Direct Instruction news
ADI Effective School Practices
DON CRAWFORD and RANDI SAULTER, Editors

Old DI Advice Still Rings True

Hello and welcome to the 2008 Summer edition of the *DI News*. This issue of the *News* contains many articles that we hope you will find both informative and interesting.

We have all embraced Zig Engelmann's so eloquently stated "mantra" that "if the children aren't learning, the teacher isn't teaching." In a 2001 interview, originally published in *School Reform News*, we have the opportunity to read a concise explanation to support this way of thinking. It also serves to remind us of the critical role of the educator.

Additionally, in an early (1993) article, Zig points out how "mis-learning" and inadequate practice often occur due to weak curriculum. In his own words, Zig offers the following prologue to the article:

> Geoff Colvin is a behaviorist who is also a good teacher and trainer. He understands the role of instruction in shaping behavior. A week before I posted this article, Geoff asked me for permission to reproduce and present it at a seminar. Sure. (In fact, I forgot that I had written this paper.)
>
> Geoff presented it to graduate students. Some of them later indicated that they were both shocked and insulted because this was the first time they had heard anything about the relationship between curriculum and failure, particularly the notion that you could observe student behavior and infer the flaws in the curriculum they went through from the kind of mistakes they make.
>
> After I heard Geoff's report, I read the article and concluded that it is as timely today as it was in 1993, when I wrote it. The field still hasn't learned that poorly designed curricula generate poor performance in both teacher and students.

We are offering a (2005) piece from Zig, "A Litmus Test for Urban School Districts." Zig notes that large districts implement innovations, such as DI, in their own manner, according to their own previously established policies and procedures. These district rules often greatly distort the innovation. Then, when the innovation is not successful, the district assumes the innovation was inadequate, rather than blaming their internal policies and procedures. Zig suggests that districts try an unfettered "litmus test" of innovations according to the developers' guidelines in two or three schools as a way to determine both the potential of the innovation as well as what needs to be changed in the way of district policies.

From Martin Kozloff and Monica Campbell we have an article entitled "Cognition, Logic, and Instruction." The authors skillfully explain the four kinds of cognitive knowledge as well as the logical structure and the logical operations, how to attain them, and how to use them. The "finale" of this article contains a critical conclusion for educators. We know you will find this article important and useful.

We are happy to include several articles that exemplify the kinds of success that we all know is possible with sound instruction utilizing DI curricula. Robert Harris of J/P Associates and Classical

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In this issue

Direct Instruction News

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Contribute to DI News:

DI News provides practitioners, ADI members, the DI community, and those new to DI with stories of successful implementations of DI, reports of ADI awards, tips regarding the effective delivery of DI, articles focused on particular types of instruction, reprints of articles on timely topics, and position papers that address current issues. *The News*' focus is to provide newsworthy events that help us reach the goals of teaching children more effectively and efficiently and communicating that a powerful technology for teaching exists but is not being utilized in most American schools. Readers are invited to contribute personal accounts of success as well as relevant topics deemed useful to the DI community. General areas of submission follow:

From the field: Submit letters describing your thrills and frustrations, problems and successes, and so on. A number of experts are available who may be able to offer helpful solutions and recommendations to persons seeking advice.

News: Report news of interest to ADI's members.

Success stories: Send your stories about successful instruction. These can be short, anecdotal pieces.

Perspectives: Submit critiques and perspective essays about a theme of current interest, such as: school restructuring, the ungraded classroom, cooperative learning, site-based management, learning styles, heterogeneous grouping, Regular Ed Initiative and the law, and so on.

Book notes: Review a book of interest to members.

New products: Descriptions of new products that are available are welcome. Send the description with a sample of the product or a research report validating its effectiveness. Space will be given only to products that have been field-tested and empirically validated.

Tips for teachers: Practical, short products that a teacher can copy and use immediately. This might be advice for solving a specific but pervasive problem, a data-keeping form, a single format that would successfully teach something meaningful and impress teachers with the effectiveness and cleverness of Direct Instruction.

Submission Format: Send an electronic copy with a hard copy of the manuscript. Indicate the name of the word-processing program you use. Save drawings and figures in separate files. Include an address and email address for each author.

Illustrations and Figures: Please send drawings or figures in a camera-ready form, even though you may also include them in electronic form.

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Old DI Advice...
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Learning Universe tells us the story of Old West End Academy and how, after only three years of operation, the school began to consistently outperform the rest of Toledo (OH) Public Schools.

From Miami-Dade County, we have a report on the 50% gain in students reading at or above grade level over an eight-year period.

In Corning, CA, Ridgefield Elementary School reports on its movement toward closing the achievement gap and raising the Academic Performance Index (API) for all students thanks to *Reading Mastery* and other Direct Instruction curricula.

Gulf Elementary School in Cape Coral, FL, reminds us how the use of Direct Instruction curricula often begins in special education programs, then moves to general education use when the students receiving special services begin to outperform their general education peers.

Our final success story for this issue comes from Rapides Parish School District in Louisiana where there has been a marked decrease in referrals for special education services.

Don Crawford provides a comprehensible article outlining the benefits of "challenging" students and then acting surprised at their success as a method of motivating them to push themselves to higher levels of performance.

We hope you enjoy this issue and find it to be inspirational, informative, or both. We encourage you to send us stories of your successes, and those of you who are coaches, please send us tips that we can share with the wider DI world. Have a great summer and hope to see you in Eugene! ADI

DON CRAWFORD, Baltimore Curriculum Project

DON CRAWFORD, Baltimore Curriculum Project

Challenge and Be Surprised by Your Students

Being surprised by your students' accomplishments is the highest type of motivation possible.

