

Direct Instruction in Reading Comprehension

Research findings support training students in precise, step-by-step strategies to improve their understanding of what they read.

We can be precise.

—Charles Olson (from "The King Fishers," cited by Creeley 1966, p. 171.)

The recent report by the National Commission on Reading (Anderson et al. 1985) concluded:

Direct instruction needs to be distinguished from questioning, discussion, and guided practice. Direct instruction in comprehension means explaining the steps in a thought process that give birth to comprehension. It may mean that the teacher models a strategy by thinking aloud about how he or she is going about understanding a passage. The instruction includes information on why and when to use the strategy. Instruction of this type is the surest means of developing the strategic processing that was identified earlier as characteristic of skilled readers (p. 72).

Fifteen years of research have gone into developing and evaluating direct instruction in reading comprehension at the University of Oregon. This research was based on the proposition that precise principles of instructional design can be developed for instruction even in an area as complex as reading comprehension, and that these procedures can (and should) be empirically investigated. The general model that guided the research (Englemann and Carnine 1982) was originally developed as part of Project Follow Through, a U.S. Office of Education research and training project aimed at improving the academic achievement of low-income students in 20 communities—from Arkansas to New York City.

In Follow Through, we faced a perennial problem, recently articulated by Duffy: "How can teachers, despite

the complexities of classroom context, provide instruction beyond the routine level?" (1983, p. 135). In order to work effectively with teachers, Follow Through consultants were forced to make decisions about the structure and nature of reading texts, the nature and sequence of comprehension strategies to be taught in these texts, and the specific procedures used to teach these skills. We focused on what many would consider mundane decisions: the best wording for teachers to use in demonstrating a comprehension skill, the most effective way to correct students' errors, the number and range of examples necessary to ensure mastery of a new concept. While many researchers may treat these topics as separate strands, practitioners play them in concert.

This concern with precision in all details of instruction was particularly alien to educational thinking in the late '60s, when Follow Through originated. Developmental, Piagetian, and psychodynamic models of early childhood education were then in vogue. Many felt that the extremely structured teaching would stifle students' learning (Maccoby and Zellner 1970) or impede teachers' creativity and ultimate effectiveness (Resnick 1981a).

Yet independent evaluations of direct instruction in Follow Through showed that economically disadvantaged students made significant progress in reading comprehension as measured on standardized tests (Stebbins et al. 1977, Guthrie 1977). More recent research has indicated that

these students have maintained their elementary school gains in comprehension through high school (Gersten et al. 1984).

Building on the Follow Through experience, a group of researchers at the University of Oregon began to examine the applicability of direct instruction for teaching reading comprehension to students at the intermediate and secondary levels.

Current Problems in Comprehension Instruction

There have been several investigations of how comprehension is actually taught in classrooms. After observing over 600 hours of reading instruction in grades 3 through 6, Durkin concluded:

Practically no comprehension instruction was seen. Comprehension *assessment*, carried on for the most part through interrogation, was common. Whether children's answers were right or wrong was the big concern . . . time spent in giving, completing, and checking assignments consumed a large part of the observed periods (1983, p. 318).

Duffy and Roehler (1982) collected and analyzed audiotapes of actual comprehension lessons being taught in the primary grades. The majority of teachers in their study merely gave students the right answer without offering explanations or suggesting strategies by which students could reach the right answer.

For example, the following excerpt chronicles a teacher's attempt to instruct students in how to select an appropriate title for a story:

Fig. 1. Components of Direct Instruction

1. Instruction on *explicit* step-by-step strategy. (When this is not possible or necessary, model effective performance.)
2. Student mastery of each step in the process.
3. Strategy (or process) corrections for student errors.
4. *Gradual* fading from teacher-directed activities toward independent work.
5. Adequate, systematic practice for students—using a range of examples.
6. Cumulative review.
7. Teaching formats that anticipate ("pre-correct") potential errors.

