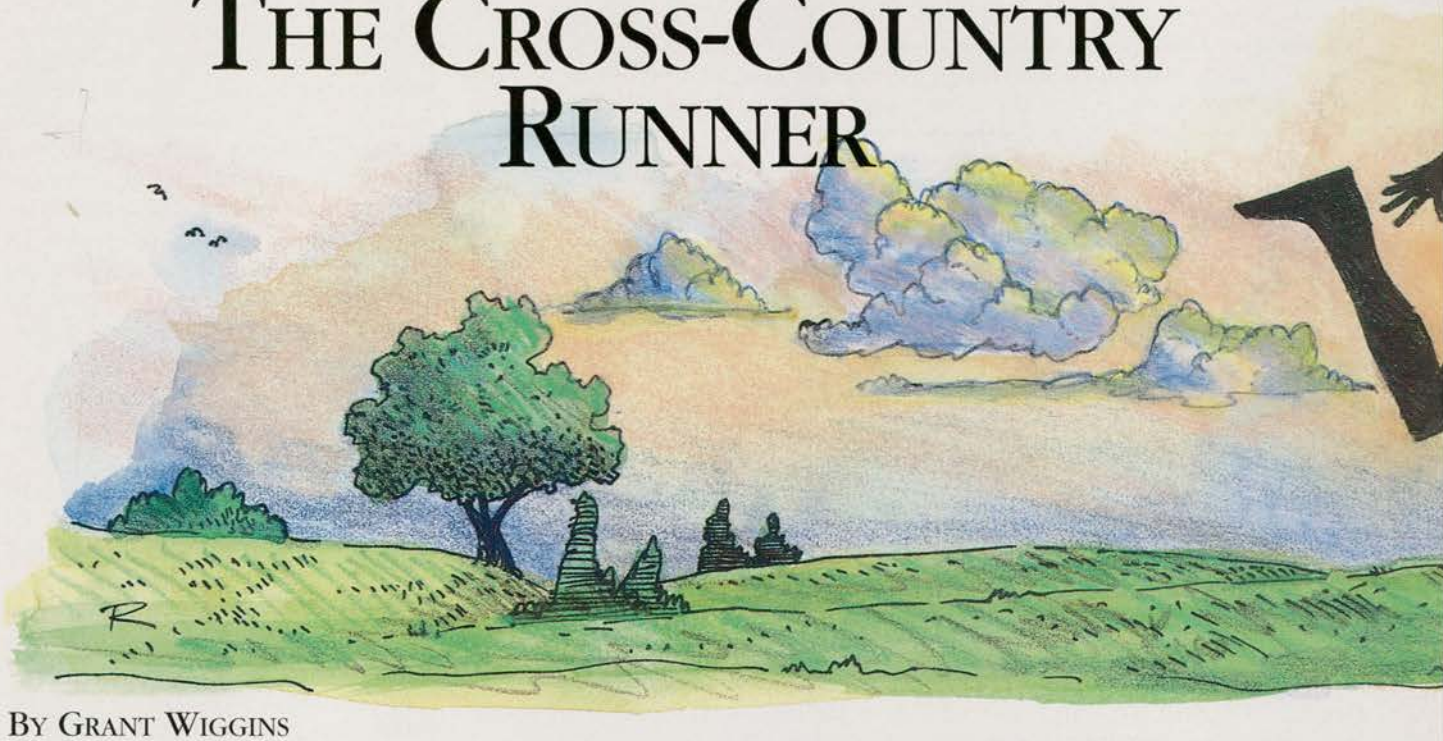
Robinson Crusoe. Daniel Defoe. Originally published in 1719. Knopf, 1991. 256 pp.

This book, one of the first novels in the English language, is a classic of adventure. Crusoe, Defoe's first-person narrator, runs away to sea as a young man, and experiences every kind of peril and misfortune, including slavery. He is at length cast away upon a deserted island, where he slowly learns to survive by his wits. Defoe's narrative is full of the accurate minor details that make a story convincing—so convincing, indeed, that when the book first appeared, many took it to be fact. The reader comes to admire the inventiveness, pluck, and hard work of Crusoe, as Crusoe learns to trust in the goodness of a power greater than himself.

Warrior Scarlet. Rosemary Sutcliff. Oxford University Press, 1958, 1979. 207pp.

Among the tribes of Bronze Age Britain, to be different was often the same as being outcast. The boy Drem knows this well. Drem struggles fiercely to overcome the handicap of his withered right arm, and to pass his tribe's test of manhood in order to wear the warrior's red robe, the "warrior scarlet." Because Drem tries so desperately to succeed, his failure is all the more unbearable. The heart of the story is found in Drem's positive response to this failure: sick at heart, he nonetheless faces the loss of all his hopes without becoming resigned or bitter. The deep sorrow he experiences works an inward change in Drem, giving him more compassion toward others who also suffer because they are different. The swift, stirring plot culminates in a satisfying conclusion. □

Remembering The Cross-Country Runner



By Grant Wiggins

My experience as a coach more than as a classroom teacher revealed how important incentives from within the assessment process can be to student motivation. Years ago, I coached girls' varsity cross-country when it was just becoming a regular offering in schools. We consequently had teams made up of a wide range of athletes and runners with little competitive experience. (Frankly, we took everyone who tried out, given the numbers.) The sport is not glamorous or pleasant: it is not a "game" to be "played" but a difficult "course to be run" (curriculum) while in pain. Workouts are grueling in both their difficulty and sameness, injuries are common, and there is little chance for public glory or fan interest in a sport where no one sees you for 80 percent or 90 percent of the race.

Leaving aside the question of what lures people to the sport, why do they stay? In particular, why did one girl, Robin, stay for four years—despite the fact that in those four seasons she never beat a soul, neither on our team or on the other team? (Think of how you would feel if you routinely came in dead last in front of the few remaining spectators, while nonetheless feeling that you could not have run any faster.) The answer, as she told me, was to be found in the scoring and record-keeping systems.

As anyone familiar with the sport knows, the scoring in cross-country gives points that correspond to each runner's place of finish: the first-place runner gets one point, the fourth-place runner gets four points, etc.—through each team's first five of seven runners. Thus, the lowest score wins. A shutout of one team by another would yield a score of 15 (1+2+3+4+5) to 40 (6+7+8+9+10)—or more than 40, depending upon where the winning team's sixth and seventh runners also finish.

There is thus a significant incentive provided for every runner to run her hardest, even when the leaders have long since passed the finish line. The scoring system, not just the "test" of the run itself, heightens everyone's effort. The #4 runner on a team would not expect to beat the #1, #2, or #3 runners on either ream. But one would hope to have her beat the *other* team's #4 runner. This is especially significant in a close meet: The performance of the least-able runners often determines which team wins. In an evenly matched meet, if the order of finish moves back and forth from team to team, the meet will be won or lost by whether your #5 runner defeats their #5 runner—sometimes, in fact, by whether your #6 runner defeats their #5 runner. (Even though the #6 runner does not figure in a team's total score, she can cause the other team's score to be increased by a point, because the fifth and final number making up the other team's total score is the place of finish of the #5 runner.) This always spurs on the less able. They naturally want to help their team win meets—and they often do so, even though they know themselves, correctly, to be less talented than their teammates. (The failure to win or be the

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ILLUSTRATED BY ROBERT BARKIN

best, therefore, is not the debilitating experience many people imagine it to be—unless you expect to win or are expected to win by those people whose judgment you trust.)

But Robin, you will recall, never had the experience of figuring in any team result. She never defeated anyone. Why, then, did she persist with the sport? What caused her to keep working hard in workouts and in the meet? She persisted because we kept her times and her weight—and both steadily fell over the course of four years. In fact, by the end of her junior year and third season, she not only had the satisfaction of seeing measurable progress in her times and the feeling of being more fit, she took quiet pleasure in the fact that her last race times for the year would have earned her fourth place in a race held back in her freshman year.