> The most effective reinforcement that you can present is built around surprise, because the surprise shows that the child did not merely do what you expected, but more. Doing better than you expect is one of the most reinforcing experiences a child can have. Therefore, the most effective procedure you can use to assure that the child will find learning to read [or any other skill] very reinforcing is to challenge the child. … The challenge is designed to let the child show you that she can do more than you expect. … The "Wow, you did it" is what the challenge is all about.
> — from *Teach Your Child to Read in 100 Easy Lessons* by Siegfried Engelmann, Phyllis Haddox, and Elaine Bruner, p. 21.

Many teachers hope to motivate students by saying things like, "I know you can do this," or "This is easy, I'm sure you can do it," or "C'mon, try it. I know you can do this." Teachers feel that expressing confidence in a child's abilities will encourage the child to try harder or take a risk. While on the face of it this seems correct, it turns out that acting differently can be a much better motivator. If teachers act as if they are quite doubtful of a child's or a group's ability to do a task and then act surprised and impressed when the students succeed, teachers can increase motivation better than they can by expressing certainty.

An example may help to illustrate how this works:

By the time she was ready to start kindergarten, my daughter had learned how to put on her socks and shoes but still needed someone to tie her shoes. During the summer, I had seen her do this many times. But during the first week or so of kindergarten, as I was hurrying to get her ready on time, she started saying she couldn't do it. Being in a rush, I did it for her for a few days. One day I caught myself saying, "I know you can put on your socks and shoes. I've seen you do it."

Before I could get caught up in a silly argument, the things I had learned about motivation kicked in. I said, "You're right. Putting on socks is *way* too hard for a 5-year old. *Of course* you can't do it. Just wait a minute and I'll be back to do that for you."

As I was turning away I heard her say, "I think I can do it."

I quickly responded with, "No, no. That's too hard for someone your age. I'll come do it for you—in just a second."

A few minutes later my daughter reappeared with her socks and shoes on. I acted shocked. "Oh my gosh! Did you do that? You put on your shoes and socks all by yourself? I don't believe it." Then I peered into her room, saying, "Are you sure someone isn't in there helping you?"

She giggled and said proudly, "I did it all by myself!"

As I was tying her shoes I told her how impressed I was that she could do this really hard thing by herself.

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The schools and organizations listed below are institutional members of the Association for Direct Instruction. We appreciate their continued support of quality education for students.

Aloha Huber Park
Beaverton, OR

American Preparatory Academy
Draper, UT

Baltimore City Public School System
Baltimore, MD

Beacon Services
Milford, MA

Berks County Intermediate Unit
Reading, PA

Brighton Elementary
Seattle, WA

Cache Valley Learning Center
Logan, UT

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Franklin Pierce Schools
Tacoma, WA

JP Associates
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Keystone AEA Instr. Services
Elkader, IA

Laurel Nokomis School
Nokomis, FL

Legacy Preparatory Academy
North Salt Lake City, UT

LICA
Mt. Prospect, IL

Livermore Joint Unified School District
Livermore, CA

Los Molinos Unified School District
Los Molinos, CA

Morningside Academy
Seattle, WA

Mountain View Academy
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Mt. Pleasant Cottage School UFSD
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Mt. Vernon, OH

OCISS-ISB-Languages Section
Honolulu, HI

Oconomowoc Developmental Training Center
Oconomowoc, WI

Saint Anthony School
Milwaukee, WI

School District of New Richmond
New Richmond, WI

The Gregory School for Exceptional Learning
Ancaster, ON

Tri City Elementary
Myrtle Creek, OR

For the next week or so, every day we played the same game. I would tell her that it really was too hard for a 5-year-old to be expected to put on her own shoes and socks. I'd say I was going to come back to do it for her and give her a few minutes. She would proudly come out and display her accomplishment. I would drop my mouth open and act surprised and say that I was "so impressed" that she was able to do this without help.

One day I was distracted, and when my daughter presented herself in the hall with her shoes and socks already on, I started tying her shoes without saying anything. She said in a hurt voice, "Aren't you going to say how impressed you are?" Chastised, I belatedly told her what an accomplishment it was and how impressed I was.

A few days later, I told her I was going on a trip and that her mother would be getting her ready for school until I got back. I said to my daughter, "Now, you're going to be putting on your own shoes and socks for your mom, just the way you've been doing it for me, right?"

"No," was my daughter's immediate response. I was taken aback, so I asked her why she thought she wouldn't be putting on her shoes and socks for my wife the way she did for me.

Her response was unhesitating. "Because she isn't impressed the way you are." My daughter was clearly aware that she was putting on her shoes and socks just for the fun of seeing me act surprised and impressed when she did it by herself.

A couple of weeks after returning from my trip, my surprise was finally no longer believable. My daughter no longer needed that extra reinforcement. Yet, she continued to put on her shoes and socks independently.

Why is the act of surprise so reinforcing? Because it tells the child that she not only met but exceeded expectations. To have done even more than the teacher (or parent) expected is to have really excelled. Being impressed by their actions tells children that they have accomplished something for which they can be justifiably proud.

Conversely, when the teacher says, "See, I knew you could do it," students learn that their actions were no more than the least that was expected of them. When you think about the meaning of the "I knew you could" comment from the student's perspective, you can see why that kind of comment is not motivating to students.

Giving students a challenge is a way to arrange the situation so the children can exceed your expectations. You set the challenge by saying that you think this is a very difficult task and you don't really expect the child to accomplish it.