Teacher: Listen to the story I read you, and I will give you three possible titles. Listen really closely. See if you can pick out a good title for it. (Teacher reads the story aloud.) All right. Now here are some possibilities: "A Trip Downtown," "A New Shirt," "The Shirt That Didn't Fit." Of those three possibilities, which one goes best? Angela?

Angela: "A Trip Downtown."

Teacher: Okay, Tom, what do you think?

Tom: "The New Shirt."

Teacher: Andy, what was your choice?

Andy: "The New Shirt."

Teacher: Susie, how about you?

Susie: "The Trip Downtown."

Teacher: Joe, how about you?

Joe: "The New Shirt."

Teacher: I think the girls decided on "The Trip Downtown," and the boys liked "The New Shirt." Mainly, what was the story about?

Child: A trip downtown.

Child: Getting a new shirt.

Teacher: Getting a new shirt, wasn't it?

Examples like this led Duffy and Roehler to conclude that a typical teacher "only asks for answers . . . her responses to pupil answers *do not create an understanding of either the main idea or strategy for figuring out the main idea.* Apparently, students are expected to come up with both the answer and the strategy (on their own)" (p. 135). Although some students are unable to develop their own strategies, few teachers can spontaneously think up ways to help them (Durkin 1984), and teachers' guides attached to basal series do not provide the necessary guidance.

Explicit Strategy Instruction

In contrast, the distinguishing characteristic of the approach we examined

in the 16 experimental studies is the use of *explicit, step-by-step training* in comprehension strategies. When this was not possible, students were provided with models of appropriate performance followed by extensive practice with immediate feedback.

The purpose in articulating and demonstrating a step-by-step strategy is to show students how a thinking process can lead to accurate solutions, or to demonstrate reasonable attempts at deducing an acceptable answer to a question. In demonstrating a strategy for solving a particular type of problem, the teacher makes each step clear to the student. This overt demonstration and guidance appears to be most important for low-performing students, who do not intuitively devise ways to answer comprehension questions. These students learn to copy the steps modeled by the teacher, however, and later will modify or personalize them. Duffy and Roehler (1982) found that teachers needed the most help with this crucial step of articulating and modeling explicit strategies.

Rather than present a detailed overview of the instructional model (see fig. 1), I think one can get a sense of the model by examining the actual teaching methods used in three experimental studies. The studies involved three different types of comprehension skills: the ability to draw inferences in the context of distracting information, knowledge of story grammar (a technique for comprehending narrative), and the ability to detect faulty arguments (a critical reading

skill). The first two studies involved low-achieving students; the third involved average and above-average students. Teaching strategies in these three studies range from the highly detailed approach used in the "distracting information" study, to the looser approach used in the metacognitive story grammar study. Each study focused on teaching students a specific procedure or strategy for dealing with the comprehension.

Drawing Inference in the Context of Distracting Information

In a study by Carnine, Kameenui, and Woolfson (1982), students were taught to draw an inference based on relevant information. Rather than *teach* an explicit strategy, teachers *modeled* its appropriate use by a series of prompting questions. We felt that with a good deal of detailed guided practice and teacher feedback, students' performance could improve dramatically.

To select students for the study, we gave a screening test consisting of a series of passages that contained distracting information. Only students who failed, scoring less than 65 percent on the test, were included in the study. These students were then randomly separated into three groups to

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“The research demonstrates that the type of questions, the detailed step-by-step breakdowns, and the extensive practice with a range of examples illustrated in our three studies will significantly benefit students’ comprehension. The next step is integrating these procedures into reading series and into teacher training programs.”

Fig. 2. Sample Passage: “Drawing Inferences in the Context of Distracting Information” Study

John is recovering from a bad cold. His doctor told him to change his eating habits and eat good foods. John went to the local health food store and told the clerk about his problem, “I am tired of being sick all the time. All I care about is eating good food with lots of vitamins.”