Any band director or special education teacher has many similar stories to tell. It is not merely the test itself that provides the incentive or disincentive (though we will want to look at how assessment tasks can be made more enticing and engaging). The form and manner in which we report the result, and the opportunity to improve through hard work can provide crucial incentive for the student to give something difficult another go or work a little harder even when improvement does not seem possible.

THE TRICK in establishing more noble and effective incentives for mastering performance is to make the student dissatisfied with present effort and achievement without being overwhelmed or made needlessly fatalistic. Too often we think students are only motivated by immediate pleasure or fear of punishment; or we think that we have to resort to heightened competition to appeal to such interests. Robin's experience and that of all athletes, musicians, and debaters suggest otherwise. Of course, we should abolish systems of invidious comparisons. Let us, however, not abolish incentives that cause students to be appropriately edified about and dissatisfied with their current performance. "Yes, I know you think I have made great progress, but how am I *doing*?" one student once lamented to me when I tried to have him ignore the lack of a grade on the paper—fairly enough, I now think. Broad descriptive terms are no substitute for times and place of finish, or their academic equivalent.

Nor is a low score, by itself, a disincentive to further learning. The disincentives come from having no opportunity to profit from the assessment, in the form of useful feedback and opportunities to try again. In fact, a low score on a valued test, and where there is ample opportunity to get a higher score, is an incentive to harder work and better learning.

Common sense suggests that we will increase the number of successful performers to the extent that we get the incentives right on a daily basis for the performer and the teacher of the performer (including through the use of *important* extrinsic incentives, such as—for high school students—making the link between diplomas received, courses taken, and jobs available, as Albert Shanker and others have pointed out).

Our runner friend described above dramatically demonstrates what few modern educators seem to grasp, namely that clear and worthy standards, combined with the measuring of incremental progress, always provide incentives to the learner—even when the gap between our present performance and the standard is great. □

(Continued from page 15)

of the same strategies Bransford had used to learn physics. Less-skilled learners used few, if any, of them. The less-skilled did not always appreciate the difference between memorization and comprehension and seemed to be unaware that different learning strategies should be used in each case (Bransford et al. 1986; Bransford and Stein 1984). These students were less likely to notice whether texts were easy or difficult, and thus were less able to adjust their strategies and their study time accordingly (Bransford et al. 1982). Less-able learners were unlikely to use self-tests and self-questioning as sources of feedback to correct misconceptions and inappropriate learning strategies (Brown et al. 1983; Stein et al. 1982).

The importance of metacognition for education is that a child is, in effect, a universal novice, constantly confronted with novel learning tasks. In such a situation it would be most beneficial to be an intelligent novice. What is encouraging is that the research also shows that it is possible to teach children metacognitive skills and when to use them. If we can do this, we will be able to help children become intelligent novices; we will be able to teach them how to learn.

We are just beginning to see what this new understanding of expertise and intelligence might mean for educational practice. The most important implication of the theory is that how we teach is as important as what we teach. Domain-specific knowledge and skills are essential to expertise; however, school instruction must also be metacognitively aware, informed, and explicit. In the next section, we will see a vivid example of this in the teaching of reading comprehension.

IV.

Reading Comprehension: Teaching Children the Strategies Experts Use

Reciprocal teaching, the method mentioned in the introduction to this article, improved Charles' classroom reading comprehension by four grade levels in 20 days. This method illustrates how instruction designed on cognitive principles can help children to apply language-comprehension skills in their reading and to acquire the metacognitive strategies essential to skilled reading.

Reciprocal teaching also shows how researchers, administrators, and teachers can collaborate to apply the results of research in the classroom. Annemarie Palincsar, Ann Brown, and Kathryn Ransom—a graduate student, a professor, and a school administrator—shared the belief that cognitive research could improve classroom practice and that classroom practice can improve research.

After five years working as a special education teacher and administrator, Palincsar returned to the University of Illinois as a doctoral student. She felt her previous training in psychodiagnostics—training based on a medical model of learning disabilities—was not meeting the needs of her students. She decided to broaden her academic background and to study how sociocultural factors might influence students' experience in school.

The cognitive revolution was spreading through academic circles, but had not yet reached teacher-practitioners. Palincsar's classroom experience influenced her choice of a thesis project. In her words: "As a teacher, one of the situations I found most baffling was having children who were fairly strong decoders but had little comprehension or recall of what they had read." She was baffled by students like Charles, students who can adequately comprehend spoken, but not written, language.

At first, Palincsar was interested in how self-verbalization might be used to help children regulate their cognitive processing. Donald Meichenbaum (1985) had developed techniques based on self-verbalization to help impulsive children—children who mentally fail to stop, look, and listen—pace their actions and develop self-control. At the time, most of the work on self-verbalization had explored how it could be used to regulate social behavior. Palincsar wondered how it might be used to regulate *cognitive* behavior—specifically, how it might be used to improve reading comprehension. She wrote to Meichenbaum, who suggested that the application of his ideas to academic subjects might be strengthened by incorporating ideas from research on metacognition. He told Palincsar to discuss her idea with Ann Brown, an authority on metacognition who at that time was also at Illinois.

At their initial meeting, Palincsar showed Brown a design for the pilot study that was to evolve into reciprocal teaching. Brown offered her a quarter-time research appointment to do the study. When it proved successful (Brown and Palincsar 1982), Brown gave Palincsar a full-time research assistantship and supervised her thesis research.

Palincsar and Brown developed reciprocal teaching from the pilot study on a sound theoretical basis. (See Brown and Palincsar 1987). They analyzed the task's demands, developed a theory of task performance based on expert-novice studies, and formulated a theory of instruction that might improve task performance. This is the same sequence Bob Siegler followed with the balance-scale task. A major difference, of course, is that reading comprehension presents a more complex problem than the balance scale.

From their analysis and a review of previous research, Palincsar and Brown (1984) identified six functions that most researchers agreed were essential to expert reading comprehension: The competent reader *understands* that the goal in reading is to construct meaning, *activates* relevant background knowledge, *allocates* attention or cognitive resources to concentrate on major content ideas, *evaluates* the constructed meaning (the gist) for internal consistency and compatibility with prior knowledge and common sense, *draws* and *tests* inferences (including interpretations, predictions, and conclusions), and *monitors* all the above to see if comprehension is occurring.

Palincsar and Brown then identified four simple strategies that would together tap all six functions needed for comprehension: *summarizing, questioning, clarifying,* and *predicting.* They explained the relation between the four strategies and the six functions as follows (Pal-

incsar and Brown 1986): Summarizing a passage requires that the reader recall and state the gist he or she has constructed. Thus, a reader who can summarize has activated background knowledge to integrate information appearing in the text, allocated attention to the main points, and evaluated the gist for consistency. Formulating a question about a text likewise depends on the gist and the functions needed for summarizing, but with the additional demand that the reader monitor the gist to pick out important points. When clarifying, a reader must allocate attention to difficult points and engage in critical evaluation of the gist. Making predictions involves drawing and testing inferences on the basis of what is in the text together with activated background knowledge. A reader who self-consciously uses all four strategies would certainly appreciate that the goal of reading is to construct meaning.

Expert-novice studies supported the hypothesized connection between comprehension functions and strategies. After completing a comprehension task, expert readers reported that they spent a lot of time summarizing, questioning, clarifying, and predicting. Experts' "comprehend-aloud" protocols substantiated these self-reports. Poor readers did not report using the strategies and showed no evidence of using them in their comprehension protocols. As Palincsar and Brown characterize it, novices executed a "once-over, desperate, nonfocused read."

> Poor readers executed a 'once-over, desperate, nonfocused read.'

But can you teach the strategies to novices? And if you can, will it improve their comprehension? To answer these questions, Palincsar and Brown designed a prototype instructional intervention to teach nonexperts how to use the strategies. As with all instruction, the primary problem is transfer. How should one teach the strategies to get novices to use them spontaneously? Here Palincsar based her strategy instruction on Brown's work on teaching metacognitive skills. Brown's research had shown that successful strategy instruction must include practice on specific task-appropriate skills (the cognitive aspect), explicit instruction on how to supervise and monitor these skills (the metacognitive aspect), and explanations of why the skills work (the informed instruction aspect).