Your stated assessment of the task does not really change the student's perception of the task. If the student has some doubts about his or her ability to succeed, your pronouncement that it is "really hard" or "too difficult for second-graders" only increases the payoff if the child is successful.

Your view of the difficulty of the task also reduces the risk associated with failure. In the child's mind, the teacher has just said it was too hard, so there is no shame in an attempt that does not succeed. On the other hand, the student is apt to think of the potential for glory if the teacher is "surprised" and "impressed."

Students whose teacher reliably reacts with "amazement" when they exceed her expectations are anxious to try to amaze their teacher. The teacher sets up the challenge by saying, "I don't know. This is really hard. I'm not sure anyone can do this." The students are highly motivated to try their best, because they know there is a big payoff (a very impressed teacher) if they succeed.

The teacher should challenge the children to do something the teacher thinks they can do if they make an effort and concentrate. Ideally the challenge should be a set of items, a list, a paragraph—a whole "task" from the program. The teacher should say something like, "I'll bet that you can't read all of these words without making more than two mistakes. These are really hard words in today's lessons."

Teachers who are using points or the teacher-student game can say, "I'll bet you five points you can't …" Then do the tasks. If the children meet the criteria—act amazed! Say something like, "Wow! I can believe you read all of those without a single mistake! You must be really smart!"

If the child doesn't meet the criteria the teacher can help them "save face" by saying something like, "See, I told you these were hard words. Let's do them one more time to make sure you know them now. I'm sure some of them will be in tomorrow's lesson." The teacher should segue into the next task with a similar challenge. If the challenge is working, the teacher should end most tasks with an impressed, "Wow, you did it!" ADL

ROBERT HARRIS, J/P ASSOCIATES

The Curriculum as the Cause of Failure

When children do not learn, it is evident that they have not been taught. In other words, the teaching failed. But why does the teaching fail so frequently in the traditional classroom, and why is such a large number of students labeled disabled, dyslexic, or immature? I believe that the principal cause of failure is the curriculum. I do not believe that the children who fail are "odd" in their orientation to the world, that their learning styles are different in type from those children who succeed, or that their failure is their fault. I further believe that the reason the curriculum has not been addressed as the cause of failure is that the traditional educator is not highly literate in the technical details of curricula or how to change them.

How the Curriculum Causes Failure

To appreciate the role of the curriculum in providing misinformation and inadequate practice, we start with the obvious fact that the purpose of the curriculum is to communicate with the learner. More specifically, the curriculum is supposed to convey information about concepts that the learner does not possess. To appreciate the problems the learner may experience, we must look at teaching interactions from the standpoint of the naive learner, not from that of someone who already knows that information or skill.

Situation A

The teacher presents the learner with a card that displays 5. The teacher tells the learner, "This is four." On subsequent interactions with the learner, the teacher either refers to the figure as "four" or reinforces the learner for identifying it as "four." If the learner had no pre-knowledge of the symbol's name, and if the learner learned exactly what the teacher taught, the learner would learn that 5 is "four." Later, the learner would probably have to relearn the symbol name, and this relearning would require substantially more time than the time required to induce the misrule.

Although this scenario seems incredible because the teacher obviously presented the learner with information that is not accurate, it has all the features of the type of mis-learning that is induced by most traditional curricula. These features are:

1. The learner learns exactly what the teacher teaches. The mis-learning is not caused by the learner's mind running wild or being unable to process the information. Rather, the learner learns what the teacher teaches, as documented by facts of what happened during the teaching.
2. The communication with the learner is the basis for inducing the mis-learning. The learner did not spontaneously generate the misconception about 5 but rather received the information through an interaction with the teacher.
3. The mis-learning is very expensive in time, because the re-teaching of the misunderstood concept requires far more time than the teaching of the original concept.

Situation B

The teacher has two numbers on the board:

4 5

The teacher stands some distance from the board and points to the board, saying, "That's four. What is it? …" On subsequent lessons, the teacher repeats this demonstration or asks the learners in the classroom, "What's that number?" The children, of course, respond, "Four."

If all the children in the classroom were naive and could not identify any numbers before the demonstration, we would be amazed if all of them learned that 4 is called "four." We'd also be amazed if all learned that 5 is called "four." We could expect that some of the children would learn that 5 is "four," some would learn that 4 is "four," and some would learn that 4 5 is "four." The children's experience with reading would affect the percentage of those identifying 4 or 4 5 as "four." (Reading lists of words starts at the top.) However, the children who identified 5 or 4 5 as "four" could not be viewed as learning disabled. Their use of information the teacher provided was no different than that of the learners who learned that 4 is "four." All learners were in the position of having to "guess" about the concept.

Scenario B adds two ingredients to those listed for situation A. They are:

1. The teacher didn't provide the learner with information that is inaccurate. The teacher didn't lie when saying, "That's 4," because a 4 was present. Although the statement obviously had more than one possible meaning, the statement was "accurate."
2. The presentation is ambiguous and therefore provided the learner with a choice of "interpretations." The question of the salience of these choices is irrelevant. One choice may be more naturally attractive to the average learner than the other. In fact, however, all choices are consistent with the presentation; none is contradicted by what the teacher does or says. Therefore, the learner who learns any one of them is learning exactly what the teacher is teaching (even though the teacher's intent is to teach only one possibility).

Reprinted with permission of Behavioral Research and Teaching. This article was first published as: Engelmann, S. (1993). The Curriculum as the Cause of Failure. In J. Marr & G. Tindal (Eds.), *The Oregon Conference Monograph, 5*, 3–8. Eugene, OR: University of Oregon, Behavioral Research and Teaching.