“I had colds all the time until I started eating fresh foods,” the clerk said, “Fresh foods taste so much better than canned foods and have a lot more vitamins. We have the best vegetables in town—they are all organic. Look at these nice carrots. Did you know that carrots have more Vitamin A than any other vegetable, as well as being high in Vitamins D, C, and K. You know, the fresher the food, the more vitamins it has. This batch of carrots just arrived from the largest farm in California. Have you ever seen such big carrots? They had a great growing season down there, so they are especially sweet and tasty. Also, the price is really low. They are only 29¢ a pound. They are a week-and-a-half old and a great buy. Carrots can be prepared in different ways. You can eat them raw or cooked. It wouldn’t take many of these big ones to make a nice carrot cake.

“These smaller ones are nice, too. But they are just from a little garden around the corner. They were picked yesterday. Because it rained so much this summer, these carrots are small and don’t have as much taste. But they would make good carrot juice. They cost 52¢ a pound. Last year carrots from the same garden were 10¢ a pound, but I guess everything costs more today.”

Which carrots do you think John bought—the big carrots or the small carrots?

receive either direct instruction, corrective feedback only, or no intervention. Those who received corrective feedback were given a series of comprehension passages containing distracting information, asked to answer questions, and told whether they were right or wrong. The average score for the corrective feedback group was 23 percent. The control group, at 20 percent, scored only a little lower. The average score for students taught with direct instruction, however, was 63 percent.

A sample passage from the study

(fig. 2) ends with a question for the reader: “Which carrots did John buy?” In the first paragraph, John states his criterion for buying food: having lots of vitamins. A sophisticated reader would be able to relate the rule in the second paragraph—“the fresher the food, the more vitamins it has”—to John’s criterion to draw the correct inference. Intentionally distracting facts, however, make an inappropriate choice appear attractive. The sweet, tasty carrots from California look inviting (and they are cheap), but they’re not as fresh as the smaller, local car-

Fig. 3. Example of a Teaching Format: "Drawing Inferences in the Context of Distracting Information"
(adapted from Carnine, Kameenui, and Wolfson, 1982)

Introduction

Teacher: Read this story carefully; you're going to answer the question at the end. [The subject read the entire story orally. The teacher assisted with any decoding errors.]

1. Statement of the Problem: Student reads the question at the end.

Teacher: Now let's go back to the beginning of the story so we can figure out the answer to the question at the end of the story.

First, what does John want?

Student: Not to be sick all the time.

Teacher: Right. What's most important to him?

Student: To eat good food with lots of vitamins.

2. Discrimination Questions

Teacher: Is getting big carrots most important to him?

Student: No.

Teacher: Is getting sweet and tasty carrots most important to him?

Student: No.

Teacher: Is getting cheap carrots most important to him?

Student: No.

3. Review of Problem Statement

Teacher: What's most important to John?

Student: To get food with lots of vitamins.

4. Identification of Rule

Teacher: What does it tell you in the story about getting lots of vitamins?

Student: The fresher the food, the more vitamins it has.

Teacher: Good. So what do you have to find out now to tell which carrots John will choose?

Student: Which carrots are fresher.

5. Locating and Converting Indirect Information

Teacher: Find out how fresh the big carrots are.

Student: A week-and-a-half old.

Teacher: Now find out how fresh the small carrots are.

Student: One-day old.

6. Making the Text-Based Inference

Teacher: How fresh are the big carrots?

Student: A week and a half old.

Teacher: How fresh are the small carrots?

Student: One-day old.

Teacher: What does that tell you about which carrots John will choose?

Student: The small carrots.

best"), the teacher can again direct the child back to the text. If, on the other hand, the student has difficulty making the inference from the given information, the teacher can work on that specific problem. With this kind of step-by-step breakdown, teaching becomes more analytical and precise.

Pearson's (1984) synthesis of research on comprehension instruction concluded that "younger and poorer readers benefit from *conscious explicit attempts to alter comprehension strategies* ..." (p. 229, emphasis added). In contrast, teachers in situations that Duffy and Roehler observed tended to ask the same question repeatedly until someone in the group came up with a correct answer.