The research suggests what teachers should do to help students master strategies. First, teachers have to make the strategies overt, explicit and concrete. Teachers can best do this by modeling the strategies for the students.

Second, to ensure that students will spontaneously use the strategies where needed, teachers should link the strategies to the contexts in which they are to be used and teach the strategies as a functioning group, not in isolation. This suggests that reading-strategy instruction should take place during reading-comprehension tasks, where the explicit goal is to construct meaning from written symbols.

Third, instruction must be informed. The students should be fully aware of why the strategies work and where they should use particular strategies. Thus, instruction should involve discussion of a text's content and students' understanding of why the strategies are useful in that situation.

Fourth, students have to realize the strategies work no matter what their current level of performance. Thus, instruction should include feedback from the teacher about the students' success relative to their individual abilities and encouragement to persist even if a student is not yet fully competent.

Finally, if students are to become spontaneous strategy users, responsibility for comprehension must be transferred from the teacher to the students gradually, but as soon as possible. This suggests that the teacher should slowly raise the demands made on the students and then fade into the background, becoming less an active modeler and more a sympathetic coach. Students should gradually take charge of their learning.

Palincsar designed reciprocal teaching to satisfy all five of these requirements. Reciprocal teaching takes the form of a dialogue. Dialogue is a language game children understand, and it is a game that allows control of a learning session to alternate between teacher and student. Most important, when engaged in dialogue students are *using* their language-comprehension skills and *sharing* any relevant background knowledge they have individually with the group. In reciprocal teaching, dialogue directs these skills and knowledge toward reading.

The dialogue becomes a form of cooperative learning, in which teachers model the strategies for the students and then give students guided practice in applying them to a group task of constructing a text's meaning. Teach-

er and students take turns leading a dialogue about the portion of text they are jointly trying to understand. The dialogue includes spontaneous discussion and argument emphasizing the four strategies.

In reciprocal teaching, the teacher assigns the reading group a portion of a text and designates one student to be the leader for that segment. Initially, the teacher might be the leader. The group reads the passage silently. Then the assigned leader summarizes the passage, formulates a question that might be asked on a test, discusses and clarifies difficult points, and finally makes a prediction about what might happen next in the story. The teacher provides help and feedback tailored to the needs and abilities of the current leader. The student-listeners act as supportive critics who encourage the leader to explain and clarify the text. Each student takes a turn as leader. The group's public goal is collaborative construction of the text's meaning. The teacher provides a model of expert performance. As the students improve, the teacher fades into the background.

In the first test of reciprocal teaching, Palincsar served as the teacher and worked with one student at a time. The students were seventh-graders in a remedial reading program who had adequate decoding skills but who were at least three grades behind in reading comprehension. At first, students found it difficult to be the leader, and Palincsar had to do a lot of modeling and prompting, but gradually the students' performance improved. In the initial sessions, over half the questions students formulated were inadequate. Only 11 percent of the questions addressed main ideas, and only 11 percent of the summaries captured the gist of the passage. After ten tutoring sessions, however, students could generate reasonably sophisticated questions and summaries. By the end of training, 96 percent of the students' questions were appropriate, 64 percent of the questions addressed main ideas, and 60 percent of their summaries captured the gists of the passages.

Students' reading comprehension improved along with their performance in reciprocal teaching. On daily comprehension tests, scores improved from 10 percent to 85 percent correct and stayed at this level for at least 6 months after reciprocal teaching ended. Back in the classroom, reciprocal-teaching students improved their performance on other reading tasks from the seventh percentile before reciprocal teaching to the fiftieth percentile after. Palincsar repeated the study working with two children simultaneously and obtained the same results. (Charles, mentioned above, was one of the students in this second study.)

Palincsar and Brown wanted to know if reciprocal teaching was the most efficient way to achieve these gains before they asked teachers to try it in classrooms. Reciprocal teaching demands a great deal of the teacher's time and requires intensive interaction with small groups of students. Both are valuable classroom commodities. Could the same results be achieved more efficiently by a different method? Reciprocal teaching turned out to be superior to all the alternatives tested (Brown and Palincsar 1987, 1989). In all the comparison studies, reciprocal teaching improved remedial seventh-graders' performance on comprehension tests from less than 40 percent before instruction to between 70 and 80 percent after instruction, a level typically achieved by average seventh-graders. The best of the alternative methods—explicit strategy instruction, where the teacher demonstrated and discussed each strategy and the students then completed worksheets on the strategies—raised scores from around 40 percent to between 55 and 60 percent (Brown and Palincsar 1987). These studies showed that the intense and prolonged student-teacher interaction characteristic of reciprocal teaching is crucial to its success (Palincsar et al. 1988). This is the investment teachers have to make to cash in on reciprocal teaching's dividends.

Into the Classroom

Can reciprocal teaching work in a real classroom? Here Kathryn Ransom, Coordinator for Reading and Secondary Education in District 186, Springfield, Illinois, enters the story. Ransom—a former teacher—is a veteran professional educator. She makes it clear she has seen many trends come and go, and realizes that neither she nor the schools will please all the people all the time. Nonetheless, Ransom devotes time and effort to get new things happening in the Springfield schools. She has become adept at, as she puts it, "making deals" with research groups. "We can bring in people who have exciting ideas that need to become practical, and as the researchers work with Springfield teachers they can provide staff development experiences I never could."

Springfield's District 186 serves a population of 15,000 students, from kindergarten through high school. The system is 25 to 28 percent minority. On standardized tests, classes at all grade levels score at or above grade level in all subjects. This is a solid achievement, Ransom points out, because the majority of special education children in the district receive instruction in regular classrooms. When it was time for the classroom testing of reciprocal teaching, Palincsar approached Ransom. Ransom saw the potential of reciprocal teaching and recognized in Palincsar a researcher who could make cognitive science meaningful to administrators and teachers. The researcher and the administrator struck a deal advantageous to both.

Together, they decided to approach Springfield's middle school remedial reading teachers. These teachers worked daily with children who had adequate decoding skills but no functional comprehension skills. Ransom and Palincsar collaborated to design a staff development program that would encourage the teachers to think about instructional goals and methods and that would allow the researchers to introduce reciprocal teaching and the theory behind it. The teachers first watched videos of Palincsar conducting reciprocal teaching sessions. Later the teachers took part in reciprocal teaching sessions, playing the roles of teacher and student. Next a teacher and a researcher jointly conducted a reciprocal teaching lesson. The final training consisted of three formal sessions on the method over a three-day period.

In the first classroom study of reciprocal teaching, four volunteer remedial reading teachers used the method with their classes (Palincsar et al. 1988). Class size varied from four to seven students. Before reciprocal teaching, the baseline on daily reading-assessment tests for the students was 40 percent. After 20 days of reciprocal teaching their performance rose to between 70 and 80 per-

cent, just as in Palincsar's initial laboratory studies. Students maintained this level of performance after reciprocal teaching and also improved their performance on other classroom comprehension tasks, including science and social studies reading. Reciprocal teaching worked in the classroom! Experienced volunteer teachers, after limited training, could replicate the laboratory results in classroom settings.

Palincsar and Ransom obtained similar results in a study that used conscripted teachers, who varied greatly in experience and expertise. The students also were more diverse in their reading deficiencies than the students in the first study. Class size varied from 7 to 15, with an average size of 12. Each teacher taught one reciprocal teaching group and one control group; the latter received standard reading-skills instruction. Again, after 20 days of reciprocal instruction, scores on daily comprehension tests improved to 72 percent for the reciprocal teaching group, versus 58 percent for the control group. Thus, average classroom teachers, working in less-than-ideal circumstances and teaching groups of seven or more students, replicated the original laboratory results. As the ultimate test, the Springfield team ran an experiment in which the strongest student in a remedial group served as the teacher. In this study, the student-teachers improved their scores on comprehension tests from 72 percent to 85 percent correct. The other students in the group improved their scores from 50 percent to 70 percent correct.