Virtually all the mis-learning that is created by the traditional curriculum follows the format of situation B. The teacher presents information about concepts that the teacher understands. The presentation is ambiguous to the naive learner. The ambiguity may result from a variety of features in the presentation. The presentation may not provide concrete information; the presentation may stipulate a particular set of examples although the concept being taught is supposed to apply to a very broad set of examples. The presentation may unintentionally prompt the learner to use a spurious operation that will permit the learner to obtain the right answer.

For example, the traditional teaching of any subject reveals an appalling number of ambiguous communications (National Council of Teachers of Mathematics, 1989). Here are some examples from beginning arithmetic that display the order misrule: Teachers sometimes present numeral identification in the order of the counting numbers. The numerals are displayed in this order: 1 2 3 4 5. Children identify the numbers from left to right. Although many of the children already know how to identify some of the symbols, some children don't, but they know how to count, which is what they identify as the concept the teacher is apparently doing. These children will not learn that the shape of the symbols determines the name, but learn that the order does. The first symbol is called "one," the next is "two," the next is "three," and so forth.

The teacher who follows the curriculum (a) has no ready way of knowing that these children are operating from a "misrule" and (b) actually reinforces children for using this misrule. Consider this interaction:

Teacher: James, tell me the names of these numbers as I point to them.

(Teacher points as James says, "1, 2, 3, 4, 5.")

Teacher: Very good, James. You really know your numbers.

The strategy that the teacher is reinforcing is that of identifying the objects in order. It would be possible to infer the nature of James' misrule from some tasks. One would be to present the numerals in this order: 3 5 4 1 2 and ask James to identify them. If James said, "one, two, three, four, five," we would be provided with precise information about the misrule, and also with confirmation that the misrule is consistent with the information conveyed by the teacher.

The problems created by poorly designed curricula may be difficult for the teacher to identify because the learner may be performing perfectly on the initial activities.

Delayed Information

If the teacher follows poorly designed curricula, the tasks in the program do not reveal the problems the learner may be experiencing and the learner's problem is not identified until later, at which time, the learner is often blamed for having a learning problem (Colvin & Horner, 1983).

As situation B shows, the problems created by poorly designed curricula may be difficult for the teacher to identify because the learner may be performing perfectly on the initial activities. Another example of spurious performance is early addition facts. In many traditional sequences, the facts are presented in the order: 1+0, 1+1, 1+2, 1+3, 1+4, and 1+5. This presentation is capable of generating the same misrule as the numeral-identification misrule. The answers are always the counting numbers: l, 2, 3, 4, 5, 6. If the program the teacher uses presents the problems in the same order as they are introduced, the learner who picks up on this misinterpretation will perform perfectly, and the teacher will have no indication that the learner does not understand the concept of adding one or understand any of the facts that add one. This information may not be revealed until the children receive a test on the first addition facts taught.

Here are Amy's responses to the problems presented on the mastery test (which presents the problems in a non-counting order):

1+3=2	1+2=3	1+5=4
1+4=5	1+1=6	

Amy got two problems correct. The teacher probably would not observe that the answers are in the counting order. Instead, the teacher might assume that Amy has attention problems or that she is not functioning for some other reason—conflict at home, anxiety about taking a test, etc.

Another student, Betsy, did not miss any items on the test; however, Betsy had a serious problem that did not emerge until much later in the arithmetic sequence. When the program introduced the problems: 1+6, 1+7, 1+8, 1+9, and 1+10, Betsy got all the answers right both during the instruction and on the test that followed the introduction. Also, Betsy had no trouble on the cumulative test that presented the facts 1+1 through 1+10 in the non-counting order. Betsy's problem emerged when working with facts that begin with 2 (2+4, 2+5, etc.).

At first, Betsy made many mistakes, such as indicating that 2 + 3 equals 4. After additional work, Betsy seemed to get the hang of working these problems; however, she made what the teacher considered bizarre mistakes on the test that presented both 1+ and 2+ problems. Betsy missed some of the 1+ problems that she got right earlier. Specifically:

1 + 4 = 6
1 + 5 = 7
1 + 7 = 9

She made no mistakes on any of the 2+ problems.

The curriculum caused this problem just as it caused Amy's problem. When the children worked on 2+ facts, they worked on only 2+ facts, not on 1+ and 2+ facts presented in different orders. Betsy was never shown the difference between 1+5 and 2+5. The strategy that Betsy had used to work the first set of 1+ problems was to: (a) look at the second number, and (b) write the next number in the counting order. For the problem 1+4, she looked at the 4, said, "5" to herself, and wrote 5 as the answer. The initial work with 2+ facts seemed to contradict the rule that the answer is 1 more than the second number. Then it became clear to Betsy that the appropriate procedure for all problems is to look at the second number and (for some arbitrary reason that she didn't understand) count 2 places—not 1. For 2+6, she looked at 6 (not the 2), said, "7, 8" to herself, and wrote 8. Betsy was able to work all the 2+ problems using this procedure. The curriculum did not present a demonstration or task that ruled out the possibility that Betsy's procedure is appropriate for 1+6 as well as 2+6. (For Betsy, both would have the same answer—8.

Here is a series of problems that would have contradicted Betsy's misrule:

2+6	1+6
1+4	2+4

Pre-Correcting Problems

If the learner learns what the teacher presents, and if the curriculum specifies tasks, activities, or sequences of events that create misinterpretations, the most sensible solution to the problem would be to design the curriculum so it "contradicts" misconceptions before they occur. This approach is far more efficient than misteaching children and later providing some sort of remedial work. To avoid Amy's problems, we could simply introduce the facts in a non-counting order. To avoid Betsy's problems, we could initially show the "difference" between 1+ statements and 2+ statements by presenting counterparts.