Almost as crucial as helping students with their mistakes is gradually withdrawing teacher guidance until students can apply a strategy independently. The teacher continually assesses how the child is doing and, when the child is performing well, slowly reduces the external structure, using increasingly subtle prompts until the students can perform on their own.

Students who move easily through all the steps in a teaching sequence don't need the teacher's prompts for very long. After successfully using the procedures three or four times, these students can generally use them without assistance. On the other hand, students who are easily distracted, or who have not developed analytical strategies, need the teacher's assistance with the step-by-step models until they are ready for independent work. Neither group of students, however, should aimlessly guess at a story title.

Another important aspect of the strategy-teaching process is preemptive teaching. In figure 3 the student has just told the teacher that John really wants carrots with a lot of vitamins. The teacher then asks: "Is getting big carrots important? Sweet and tasty carrots? Cheap carrots?" These questions ensure that the student maintains the correct focus and doesn't get sidetracked by a lingering thought such as, "My mom always said to buy cheap food" or "I like sweet

rots. If students do not carefully discriminate the distracting from the relevant information, they're likely to respond incorrectly. The direct instruction teaching sequence in figure 3 illustrates the level of detail necessary to improve the performance of low-achieving students.

The teaching format in figure 3 shows that the teacher assists and directs the child in crucial steps of the thinking/analysis process. The teacher points out the small steps in the strategy so that children (1) see how a successful step-by-step solution to the problem works, and (2) can correct

errors immediately. Teachers, for their part, can see *exactly* where breakdowns occur and can solve particular comprehension problems more easily. If, for example, a child tends to interject inappropriate background knowledge (e.g., "Everyone wants cheaper carrots because my mom says you should always try to buy things that are the cheapest"), the teacher can direct the child back to the exact sentence in the text where John states what he wants. If students inappropriately put themselves in the protagonist's place (e.g., "John wants the sweet carrots 'cause I know they're the

things." This step is especially important for weak readers. Rather than let a student make an error and then deal with it, the steps in the teaching format try to *preempt* errors.

Story Grammar

One focus of recent reading research has been *story grammar*, a student's awareness of the components of typical narratives and the relationships among these components. Most people acquire the essentials of story grammar from reading and listening to stories. Singer and Donlan (1982) devised an instructional system for teaching story grammar to students with insufficient knowledge of the basic structure of fiction.

More recently, Carnine and Kinder (1985) attempted to merge Singer and Donlan's approach with explicit instruction. The subjects were 13 intermediate-level students with poor comprehension skills, most of whom were receiving remedial instruction in reading. All of these children could read the experimental passages with at least 95 percent word recognition accuracy, yet all scored lower than 60 percent on an experimenter-designed comprehension test. For instructional purposes, the Singer and Donlan framework was simplified to four questions.

1. Who is the story about?
2. What does he or she want to do?
3. What happens when he or she tries to do it?
4. What happens in the end?

Each 20–30 minute training session involved three stories. The teacher read the first story and asked the group the four questions. Then the teacher asked individual students in the group to read the second story aloud, asking each story grammar question when appropriate. She immediately corrected any student errors and then asked the students to summarize the story according to the story grammar questions. The students read the third story silently. The teacher told them to ask themselves each question as they read, answering the fourth question when they finished the story. Only when all students had completed the reading and the questions did the teacher ask the class a

"The explicit strategies create a shared language between teachers and students, which teachers can use when correcting errors. Without this shared language many teachers simply don't know what to say"

series of comprehension questions.

Instruction, using a range of narrative stories from basal and remedial reading texts, lasted for ten days. Students received two short-answer comprehension tests based on two short passages; in addition, three independent judges taped and rated students' summaries of the stories. The team administered maintenance tests two and four weeks later to determine students' retention skills.

Presenting low-performing students with an understandable, systematic approach to narrative material led to significant increases in performance. The average student's performance increased from 53 to 75 percent. The fact that students maintained gains over a four-week period showed that they

had integrated this approach into their reading.