Since the study ended, in 1989, reciprocal teaching has become a mainstay in the Springfield schools. It is now used in all remedial reading classes, and its methods have been incorporated in some form into all regular classroom reading programs. Even more encouraging, Springfield teachers exposed to reciprocal teaching and to the importance of strategic thinking attempt to integrate these elements into their teaching of other subjects.

One benefit of reciprocal teaching, and of similar projects in the Springfield system, has been the teachers' participation in extended applied research. This was part of Ransom's original agenda. A project running over 5 years, as reciprocal teaching did, provides a powerful way to change teachers' behavior. Most in-service training for teachers lasts only a day or two and at best can have only a minor impact on their thinking and their performance. Ransom sees collaboration in classroom research as a way for teachers and researchers to interact in a dignified, mutually beneficial way. The teachers gain meaningful in-service experience that is intellectually satisfying. Working closely with fellow teachers and other education professionals helps them overcome the isolation of seven-hour days as the only adult in the classroom. The research team also gains, as the reciprocal teaching researchers will attest. The teachers initially helped refine reciprocal teaching for classroom use, providing important insights into how to make an instructional prototype work in a school. Later, they helped identify new research questions and helped the researchers design ways to test the method's classroom effectiveness. Because of her Springfield experience, Palincsar decided that all her subsequent educational research would be done in close collaboration with classroom professionals.

Interest in reciprocal teaching continues within District 186 through instructional chaining. A network has developed in which teachers who have used reciprocal teaching conduct in-service sessions for other teachers. By the 1987-88 school year, 150 teachers in 23 buildings had taken part in these sessions. Teachers formed peer support groups so they could discuss progress and problems associated with daily use of reciprocal teaching and other strategy instruction. The remedial teachers also helped the district design new reading tests to assess students' use of comprehension strategies. The Springfield experience contributed to ongoing efforts at the state level to revamp reading instruction and to develop reading tests that can measure the skills that methods such as reciprocal teaching try to impart. Veterans of the Springfield experiment now work in other schools and with national educational organizations to improve reading instruction.

In the Springfield schools and in others that have used reciprocal teaching, teachers have a better understanding of what reading is about. As Palincsar and Brown (1986, p. 770) observe, "There was a time not long ago when successful reading was thought to be execution of a series of component subskills." To teach reading one taught the subskills, from word recognition through finding the main idea, often in isolation and in a fixed sequence. Charles and the approximately 60 percent of American 17-year-olds who fail to reach the fourth reading proficiency level of the National Assessment of Educational Progress—who fail to become adept readers (Mullis and Jenkins 1990)—show the inadequacy of this approach. Reciprocal teaching works. The strategies it teaches enable students to apply their language-comprehension skills to reading so that they can read for meaning. Reading is more than decoding and more than the mastery of a series of small, isolated subskills.

V.

High School Physics: Confronting the Misconceptions of Novices

One of the best places to see a cognitive science approach to teaching is in Jim Minstrell's physics classes at Mercer Island High School. (See Minstrell 1989; Minstrell 1984; Minstrell and Stimpson 1990.)

Mercer Island is an upper-middle-class suburb of Seattle. The high school serves just over 1,000 students in four grades. Jim Minstrell has been teaching there since 1962. He holds bachelors', master's, and doctoral degrees from the Universities of Washington and Pennsylvania, and during his career he has worked on several national programs to improve high school physics instruction. Although deeply committed to educational research, he prefers the classroom to a university department or a school of education. "I have one of the best laboratories in the world right here," he observes. He adopted what he calls "a cognitive orientation to teaching" for practical, not theoretical, reasons. The cognitive approach addresses a fundamental classroom problem

that confronts science teachers: Students' preconceptions influence how they understand classroom material.

In the early 1970s, after a decade of outstanding teaching (as measured both by students' test scores and by supervisors' evaluations), Minstrell became concerned about his effectiveness. His students couldn't transfer their formal book and lecture learning to the physics of everyday situations, and they showed little understanding of basic physical concepts, such as force, motion, and gravity. At first he thought, following Jean Piaget's theory of cognitive development, that his students lacked logical, or formal operational, skills. However, when he tested this hypothesis, he found otherwise.

Minstrell describes a task of Piaget's in which students are given two clay balls of equal size. Students agree that the two balls weigh the same. But if one ball is then flattened into a pancake, many students will then say that the pancake weighs more than the ball. They reason that the pancake weighs more because it has a larger upper surface on which air can press down. This is not a logical error but a conceptual one. Students believe that air pressure contributes to an object's weight.

"Students were bringing content ideas to the situation, ideas that were greatly affecting their performance on questions that were supposed to be testing their reasoning," Minstrell recalls.

Minstrell became actively involved in research on students' misconceptions, and he tried to apply the research in his classroom. First he expanded his classroom agenda. A teacher's primary goals are to control the students and to provide explanations that allow the students to solve textbook problems. A third goal, in the current climate of accountability, is to prepare the students to pass standardized tests of low-level skills. Minstrell maintains the first two goals, minimizes the third, and adds two goals of his own, based on cognitive research: to establish explicit instructional targets for understanding and to help the students actively reconstruct their knowledge to reach that understanding.

Minstrell attempts to diagnose students' misconceptions and to remedy them by instruction. Most teachers aren't trained to recognize and fix misconceptions. How does Minstrell do it?

Facets

Minstrell assumes from the first day of school that his students have some knowledge of physics and that they have adequate reasoning ability. Unlike expert scientists who want to explain phenomena with a minimum of assumptions and laws, students are not driven by a desire for conceptual economy. Their knowledge works well enough in daily life, but it is fragmentary and local. Minstrell calls pieces of knowledge that are used in physics reasoning *facets.* Facets are schemas and parts of schemas that are used to reason about the physical world.

Students typically choose and apply facets on the basis of the most striking *surface* features of a problem. They derive their naive facets from everyday experience. Such facets are useful in particular situations; however, they are most likely false in general, and for the most part they are only loosely interrelated. Thus, students can quickly fall into contradictions. Two facets Minstrell typically finds students using when reasoning about objects are (1) that larger objects exert more force than smaller objects and (2) that only moving objects exert force. The first facet explains why the smart money was on Goliath and not David; the second explains why a football can "force" its way through a window. But how do you explain what happens when you throw a ball against the side of a building? The first facet suggests that the wall must exert a larger force on the ball than the ball does on the wall, but the second facet says that only the ball can exert a force, not the wall. So how is it that the ball bounces off the wall? As Minstrell sees it, the trick is to identify the students' correct intuitions—their facets that are consistent with formal science—and then build on these. As Minstrell says, "Some facets are anchors for instruction; others are targets for change."

Benchmark Lessons: What Are Your Ideas Right Now?

At the outset, Minstrell's students are not different from other high school juniors and seniors. Early in each course unit he administers a diagnostic test to assess qualitative, not quantitative, physical reasoning.

Between 50 percent and 75 percent of the students believe that when a heavy object and a light object are dropped or thrown horizontally, the heavier one hits the ground first. As many as half believe that when two moving objects are at the same position they are traveling at the same speed; yet they all know that to pass a car on the highway the overtaking car must be going faster, even when the two cars are side by side. Nearly half believe that air pressure affects an object's weight. Almost all believe that a constant, unbalanced force causes constant velocity. The results of the diagnostic tests give Minstrell a profile of which facets are prevalent, which ones might be anchors, and which ones are targets for change.

Minstrell organizes his course into units, such as measurement, kinematics, gravity, and electromagnetism. Some lessons, usually presented early in a unit, are particularly important in helping students change their reasoning. Minstrell calls these *benchmark lessons.*

In a benchmark lesson, the teacher and the students dissect their qualitative reasoning about vivid, everyday physics problems into facets. They become aware of the limitations of each facet, and they identify which facets are useful for understanding a particular phenomenon. They can explore how appropriate facets can be combined into powerful explanations that can be used to solve other problems.

The benchmark lesson on gravity begins 6 weeks into the course. By this time Minstrell has established a rapport with his class. He has created an environment conducive to developing understanding, a climate where questioning and respect for diverse opinions prevail, a climate where the process of scientific reasoning can be made explicit and self-conscious. Even veteran teachers marvel at how uninhibited Minstrell's students are in expressing ideas, suggesting hypotheses, and arguing positions.