1+5	2+8	2+3	1+6
2+5	1+8	1+3	2+6

The teacher would explain that problems that start with 2 have an answer that is one more than the problems that start with 1. To work each pair, the teacher would direct the children to "find the problem that starts with 1 and write the answer to that problem." The teacher would then give feedback. "You should have worked 1 + 5. The answer is 6. The other problem in the pair starts with 2. The answer to the problem is 1 more than the problem you worked. What's 1 more than 6? … Write the answer to 2+5. … You should have written, 2 + 5 equals 7." After completing all the pairs, the students would read the facts.

The curriculum is capable of generating misinterpretations that may not be immediately revealed by the performance of the children. Therefore, any work on mastery may simply strengthen the misunderstanding that some children have.

This presentation could not support the misrule that Betsy learned because this presentation contradicts her interpretation. From the beginning it shows her that:

1. What you learned about 1+ problems is still in force and is not being superseded by a new procedure.
2. The problems that start with 2+ are different from those that begin with 1+.
3. The difference is a stable relationship—answers to 2+ problems are 1 more than answers to corresponding 1+ problems.

The procedure for redoing the sequence of activities for teaching 1+ facts and 2+ facts so they cannot support the misinterpretations that Amy and Betsy had involves these steps: (a) Recognize the misinterpretations that are consistent with the presentation or explanation provided in the program; (b) change the presentation so it actively contradicts the possible misinterpretation; (c) try out the revised sequence with children; (d) identify patterns of errors that individual children make and compare them with the explanations and activities presented in the revised sequence; and, (e) revise any details of the new curriculum that generate misinterpretations. If all these steps are taken, the revised program will work well.

Mastery

If the four revision steps are not taken, the sequence is not improved by requiring teachers to teach to mastery. Here's why: The curriculum is capable of generating misinterpretations that may not be immediately revealed by the performance of the children. (A learner like Betsy can perform perfectly for a long time.) Therefore, any work on mastery may simply strengthen the misunderstanding that some children have. Betsy, for instance, would not have benefited from working longer on the early parts of the program.

Although the goal of the curriculum should be to teach children to mastery, not simply expose them, the poorly designed curriculum often provides for spurious mastery because the success on earlier tasks does not reveal the underlying and serious misinterpretations individual children may have abstracted from the presentation. Therefore, mastery on these tasks does not facilitate later learning for some children, but actually interferes with it or retards it (Colvin, 1983).

Scope of Misrules in Traditional Programs

Traditional instructional approaches are replete with communications that generate misrules. The student who is labeled learning disabled or with a specific learning disability provides a detailed tribute to the misteaching they have received. Basically all of the learning behaviors reflect earlier teaching and often are examples of doing exactly what teachers told them to do in reading, math, and science (Engelmann, Becker, Carnine, Meyers, Becker, & Johnson, 1975).

Here are some of the more common misunderstandings that are generated by currently popular reading programs.

Initial Reading

1. Reading is reciting a memorized piece as you point to the marks on the page and say one word for each major mark. This interpretation is consistent with the "Language experience" or "Whole language" approach to initial reading. Children memorize poems or accounts. The material that is read is cued by pictures that prompt the topic.

In the late 60s, we went into a language-experience classroom that had "taught" the children five stories. The children were quite good at "reading" these selections. We switched the pictures and texts so that there was no "prompting" of the appropriate text. About half the children pointed to each word of the selection and, with great fidelity, recited the script appropriate for the picture. In other words, about half the children hadn't learned anything about what reading is. For them, it was nothing but a strange recitation game. Furthermore, their performance was perfectly consistent with the teaching and reinforcement they had received. The teacher told them that they were reading very well.

2. You must have pre-knowledge of the concepts the text presents. In other words, before you can read something, you must understand the various "meanings" that you'll encounter in the text. This misinformation is conveyed by showing children that discussions always precede "reading," that the discussion deal with the details that will be "read," and that pictures show some of the material that is discussed and later "read."

From the first day of reading instruction that is based on a whole-word or sight-word method, a perfectly spurious order of events is followed. Students discuss a picture that actually shows what the text covers before reading. The statements that are generated during the discussion are sentences that will be read. Children then read and are reinforced for paraphrasing or "guessing" at words.

Good readers do not perceive words by general shape but rather by the precise succession of letters, even when reading at a high rate.

3. When you read a selection, you try to guess about the words that are appropriate to say, using the picture, the pre-reading discussion, and the appearance of some words key to your reading. The mistakes the learner makes provide clear evidence of the learner's strategies. Typically, the learner doesn't have the basic understanding that a word unit like *cat* has one "name" and that the name derives solely from the order of the letters. The learner usually reads cat as "cat" but sometimes reads it as "kitty" and sometimes as "kitten." The word *a* is sometimes read, "a," and sometimes, "the." The word *little* is a size word, sometimes read as "small," sometimes even as "big." The learner is more confused about connected sentences than lists of words. Virtually all "corrective" readers read words more accurately when they are in lists than when they are in connected sentences (Engelmann et al., 1975). This fact provides evidence that sentence reading is more difficult for the learner. The nature of the synonym and "meaning" mistakes suggests that the sentence-reading strategy is painfully involved and that the learner doesn't have the basic notion that the word is the word and that it is always spelled the same way. For this learner, reading is involved "coping" and a complicated process that first requires some inspection of the word so that it is "recognized," then a search for the meaning of that thing—not for the pronunciation of that thing. After finding the meaning, the learner then goes on another search for the pronunciation of the things that could have that meaning. During this process, the learner may link the word meaning with the pronunciation that is "incorrect"—calling the word *cat*, "kitty" or the word *a*, "the."