Students seemed to internalize these four questions, using them to pinpoint what was important. The teaching sessions incorporated several key principles of our model: (1) teacher modeling of explicit strategies, (2) immediate correction of student errors, (3) gradual shift from teacher-directed activities to independent work, and—perhaps most important—(4) sustained, supervised work on the strategy until students demonstrate that they are using the strategy independently.

The Ability to Detect Faulty Arguments: An Example of Critical Reading

The third study was conducted with above-average ability students in the domain of critical reading and critical thinking (Patching et al. 1983). This study examined the effectiveness of systematically teaching students one aspect of critical reading—the detection of potentially faulty arguments. A review of some publications of the Institute for Propaganda Analysis (Smith 1974) helped us identify three categories of commonly used invalid arguments. We then developed an instructional procedure to teach students to identify these types of invalid arguments. Figure 4 is a sample teacher's guide for the lesson that trains students to detect what is often called "invalid testimonial."

First the guide stated a clear rule to help students recognize instances of invalid testimonial: "Just because someone important in one area says something is good or bad in another area, you can't be sure it's true" (step 1, fig. 4). Students practiced distinguishing between a person's being important or competent in one area and being an expert in all areas of knowledge. They practiced with a set of examples—comedians may not be experts on nutrition, and high school principals may not know everything about sex or emotion. As in the *rule-based inference* example discussed earlier, teachers used a detailed, step-by-step analysis during the early stages of instruction.

Unlike the other studies, students in this study were reading at or above grade level. Nonetheless, 39 percent of the 5th graders failed the screening test (i.e., were unable to detect invalid arguments more than 50 percent of the time). This is not so surprising when one realizes that advertisers and politicians commonly use invalid testimonials to confuse adults.

Students were randomly assigned to one of three groups: (1) direct instruction with an adult teacher, (2) workbook practice using the direct instruction teaching materials and exercises (with corrective feedback from an adult), or (3) a control group (workbook practice or general comprehension exercise). After only three days of teaching, the mean score for the direct instruction group was 90 percent; scores for the other two groups were both at 58 percent. The study shows that students with the greatest gains had the benefit of direct instruction and guided workbook practice as well as work with a teacher who modeled the steps, asked questions, and provided immediate feedback.

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Fig. 4. Critical Reading: Sample Teaching Format

1. Teacher:	Listen. Here's a rule. Just because someone important in one area says something is good or bad in another area, you can't be sure that it's true.
2. Teacher:	When someone important in one area says something is good or bad in another area, can you be sure that it's true?
3. Student:	No.
4. Teacher:	No, just because someone important in one area says something is good or bad in another area you can't be sure that it's true.
5. Teacher:	OK, listen. Dr. Smith is a very good doctor, and everyone likes him. He tells people why they are sick and helps them get better quickly. One day I saw Dr. Smith at Ben's Hardware Store. I wanted to buy a lawnmower. Dr. Smith told me that I shouldn't buy a Victor mower because they are the worst around. Since he's a good doctor, he should know. In what area is Dr. Smith important?
6. Teacher:	Being a doctor.
7. Student:	And what is Dr. Smith saying?
8. Teacher:	Victor mowers are the worst around.
9. Student:	So what is the other area that Dr. Smith is talking about?
10. Teacher:	Mowers.
11. Student:	Since we're learning to judge what people say, can you be sure what a doctor says about Victor mowers is true?
12. Teacher:	No.
13. Student:	Why not? (Or prompt with, "What can you say when someone important says something good or bad?")
14. Teacher:	You can't be sure it's true, and doctors may not know very much about mowers.
15. Student:	

These three examples from recent research suggest how explicit strategies work and what level of detail is necessary for most students to acquire new learning. In addition, the majority of the studies cited in figure 5 support the use of direct instruction.

Effectiveness of the Approach

As recently as 1981, Resnick concluded her review of instructional psychology with this remark: "For the moment, cognitive instructional psychology is largely descriptive science, intent upon analyzing performance but not upon making strong suggestions for

improving it" (1981b, p. 692). Pearson was more blunt in his summation, declaring that throughout the '70s "our knowledge about *teaching* reading comprehension advanced very little, if at all" (1982, p. 11).