Minstrell explains to the students that the unit will begin with a three-problem diagnostic quiz, and that their answers will be the subject of discussion for the next two days. He reassures them that the quiz is not

intended to embarrass them or show how little they know. He wants to find out what they already know, and he wants them to be aware of what they already know. (Two of the problems from the quiz are reproduced in Figure 2.)

As the students work, Minstrell moves among them and observes their answers and explanations. After 15 minutes he collects the quizzes and goes to the board at the front of the classroom. He reports that on the first question, the scale problem, he saw several answers, and he writes them on the board: 15-20 pounds, a little over 10 pounds, exactly 10 pounds, a little less than 10 pounds, and about 0 pounds. "Now let's hold off on attacking these answers. Rather, let's defend one or more of them," he suggests.

Ethan explains why he thinks the object in the vacuum weighs nothing: "I felt it was zero, because when you're in space you float. It would be related to that." Minstrell helps fill in the argument: "When you're in space things seem weightless. Space is essentially an airless environment, so the object would weigh nothing."

A few students argue that the object weighs the same in the vacuum as in air. One says that when air is present the air above and the air below the scale balance out; some air pushes down and some pushes up, with no net effect. Chris, baseball cap on the back of his head and arms crossed, offers: "Ten pounds. The vacuum inside only has a relation to air pressure, not a relation to mass."

Two students argue that the object in a vacuum weighs slightly more than 10 pounds, because under normal conditions air helps hold up the scale. When you remove the air, the object will weigh more because there is no air supporting the scale.

The most popular student response is that the scale would read slightly less than 10 pounds. These arguments invoke facets involving density and buoyancy. John presents the rationale: "It's gonna be a little less than 10. You remember Bob Beamon. He set a world record in the long jump at the Mexico City Olympics. He jumped really far there because there is less air and it is lighter and so everything weighs less."

In the class period devoted to discussion, over half the students offer explanations for one of the answers. Minstrell is strictly a facilitator, offering no facts, opinions, or arguments himself. He then encourages students to present counterarguments. When the counterarguments and the responses have run their course, Minstrell signals the start of the next lesson segment: "Sounds like there are some pretty good arguments here across the spectrum. So what do we do?" The students urge him to run an experiment. He says, "Luckily, I happen to have a scale, a bell jar, and a vacuum pump here."

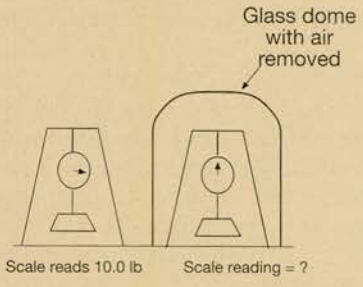
Minstrell calls two students to the front to help conduct the crucial experiment. Such demonstrations are dramatic and exciting for the students and allow them to see which prediction is correct. Research also suggests that such experiences have an important cognitive role in inducing conceptual change. They provide an initial experience that places naive and expert theories in conflict. As the students try to resolve the conflict, the dramatic demonstration serves as an organizing structure in long-term memory (an anchor) around which schemas can be changed and reorganized (Hunt 1993).

The first student reports that the object on the scale weighs 1.2 newtons under normal circumstances. Minstrell starts the vacuum pump, and the students watch the gauge as the pressure drops inside the bell jar. The pump stops when the pressure gauge reads nearly zero.

"Did the weight go to zero?" Minstrell asks. Somewhat amazed, the students respond that the weight stayed the same. Minstrell suggests that they see what happens when the air rushes back into the jar. He opens the valve and the air whistles in. A student exclaims, "Air or no air in there, there's not much difference either way!"

Minstrell asks "What does this tell us about gravity and air pressure?" "Air pressure doesn't affect weight," the students respond. They have started to correct a major misconception. Other experiences in the unit and throughout the course reinforce this benchmark discovery that air pressure and gravity are distinct physical phenomena.

Problem 1. Under normal atmospheric conditions, an object is placed on a scale and the scale reads 10 pounds. If the scale and the object were placed under a glass dome and all the air were removed from under the dome, what would the scale read?



Problem 2. An object weighing 1 kilogram in normal air takes 1 second to fall a distance *d*. How long will it take an object the same size but weighing 5 kilograms to fall the same distance?

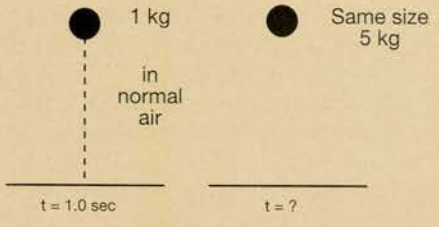
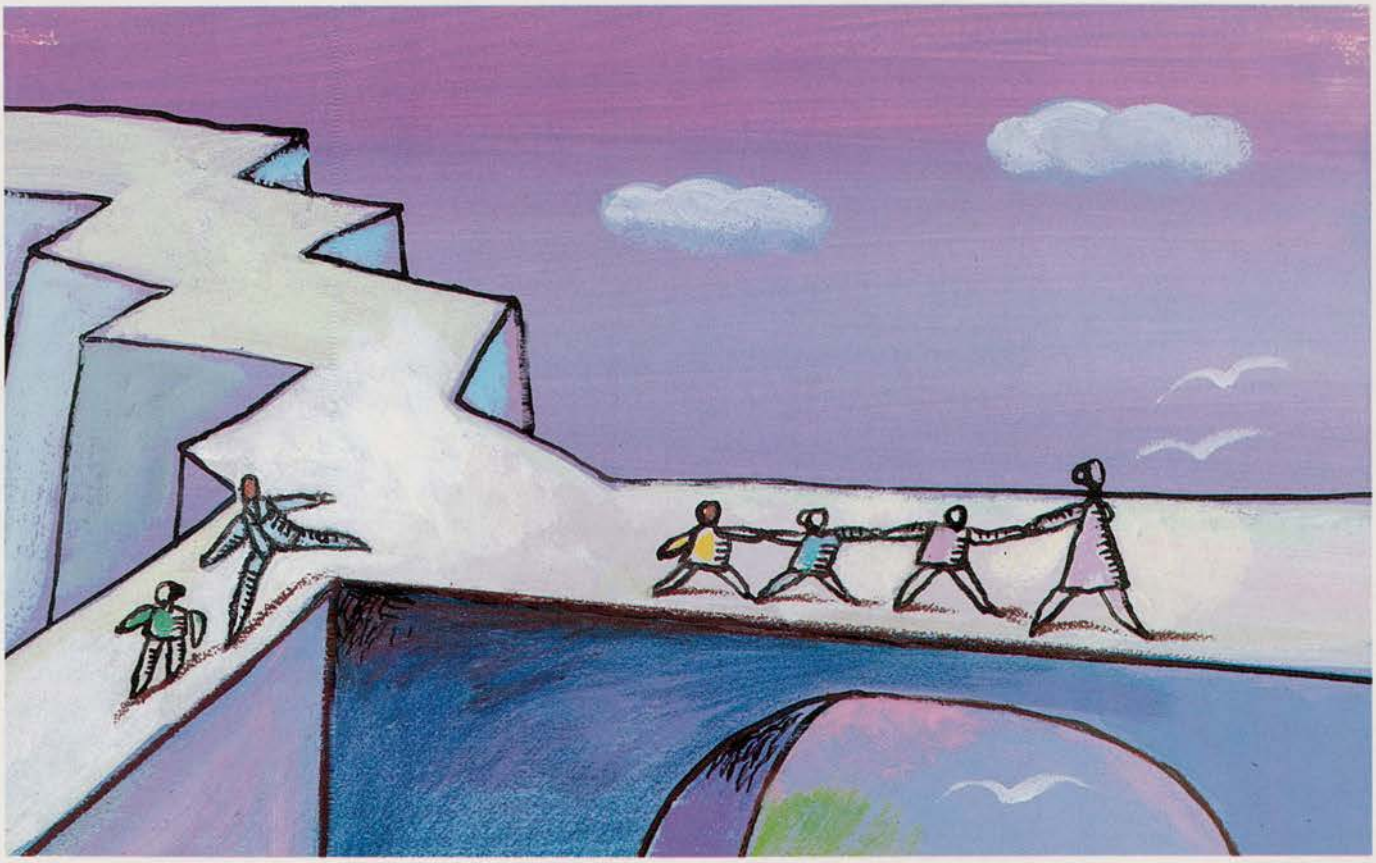


Figure 2
(From Jim Minstrell's diagnostic quiz. Used with his permission.)