This laborious and perfectly inappropriate procedure is consistent with what the learner had been shown about reading. Somebody told the learner to look at the beginning of the word and "guess." "What could that word mean?" the teacher asked. Other teachers told the learner to use sentence context clues to figure out the word, and to look at the beginning of the word or the general shape and use that information as a basis for identifying the word. These rules are neither accurate nor necessary. Good readers do not perceive words by general shape but rather by the precise succession of letters, even when reading at a high rate. In very limited contexts, the "What could that word mean?" strategy is appropriate, but certainly not for the beginning reader who has none of the background information needed to make intelligent choices or to rule out possibilities. Asking this reader to identify words on the basis of context is tantamount to asking the average six-year-old to judge the adequacy of safety rules for a power plant.

Solutions

As with other problems of miscommunication with the learner, they can be corrected by identifying them and providing tasks or activities that actively contradict or preempt them. Here are some of the specific changes that would result in the program:

1. Children first decode words, then focus on meaning. The steps of decoding and "understanding" would not be amalgamated during the early work. Several activity formats could achieve this goal but all would involve the reading of words with no discussion of their meaning—only their "sound" or the "sounds" of the individual letters, or the "spelling" of the word as a key to its pronunciation.

2. No general clues would be provided for looking at the whole word, guessing, or extrapolating from the initial sound of the word. The word would be approached a letter at a time, from left to right.

3. No pictures would be shown at the beginning of reading selections. If pictures are provided they would occur in the most reasonable position—after the selection had been read. After all, the text tells what the picture would show, and not vice versa.

4. When reading connected sentences, the read-first practice would be followed initially. No pre-reading discussion of the context would be provided. Rather, children would read the title and use that information to judge what the selection is about. Next, the children read the story, then they read it again and answer comprehension questions, including the final question: "What do you think the picture for this story is going to show?" The read-first strategy assures that the learner will derive the meaning from the sentences that have been read, not from spurious cues. The picture will show something about the main event of the story; the learner understands the main of the story; therefore, the learner can predict the picture. After reading about a goat that had three red hats, the learner would probably predict that the picture would show the goat with its hats. In this context, intelligent guessing (or predicting) is perfectly permissible. Furthermore, the role of the picture is framed for the learner.

The picture is not the basis for the story or the source of meaning; it is merely something that is consistent with the story.

As with other problems of miscommunication with the learner, they can be corrected by identifying them and providing tasks or activities that actively contradict or preempt them.

5. The comprehension activities presented with the reading selection would be the type appropriate for the discourse. The initial selections should not be designed to "teach" students how to comprehend. The test of whether the student should be in the beginning reading program is simply: If the stories were told to the learner, would the learner be able to answer the "reading" comprehension questions. With a few exceptions, reading comprehension of beginning-level stories is simply language comprehension. The children are not required to learn anything new about comprehension, merely to apply what they know about a verbally presented story to a story that is read. If the story is decoded accurately, it has all the essential "meaning features" of the verbally presented story. Children should be able to answer questions about what happened, who the "actors" are, and what they did. The only attempt to teach anything new about comprehension to the beginner would be associated with those conventions of the written word that have no parallel in spoken language. Quote marks, for instance, do not occur in oral language; therefore, they imply some instruction before children encounter them in stories. (Too often, this teaching is not provided by traditional programs.) Associated with the introduction of quotes would be comprehension questions. For example, after the children read: The goat said, "I am not a boat," children might be presented with two tasks: "Say the whole sentence you just read. … Say what the goat said. …" (If this pair of tasks were presented to fourth graders who went through a traditional sequence, most would respond incorrectly, suggesting deficiencies in what they had been taught.)

Note: Comprehension is important; however, the treatment of comprehension as it is presented in traditional reading programs is insulting. Thorough comprehension of a story presented in the beginning levels of these programs requires precisely no new comprehension learning. Yet, the child would have exactly no access to the story without first being able to decode it. Most of the essential learning that must take place, therefore, is on decoding, not comprehension; however, the pretense of these programs is that they teach comprehension. This presumption is lavishly contradicted by the later levels of the program, which provide students with almost none of the comprehension teaching that would be required for them to understand their science text or simpler documents that attempt to teach (that introduce new words, rules, etc., and apply them to concrete situations). Precious little work is done to prepare children either for the content that they will encounter or for the format or the syntax of what they will read.

Inferring Teaching Deficiencies from Performance

The same miscommunications that are observed in traditional reading approaches are found in mathematics instruction and science instruction. As a general description, none of the more widely used curricular sequences has been shaped by observing the mistakes that children make, by determining the extent to which the mistakes are supported by what the program "taught," and by redoing the curricular sequences so they actively preempt and contradict these misinterpretations.

Furthermore, much of what students have been unintentionally taught can be inferred from their performance. The performance of eighth-grade math students who are removed from the traditional sequence and put in a sequence that is appropriate for their skill level reveals both what these students had been taught about approaching mathematics and how strongly they have been reinforced for using inappropriate strategies.