An assumption underlying the design of our research agenda was that teachers need precise guidance in how to teach comprehension to low-performing students. Virtually all the strategies used in the research led to significant improvements in the targeted comprehension skill. A meta-analysis of the studies (White, Gersten, and Carnine 1983) revealed a mean

magnitude of effect of .97 standard deviation units, well above levels usually set for educational significance. The meta-analysis demonstrated significant effects for retention of the skills as well.

In their review of the research on strategy training, Belmont and Butterfield (1977) concluded, "Children can be trained to use effective strategies, but once trained, they frequently revert to their immature strategies when no longer explicitly constrained to play the instructor's program" (p. 465). In the studies presented here, the consistent effects on *maintenance measures administered one or two weeks after the intervention* suggest that students are still using strategies

even though no one is present to monitor or remind them to use them.

Cases Where Intensive Instruction Was Not Necessary

Up to now, our implicit assumption has been that modeling an explicit, overt strategy leads to higher performance. However, our research has shown that this is not always the case. Sometimes providing extensive systematic practice on the skill (accompanied by corrective feedback) is as effective as teaching step-by-step strategies. It appears that for relatively simple comprehension skills—such as using context clues to learn the meaning of unfamiliar vocabulary words (Carnine, Kameenui, and Coyle 1984),

or determining real (versus apparent) character motive in a story (Carnine et al. 1982)—teachers may not need to model or explain an overt process. By receiving extensive practice (with feedback), even low-achieving students appear to learn not to trust everything characters say, but to evaluate their motivation by their actions, as well.

In these studies, the amount of practice differs radically from the amount found in most conventional teaching (Durkin 1984). In the study teaching students to identify character motives, for example, students were given 14 practice examples spread over a three-day period. In a basal reader, that much practice on such a skill might be spread over three years.

In most studies, however, explicit step-by-step instruction by an adult was necessary. In the two studies discussed in detail—learning to analyze arguments (Patching et al. 1983) and learning to draw inferences to analyze arguments (Carnine et al. 1982)—students who received extensive practice on the skill performed no better than students who received no practice at all. For these fairly difficult abstract skills, the teacher's role may be to provide successful models, offer immediate feedback, and systematically correct errors. This observation could have significant implications for how teachers use their time during the reading lesson. If research can indicate which topics and skills seem to require concerted, active teaching in reading—as well as in other disciplines—teachers could allocate instructional time accordingly.

Strategies with Limited Utility

Even extensive practice and teacher feedback on purportedly critical comprehension skills do not necessarily ensure improvements in comprehension. For example, a large body of research on pronoun constructions (e.g., Bormuth et al. 1970) has suggested that confusion about the meaning of antecedent pronouns impairs students' comprehension. Yet, intensive training in how to identify pronoun antecedents in typical social studies passages did not enhance overall com-

Fig. 5. Research Conducted to Date on Direct Instruction in Reading Comprehension Strategies

General Comprehension

1. Story grammar (Carnine and Kinder 1985)
2. Study skills (Adams, Carnine, and Gersten 1982)
3. Reading for meaning: oral reading errors (Carnine 1984)

Inference

1. Critical reading (Patching et al. 1983)
2. Rule-based deductions (Carnine, Kameenui, and Woolfson 1982, Carnine and Gersten, Carnine, Kameenui, and Maggs 1982, Ross and Carnine 1982)
3. Logical deductions (Collins 1985)
4. Character motives (Carnine et al. 1982)

Specific Skills (Vocabulary, Syntactic)

1. Learning vocabulary from context (Carnine, Kameenui, and Coyle 1984)
2. Vocabulary drill (Kameenui, Carnine, and Freschi 1982)
3. Computer-assisted vocabulary instruction (Johnson, Carnine, and Gersten 1985)
4. Syntax—pronoun constructions, clauses, passive voice (Kameenui, Carnine, and Maggs 1980; Kameenui and Carnine 1982)
5. Anaphoric structures (Dommes, Gersten, and Carnine 1984)