Don't Feel Dumb!

A few days later, Minstrell and the class analyze their reasoning about the time it would take a 1-kilogram and a 5-kilogram object to fall the same distance (problem 2 above). They run the crucial experiment—a miniature replay of Galileo's apocryphal experiment at Pisa. After both balls hit the floor simultaneously, Minstrell returns



to the board where he had written the quiz answers. "Some of you were probably feeling pretty dumb with these kinds of answers. Don't feel dumb," he counsels. "Let's see what's valuable about each of these answers, because each one is valuable. Why would you think that heavier things fall faster?"

A student suggests that heavy things (such as barbells) are harder to pull up, so it seems they would fall back to the ground more quickly too. "Right," Minstrell says. "When you lift something heavy, that sucker is heavy. Gravity is really pulling down. 'Aha,' you think, 'big effect there.' A useful rule of daily life is the more of X, the more of Z."

Why would anyone think a heavier object falls more slowly? A student argues that heavier objects are harder to push horizontally than light ones, and that because they are harder to push, one moves them more slowly; thus, when a heavier object is dropped, it must fall more slowly. Minstrell reinforces what is correct about this intuition. He points out that the first argument uses the facet of direct proportional reasoning and the second argument the facet of indirect proportional reasoning. Minstrell and the class will revisit these facets when they grapple with Newton's Second Law, $F = ma$ (i.e., when a force acts on an object the acceleration is directly proportional to the force and inversely proportional to the object's mass).

Minstrell concludes: "So, there are some good rationales behind these answers. Part of what I'm saying is that the rationales you have—the physics you've cooked up in the past 16 to 19 years of living—are valuable. But they are valuable only in certain contexts." The trick to becoming a competent physicist is knowing when to use which facet. It's not just a matter of having the pieces of knowledge; what counts is knowing when to use them—linking *conditions* of applicability to cognitive *actions*.

The unit on gravity continues with students doing experiments in the classroom and around the school building. It ends with seven problems, all taken from standard high school texts, which allow the students to assess their mastery of the unit's central facets and concepts.

Throughout the unit, Minstrell has not lectured, expounded, or "taught" in the traditional sense. He has identified students' initial intuitions, made their reasoning explicit by eliciting and debating their positions, provided vivid benchmark experiences to help trigger conceptual change, and encouraged them to reason about these views and experiences. He has taught physics from a cognitive perspective.

Does It Work? Why?

In 1986 Minstrell initiated a collaboration with Earl Hunt, a cognitive psychologist at the University of Washington, to assess and refine his classroom method. Hunt, a "basic" cognitive scientist who has developed an interest in an applied science of learning, describes himself as the "wet blanket" of the project. "I'm the professional skeptic who must be convinced that it is the cognitive approach and not just Minstrell that accounts for the effects," he says.

A comparison of students' scores on pretests and posttests makes it clear that Minstrell's method works. The students learn physics. But why does it work?

One concern is whether the method's success depends entirely on Jim Minstrell's pedagogical talents. This was the first issue Hunt and Minstrell investigated. Could someone other than Minstrell use the method successfully?

Minstrell trained Virginia Stimpson and Dorothy Simpson, two math teachers at Mercer Island High who had never taught physics, to use his method. At Mercer Island, as at most high schools, which students end up in which physics sections is due more to scheduling than to student choice or teacher selection. Thus, students of varying abilities are likely to end up in each section. This allowed Minstrell and Hunt to make reliable comparisons between the performances of Minstrell's students and the performances of Stimpson's and Simpson's. Gini's and Dottie's students did at least as well as Jim's, so the effect (at least at Mercer Island High) is not due to Minstrell himself.

Is Minstrell's method better than other instructional methods currently in use? Minstrell himself has shown at Mercer Island High that his method is superior to traditional methods. His students have fewer misconceptions at course's end than do students taught traditionally. For example, on the pretest 3 percent of Minstrell's students showed correct understanding of both Newton's First and Second Laws. When he used the traditional methods and curriculum, Minstrell observed that after instruction 36 percent understood the First Law and 62 percent the Second Law. When he used his cognitive approach, 95 percent of the students ended up with a correct understanding of the First Law and 81 percent with a correct understanding of the Second Law (Minstrell 1984).

Minstrell and Hunt compared Mercer Island students with students at a neighboring, comparable high school that Hunt calls "Twin Peaks." The physics instructor there also uses a conceptual, non-quantitative approach in his course. Performance on standardized math tests is the best predictor of high school physics performance. On this measure, Mercer Island and Twin Peaks students were not significantly different. So, in physics one would expect similar outcomes at the two schools. However, on the same final exam in mechanics, taken after 3 months of studying that topic, the Mercer Island students scored about 20 percent higher than the Twin Peaks students across the entire range of math scores. "This is an important result," skeptic Hunt emphasizes, "because it shows that the method does not selectively appeal to brighter students as measured by math achievement."

For good measure, Minstrell and Hunt also compared Mercer Island students with students in a "nationally known experimental, physics teaching, research and development program." The Mercer Island students consistently outperformed the other experimental group on all topics tested. Hunt adds: "We regard these data as particularly important because the questions we used in this comparison were developed by the other experimental group."

These results have allayed some of Hunt's initial skepticism, but Hunt and Minstrell realize that much remains to be done. The success of Minstrell's theory-based curriculum vindicates the cognitive approach, but for Hunt success raises further theoretical questions. He has begun a research program back in his laboratory to refine the theory underlying Minstrell's method. Why are benchmark lessons so important? How does transfer occur? How do students develop deep representations and make appropriate generalizations? Minstrell's classroom is a good laboratory, but a teacher who is responsible for seeing that his students learn physics is limited in the experiments he can conduct. No doubt, in a few years results from Hunt's basic research will feed back into Minstrell's applied research at Mercer Island High.

The next challenge for Minstrell and Hunt will be to test the method elsewhere. What will happen when teachers who are not under the innovators' direct supervision try to use the method? Instructional materials, including videotapes of benchmark lessons for each unit, will soon be ready for dissemination. The next step will be to assemble an implementation network and conduct applied research in a variety of classroom situations.

Teaching for Understanding

Jim Minstrell's students end up with a better understanding of physics, in part, because they learn more expert-like representations and concepts, as well as how to reason with them. There is a price to pay for this deeper understanding. As Earl Hunt points out, "From a traditional perspective one might argue that Minstrell's classes fail, because often students don't get through the standard curriculum. Last year, they did not complete electricity, and atomic physics and waves were barely mentioned." Hunt thinks that changes in curricular time and course coverage will be crucial in making science instruction more effective. Hunt is quick to add that in other countries curricula sometimes allow two to three years to teach what we cram into one.

The applied work of Minstrell and others shows that we can teach in such a way as to make a significant impact on students' scientific understanding. All who have attempted to teach for understanding, though, emphasize that doing so takes time. Minstrell spends over a week developing Newton's laws, not one or two days as in most traditional courses. Reflecting on his classroom experiences, Minstrell (1989, p. 147) advises: "We must provide the time students need for mental restructuring. Hurrying on to the next lesson or the next topic does not allow for sufficient reflection on the implications of the present lesson."

Results from cognitive research indicate that if we want more students to understand science, the instruction should start early in school, and that throughout the curriculum instruction should build on students' correct intuitions and prior understanding. We should try to teach experts' conceptual understandings, not just formulas and equations, and along with this content we should teach students how to reason scientifically. Better science instruction along these lines may require a "less is more" (or at least a "longer is better") approach to the science curriculum.