1. The first thing one notices with these students is that they are seriously deficient in following directions. You may tell them, "Listen: Copy the problem just the way it is written on the board, then stop. Raise your hand when you've done that much." When you observe the students' performance, you'll note that possibly half of them did not follow your directions. The consistent inability to follow clear directions is the first indicator of poor instruction. Not only are the students unpracticed in following directions, they are poorly prepared for new learning. Here's the argument: Following directions is essential to learning complex problem-solving strategies in a timely manner; these students have obviously been taught in a way that does not require them to follow directions precisely and has left them with direction-following deficiencies; therefore, the teaching they have received has not prepared them well for learning.
2. Next, you'll observe the inability to apply things that are taught in one lesson to the next lesson, even when (a) the work on the earlier lesson is successful, and (b) you tell the students that they will use what they are being taught. During the subsequent lesson, many of the students (perhaps most) will inform you that, "I don't remember how to do that." Their lack of ability to retain and apply reinforces the diagnosis that what they had been taught earlier did not involve learning and applying. Students who are practiced in the format of learning something and then using it don't exhibit the "forgetfulness" of traditionally trained children. Their behavior further implies that they understand what teaching is all about. You're taught something not merely because of some capricious whim of the teacher to expose you to something new, but because what you learn is integrally connected to what you will learn. The earlier learning provides the stuff, the components, and the operational details that will later be orchestrated into more complex structures and used to solve more complicated problems. The well-taught learner understands this relationship because it has been a predictable feature of the teaching sequences the learner has experienced. What is done today is to be learned because it will be used for many tomorrows and in many ways. The poorly taught learner does not understand this order of events and therefore has a very jaded notion of what teaching is and why teachers have presented different activities and exactly what information the learner is expected to attend to, derive, retain, or apply.
3. You'll notice a great deal of helplessness in the students. They are quick to raise their hand and ask for help, very unsure of how to proceed. Typically after you tell them to do something, most of them will exhibit a long latency before responding. They do not pick up their pencil and start writing; instead they stare for several moments, then look around to see what their neighbors are doing. If they have an active neighbor, they will most probably copy what that student is doing, even if it is wrong.
4. The final global thing you'll observe is that they exhibit tendencies of learners who are in an unfamiliar learning setting. When engaged in highly unfamiliar learning, learners don't show rapid improvement. The mistakes they will make today predict the mistakes they make tomorrow. Last year, we worked with one group of fifth graders from a low-income school and three classes of sixth graders from high-income schools. All students were placed in the same instructional sequence. None of the students had been in this sequence the preceding year. All had good teachers. The fifth graders outperformed all of the sixth graders by a wide margin. The difference seemed to be that these students had spent less time practicing inappropriate strategies. Although their performance was initially as poor as that of the sixth graders, it speeded up a lot. The rate of the average sixth grader didn't improve as much, an indication that the amount of relearning required to be an efficient learner and applier was greater for those students and required more prac-

The same miscommunications that are observed in traditional reading approaches are found in mathematics instruction and science instruction.

tice than they received in one school year.

Summary

Instructional sequences have the capacity to make children smart or not. If students learn from their interactions with the content that (a) they are expected to dabble, (b) there is no requirement to retain what is learned today and to use it, and (c) there is no requirement to follow the teacher's directions, the children will perform at a level that will permit them to be labeled as specific learning disabilities by the time they reach the eighth grade, which, according to the National Assessment of Educational Progress math evaluation, is true of the average U.S. student (NAEP, 1991). If the program sensibly counteracts not merely the content errors that poorly designed programs might induce, but also the more general attitudes about learning and retaining information they promote, children can become impressively proficient in academic skills. The curriculum will largely determine the extent to which children are smart. Unfortunately, the more popular curricula are not well designed to make them smart, but provide teachers with very serious misinformation about how to teach well. ADI

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Litmus Test for Urban School Districts

The most frustrating aspect of trying to work with failed school districts (which includes virtually all of the top 100 largest districts) is that they have archaic organizational structures that prohibit them from learning how to be effective with failed students. Before any serious assault on fixing up at-risk kids and other failures, they would have to overhaul their organization and operating procedures. The simplest way to provide them with information about what needs to occur is to require them to implement DI fully on a small scale (two to four schools) and learn how to remove barriers to full implementation. They would then be able to have firsthand evidence of how well students are able to perform and the benefits to the students.

With this information, the district would know what needs to be done on a larger scale.

If districts can't implement DI with fidelity (which a lot of them would not be able to do) the problem areas that hinder complete implementation would be easily identified, and remedies in terms of the districts' structure are clearly implied. That's the gist of the argument in *Litmus Test for Urban School Districts*.

A man who had never seen a bicycle received a kit, completely unassembled, with instructions. The man felt he had a sense of machinery, and he didn't see the need for some parts. Also, he added parts he felt were necessary. The man believes that his assembly process was appropriate. His bike runs, but it's hard to pedal and hard to steer. Question: How much of the observed performance is created by the way he assembled the bike? If the man had accurate information on bikes that had been assembled properly, he would have a basis for comparing his bike with the standard model. As it is, he doesn't know what the bike's potential is because the bike's performance is the product of two variables, the machinery and the way it is assembled.

The same problem exists with urban school districts. They implement approaches according to their rules or standards, rather than the developers' guidelines. The result is the same as that of the bike. The performance of students is now the product of two variables—the approach and the way the district implemented it. Just as the man has no basis for comparing his bike with those assembled according to the manufacturer's specifications, the district has no basis for comparing the results it achieved with those that would be generated by the developers' guidelines.

The district could obtain this information easily, however, simply by implementing the approach in a few schools according to the developers' guidelines. That's what the litmus test is—a controlled, carefully monitored, small-scale test of possibly effective approaches. Unfortunately, there is nothing to suggest that urban districts are capable of implementing any effective approach with fidelity. That may be why they haven't discovered what works well.