Text Structure

1. Visual displays (Darch and Carnine in press)

Comprehension in the Content Areas

1. Mathematics word problems (Darch, Carnine, and Gersten 1984)
2. Legal concepts (Fielding, Kameenui, and Gersten 1983)
3. Science concepts (Darch and Gersten in press)

prehension skill (Dommes et al. 1984). Although systematic instruction improved students' ability to identify pronoun antecedents, this ability did not significantly enhance students' comprehension of passages containing pronoun antecedents. The lack of an effect for direct instruction on this pronoun subskill highlights the importance of the relationship between an intervention and its intended effect. Strategy teaching, if done well, might improve performance on a targeted behavior, but not on other seemingly related domains of behavior.

A major advantage of explicit step-by-step procedures is that they allow teachers to provide specific feedback to students when they make errors. The work of Duffy and Roehler indicates, though, that most teachers don't know how to correct comprehension "errors." Our own observations as part of a naturalistic study of reading in intermediate grades support this contention (Gersten and Carnine 1984).

The explicit strategies create a shared language between teachers and students, which teachers can use when correcting errors. Without this shared language many teachers simply don't know what to say (as the Duffy-Roehler audiotapes reveal); when students have difficulty with a comprehension item, teachers merely ask the child to think again, call on another student, or give the answer themselves.

"Rigidity" of Strategies

Some educators are concerned that teaching a step-by-step strategy will produce students who "think" in exactly the same way. An investigation of teaching study skills (Adams, Carnine, and Gersten 1982) demonstrated that many students personalized the study process by omitting one of the steps they had been taught. Others integrated the new procedure (which did not call for taking notes) with their own ideas of note-taking. Students who adapted the procedure were no less accurate. These observations demonstrate that only in the early stages of instruction need the strategy be explicit; thereafter, students will adapt and modify a strategy so that it works

well for them. Providing their performance remains accurate, these adaptations are fine.

Drawing Explicit Maps for Learning

To know exactly which strategies to use, for which skills, and with which children requires more applied research as well as informal field-testing and discussion. Our research indicates that some skills may not be worth much investment of time because transfer effects are so weak. In most cases, however, explicit strategy instruction produces positive results. Furthermore, while some components of the explicit strategy model (such as providing extensive practice) have received a good deal of attention recently, other components (provision of detailed step-by-step models, fading of those models, and type of discrimination practice provided in the rule-based inference and legal concepts examples) have received scant attention.

The real power of teaching strategies comes when students can build broad mental maps that integrate a wide range of examples. Then students learn more than the particular lessons. They learn different ways of organizing and relating information. Thus the four "story grammar" questions become powerful to the extent that students can improve in their comprehension of a number of different stories.

This highly structured approach goes against the grain of what many educators feel comprehension instruction should be—an opportunity for students to spontaneously develop and articulate perceptions. Classroom observations, however, reveal that elementary (and probably middle school) teachers need guidance in teaching students to make sense of what they read. The research demonstrates that the type of questions, the detailed step-by-step breakdowns, and the extensive practice with a range of examples illustrated in our three studies will significantly benefit students' comprehension. The next step is integrating these procedures into reading series and into teacher training programs.

The quotation at the beginning of this article, from a poem by Charles Olson, was written soon after the destruction of Hiroshima and Nagasaki in World War II. When many poets and humanists attacked science, blaming it for nuclear destruction and the beginning of the arms race, Olson offered a different view. Refuting the superficial conflict between humanism and science, Olson concluded, "We can be precise."

Many of the dichotomies that have plagued education are equally superficial. The goal of precise instruction in comprehension strategies—no less than the goal of educational humanists—is for students to be capable of independent, intelligent analysis of writing. To accomplish this goal, we need only to build on what we know from research and technology about making our instruction more precise. □

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