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Conclusion

Learning is the process whereby novices become more expert. Teaching is the profession dedicated to helping students learn, helping them become more expert. Cognitive research has matured to where it can now tell us what is involved in the mental journey from novice to expert not just in reading and physics, but across a variety of school subject domains. The research can now describe these journeys in sufficient detail—recall Siegler's exacting, fine-grained analysis of learning

the balance scale—that it can serve as a map and guide for improved learning and teaching. We have at our disposal the basis for an applied science of learning that can inform the design of new materials, teaching methods and curricula. These are the tools students and teachers must have, if, as a nation, we are serious about becoming more productive and helping all students develop their intelligence as fully as possible.

Developing these tools and restructuring our schools to use them won't be easy. We will have to start in the classroom, where teachers interact with students. We will need teachers who can create and maintain learning environments where students have the smoothest possible journey from novice to expert and where they can learn to become intelligent novices. To do this, we will have to rethink, or at least re-evaluate, much of our received wisdom about educational policy, classroom practices, national standards, and teacher training.

Admittedly, there is much we still don't know about how our minds work, how children best learn, and how to design better schools. On the other hand, we already know a great deal that we can apply to improve our schools and our children's futures. □

REFERENCES

Bransford, J.D., Sherwood, R., Vye, N., and Rieser, J. 1986. Teaching thinking and problem solving. *American Psychologist* 41(10): 1078-1089.

Bransford, J.D., and Stein, B.S. 1984. *The IDEAL problem solver.* Freeman.

Bransford, J.D., Stein, B.S., Arbitman-Smith, R., and Vye, N.J. 1985. Improved thinking and learning skills: An analysis of three approaches. In J.W. Segal, S.F. Chipman, and R. Glaser, eds., *Thinking and Learning Skills,* volume 1: *Relating Instruction to Research.* Erlbaum.

Bransford, J.D., Stein, B.S., Vye, N.J., Franks, J.J., Auble, P.M., Mezynski, K.J., and Perfetto, G.A. 1982. Differences in approaches to learning: An overview. *Journal of Experimental Psychology: General* 111: 390-398.

Brown, A.L., Bransford, J.D., Ferrara, R.A., and Campione, J.C. 1983. Learning, remembering, and understanding. In P.H. Mussen, ed., *Handbook of Child Psychology,* volume 3: *Cognitive Development.* Wiley.

Brown, A.L., and Palincsar, A.S. 1982. Inducing strategic learning from text by means of informed, self-control training. *Topics in Learning and Learning Disabilities* 2: 1-17.

Brown, A.L., and Palincsar, A.S. 1987. Reciprocal teaching of comprehension strategies: A natural history of one program for enhancing learning. In J.D. Day and J.G. Borkowski, eds., *Intelligence and Exceptionality: New Directions for Theory, Assessment, and Instructional Practices.* Ablex.

Brown, A.L., and Palincsar, A.S. 1989: Guided, cooperative learning and individual knowledge acquisition. In L.B. Resnick, ed., *Knowing, Learning, and Instruction: Essays in Honor of Robert Glaser.* Erlbaum.

Chase, W.G., and Simon, H.A. 1973. Perception in chess. *Cognitive Psychology* 4: 55-81.

Chipman, S.F., Segal, J.W., and Glaser, R. 1985. *Thinking and Learning Skills,* volume 2: *Research and Open Questions.* Erlbaum.

Covington, M.V. 1985. Strategic thinking and the fear of failure. In J.W. Segal, S.F. Chipman, and R. Glaser, eds., *Thinking and Learning Skills,* volume 1: *Relating Instruction to Research.* Erlbaum.

De Groot, A.D. 1965. *Thought and Choice in Chess.* Mouton.

Feuerstein, R., Hoffman, M.B., Jensen, M.R., and Rand, Y. 1985. Instrumental enrichment, an intervention program for structural cognitive modifiability: Theory and practice. In J.W. Segal, S.F. Chipman, and R. Glaser, eds., *Thinking and Learning Skills,* volume 1: *Relating Instruction to Research.* Erlbaum.

Gardner, H. 1985. *The Mind's New Science.* Basic Books.

Hunt, E. 1993. *Thoughts on Thought: An Analysis of Formal Models of Cognition.* Erlbaum.

Klahr, D., and Siegler, R.S. 1978. The representation of children's knowledge. In H. Reese and L.P. Lipsett, eds., *Advances in Child Development and Behavior,* volume 12. Academic Press.

Mansfield, R.S., Busse, T.V., and Krepelka, E.J. 1978. The effectiveness of creativity training. *Review of Educational Research* 48(4): 517-536.

Meichenbaum, D. 1985. Teaching thinking: A cognitive-behavioral perspective. In S. F. Chipman, J. W. Segal, and R. Glaser, eds., *Thinking and Learning Skills,* volume 2: *Research and Open Questions.* Erlbaum.

Minstrell, J. 1984. Teaching for the development of understanding of ideas: Forces on moving objects. In *Observing Classrooms: Perspectives from Research and Practice.* Ohio State University.

Minstrell, J. 1989. Teaching science for understanding. In L.B. Resnick and L.E. Klopfer, eds., *Toward the Thinking Curriculum.* Association for Supervision and Curriculum Development.

Minstrell, J., and Stimpson, V.C. 1990. A teaching system for diagnosing student conceptions and prescribing relevant instruction. Paper prepared for AERA session "Classroom Perspectives on Conceptual Change Teaching," Boston.

Mullis, I.V.S., and Jenkins, L.B. 1990. *The Reading Report Card, 1971-88: Trends from the Nation's Report Card.* Office of Educational Research and Improvement, U.S. Department of Education.

Newell, A., and Simon, H.A. 1972. *Human Problem Solving.* Prentice-Hall.

Nickerson, R.S., Perkins, D.N., and Smith, E.E. 1985. *The Teaching of Thinking.* Erlbaum.

Palincsar, A.S., and Brown, A.L. 1984. Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction* 1(2): 117-175.

Palincsar, A.S., and Brown, A.L. 1986. Interactive teaching to promote independent learning from text. *Reading Teacher* 39: 771-777.

Palincsar, A.S., Ransom, K., and Derber, S. 1988. Collaborative research and the development of reciprocal teaching. *Educational Leadership* 46: 37-40.

Perkins, D.N., and Salomon, G. 1989. Are cognitive skills context-bound? *Educational Researcher* 18: 16-25.

Savell, J.M., Wohig, P.T., and Rachford, D.L. 1986. Empirical status of Feuerstein's "Instrumental Enrichment" (FIE) technique as a method of teaching thinking skills. *Review of Educational Research* 56(4): 381-409.

Segal, J.W., Chipman, S.F., and Glaser, R. 1985. *Thinking and Learning Skills,* volume 1: *Relating Instruction to Research.* Erlbaum.

Siegler, R.S. 1976. Three aspects of cognitive development. *Cognitive Psychology* 8: 481-520.

Siegler, R.S., and Klahr, D. 1982. When do children learn? The relationship between existing knowledge and the acquisition of new knowledge. In R. Glaser, ed., *Advances in Instructional Psychology,* volume 2. Erlbaum.

Simon, H. A., and Chase, W. G. 1973. Skill in chess. *American Scientist* 61:394-403.

Stein, B.S., Bransford, J.D., Franks, J.J., Vye, N.J., and Perfetto, G.A. 1982. Differences in judgments of learning difficulty. *Journal of Experimental Psychology (General)* 111: 406-413.

(Continued from page 17)

integration into group life; the home is responsible for supporting the school's role and for providing a healthy emotional environment for the child. Parents and teachers work together, but do not duplicate one another's roles."

Effort and Ability

While Americans have generally believed in hard work and its rewards, it has a different history in education. Contrary to the purposes and pronouncements of Alfred Binet about his work in France, the U.S. testing movement enshrined intelligence and ability in standardized tests, tests that were embraced by American education to sort children into ability groups. The authors quote from an address in 1920 before the American Psychological Association: ". . . the fact that mental alertness is given like retentiveness once for all with one's native constitution, magnifies the function of the school in selecting individuals and minimizes its function in training them." While recognizing differences in ability, the Asians emphasize *effort,* believe that all students can learn what the schools need to teach them, and do not group students by ability, either among classrooms or within classrooms in work groups. This has a long history; the authors cite a quote from the Chinese philosopher Hsun Tzu: "Achievement consists of never giving up . . . If there is no dark and dogged will, there will be no shining accomplishment; if there is no dull and determined effort, there will be no brilliant achievement."

American parents are pretty satisfied with the academic performance of their children, and so are their children. Asian parents and children, who have much higher achievement, are not so satisfied. Various checks were used by the authors to see if this was just a difference in humility and cultural factors in willingness to praise their children, and rejected this possibility. If parents expect little, they ask, why would children aspire to more? Children are meeting expectations. The answer is to raise expectations. Say the authors: "Social critics may be dissatisfied, but if educational reform is to succeed, dissatisfaction must extend to the American public, especially to the parents of children who attend the nation's schools."

Organization of Schooling

"School buildings are austere, built to be functional rather than comfortable. Their dullness is relieved by the children's bright faces and colorful displays of their artwork. Furnishings are sparse. . . ." Japanese schools have more facilities and equipment than do Chinese schools. The Asian countries in the studies all have a national curriculum; students study the same lesson about the same time. The role this plays is explored by the authors: New teachers know where the prior ones left off; discussions of methods and problems among teachers are facilitated since they are teaching the same thing.Textbooks are much shorter, leave more for the teacher to fill in, and are less likely to have all the steps of the problem/solution laid out, leaving the student to do more of the thinking.

For a variety of reasons, children are on task more of the time. They go to school for more days and for longer days, but they have frequent recesses for play during the school day, and extracurricular activities are built into the school day, rather than being "after school."

The funds spent on education are more likely to go directly to the classroom and to pay the teachers—teachers are paid considerably better in Asia, relative to other occupations. The authors conclude: "It is clear that American schools allocate too much of their current resources to administration, nonteaching personnel, and physical facilities."

Teachers and Teaching

Asian teachers have less schooling and are highly respected; there is competition for entry. They have well-supervised apprenticeships, teach just two or three classes a day, have a desk in a room with other teachers, time to prepare lessons, and time to work with individual students. Although the class size is large, teachers have fewer classes and the overall ratio of students to teachers is not greatly different from that in the United States. The authors believe U.S. teachers are overworked, have too many classes, and no time for preparing lessons.

In Asian schools, practical problems are the basis for teaching, the students are engaged in solving a problem, and multiple approaches are encouraged. "It is not uncommon for an Asian teacher to organize an entire lesson around a problem." There is coherence to lessons, in contrast to what the authors frequently found in U.S. classrooms. The purpose of questions in the United States is to elicit an immediate correct answer; in Asia it is to stimulate thought.

Shattering Complacency

In the last chapter, the authors summarize their recommendations, largely already apparent from the chapters dealing with comparisons. The value of the book though is not so much in the recommendations as in the specifics of the practices they identified in each country. These provide a basis for reflection on American practices; a basis for the readers to draw their own conclusions about what they think.

The authors *do* conclude that we need national standards, a matter on which there is now some forward movement in the United States. However, it is surprising that there is no direct discussion of testing and assessment in the book. The topic is approached tangentially. The emphasis on standardized testing in the United States appears in stark contrast to Asia, and proposals here for standards *are* linked to proposals for a national system of examinations.

We are rarely treated to serious studies of education in which there has been systematic observation of the classroom over a long period of time, with careful attention to methodology, but with the purpose of informing policy more than dialogue with research and academic colleagues. John Goodlad's *A Place Called School* was one such effort. *The Learning Gap* is another. It shatters complacency and forces thought about our values and our prospects. It is a book worth your time. □

LETTERS

(Continued from page 4)

Gandhi or Dr. Martin Luther King, Jr.? Might a reading of oral histories of both past and current wars include, along with the accolades/exhilarations of victory, accounts of fear and turmoil on the battlefield, as well as accounts of civilians whose lives have been tormented by starvation, brutality, anguish, and other effects of war?

Academic knowledge and knowledge of the heart must walk hand-in-hand, lest our children (to paraphrase an oft-told anecdote relayed by Roberto Assagioli) grow up knowing everything but realizing nothing. Deep and essential ethical questions must be raised in the schools in order to equip tomorrow's leaders to confront society's greatest moral dilemmas.

—MADELEINE FRIEDMAN
BROWARD COUNTY, FLORIDA

TEENAGE SMOKE-OUT

Thank you for publishing the article "Tobacco Industry Seeks New Recruits" (Spring 1993) and the accompanying cartoons. Not only did nine out of ten smokers begin their habit by the age of twenty-one; half of them started by the time they were thirteen!

Teachers may want to contact two nonprofit organizations that are devoted to preventing young people from starting this devastating habit:

SmokeFree Educational
Services, Inc.
375 South End Ave., Suite 32F
New York, N.Y. 10280-1085
Tel (212) 912-0960

Stop Teenage Addiction to
Tobacco (STAT)
121 Lyman St., Suite 210
Springfield, Mass. 01103
Tel (413) 732-7828

Both organizations keep readers informed on health statistics, recommend actions such as poster contests and letter-writing, and furnish other information that might encourage young people to stay away from this nasty practice. Such information might be incorporated in the curriculum in mathematics, social studies, science, art, and other subjects.

—CLAUDIA ZASLAVSKY
NEW YORK, NEW YORK

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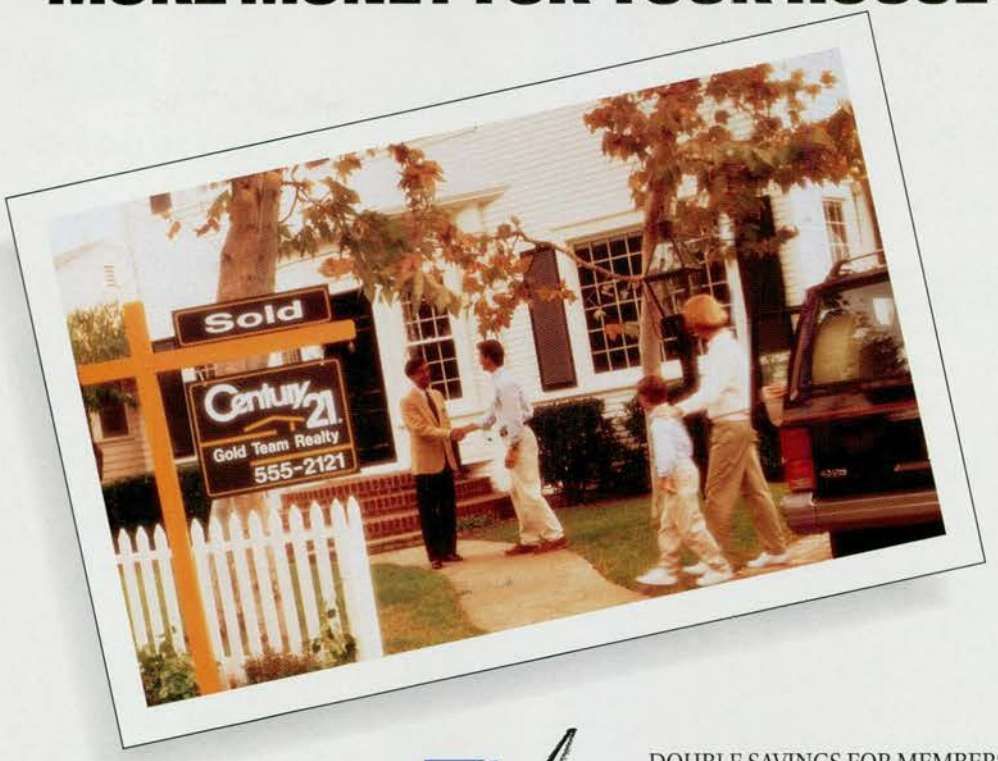

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