It's important to find out if urban districts can pass the litmus test because if they can't, they should be reconstituted so they have the capac-

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ity to implement with fidelity and so they base their decisions on outcomes of small-scale tests of well-implemented approaches.

For instance, Chicago has implemented Direct Instruction its way with some low-performing schools but is now discarding DI. A CPS researcher, Dr. David Bill Quinn, observed that other reported studies on DI have much larger effect sizes than Chicago achieved. He recommended either investigating why this discrepancy occurred or dropping the program.

Apparently Chicago did not consider the first possibility. Instead it has adopted a new initiative, 100 small Renaissance Schools for at-risk children. Although this is an elaborate commitment, Chicago claims that it is not like the man and his bike and that it is has comparative data on the effectiveness of small schools. It cites Harlem as an example of how improvement occurred in small schools. The problem is that this data is confounded by the fact that the demography of the district achieving this improvement changed a great deal and may have been the primary cause of the improvement. When the district superintendent from Harlem tried the same approach in San Diego (fuzzy math and whole language), it was not successful.

Even though the Direct Instruction implementation in Chicago is not consistent with the developers' guidelines, some DI project schools are comparatively successful. For instance, Woodlawn (which achieved the largest gain in the district between 2003 and 2004) went from 40% of children passing the Illinois State Reading Test in 1999 to 62% in 2004. Carver Primary went from 29% in 1997 to 44% in 2004. Three points of interest about Carver: (1) It has over 1,000 children in grades kindergarten through 3; (2) it reached its highest passing percentage (49%) in 2000 after the National Institute for Direct Instruction (NIFDI) had been an external sponsor working with the school; and (3) NIFDI dropped Carver and the other schools it worked with in Chicago because district standards and practices made it impossible to fully implement the model in any of these schools. So at least in NIFDI's opinion, Carver could have done a lot better.

Chicago hopes to revitalize the school with non-AFT teachers and a learning model called "Pathways," which claims to develop personal interest in fine arts, technology, math and science, journalism, and world culture. There's no compelling data to suggest this approach will work but (as Chicago apparently reasons) there's no data to show it won't.

Maybe Chicago is right and the small school will prove to be magic. After all, the best performing DI school in Baltimore, City Springs, is a small school.

Or possibly, small schools for at-risk populations are extremely hard to implement. For City Springs, its small size created a host of implementation problems. If a couple of teachers were absent, it was very difficult to cover for them with trained teachers or aides, much harder than it is in a larger school like Carver (which has many more classrooms on each grade level).

Also, in a well-implemented small school, grouping students homogeneously for instruction becomes a nightmare in grades 4 and above. The reason is that a large percentage of incoming students perform lower than any continuing students in these grades. Accommodating new entrants is far more challenging than it is in a larger school, which may have more than one classroom per grade dedicated to accommodate incoming low performers. A small school with more than 25% annual turnover (like City Springs) often has to penalize the continuing students by slowing their performance so the classroom is able to accommodate low-performing incoming students.

Other small-school problems include training and deploying coaches, accommodating students who have been absent for a while, and training teachers who are performing unacceptably. Possibly Chicago has strategies for addressing these problems. Or possibly Chicago will learn about these problems only after the 100 small schools have been in operation a while.

But even if Pathways has the potential to work well and the management has super-smart strategies for implementation and training, what evidence is there that the district could implement the approach in a way that would achieve its potential? The answer is revealed by the litmus test. If districts don't have the machinery needed to implement on a small scale, there is no reason to believe that they'll be able to faithfully implement anything that is instructionally sound on a larger scale.

The format for the litmus test is a parallel to how the man with the bike could secure information about the bike's potential. Instead of ordering one bike, the man orders two, assembles one according to the book and one his way. Now he has a strict basis for comparison and is able to evaluate which practice is best. For the litmus test, the district identifies four models. Two would have substantial data of effectiveness (such as DI) and would be implemented the developers' way. Two would be approaches that the district prefers (such as the Renaissance Schools) and would be implemented the district's way. The performance of the effective models would serve as the yardstick for evaluating the other two models.

Help us out!

Contribute your story of success with DI! We want to hear from you!

You all have stories and it is time to share them. This is *your* journal—let it reflect your stories!

See the directions on page 2 on how to make a contribution. You'll be glad you did.

Each approach would be implemented for three years in three comparable at-risk schools (12 schools total). The district would necessarily waive whatever policies and practices interfere with the effective models being implemented according to the developers' specifications (given that these are legal, humane, and feasible). The district's standards, pre-service and in-service training, and other practices may be in conflict with the models being tested. Waiving standards and procedures should not be a serious barrier. After all, the schools failed even though they followed these standards and practices.

Certainly, the effective models would have to stay within reasonable budget limitations and could not demand things like unusually gifted teachers or three aides in every classroom. A reasonable demand, however, would be that the principals are to be directed to follow the model's provisions. (This did not happen with DI in Chicago.)

The evaluation of the district's performance on the litmus test would be based on both the degree to which each model was implemented and how well the schools performed. The evaluation of implementation fidelity would be performed by an independent agency and use objective measures—how well teachers and principals follow specified procedures and schedules. Students would also be tested on standardized achievement tests and state tests (with the testing being scrupulously monitored) but the results would not be released to the school or the administration until the three-year litmus test was completed. This provision assures that judgments of how well a school is implemented would not be biased by how well students performed on these tests.

The litmus test would provide at least five benefits for the district:

1. It would generate accurate comparative data about what works well and about the relative cost of various approaches.
2. It would reveal modifications in the district's infrastructure that are needed to empower the district with the capacity to implement approaches faithfully.
3. It would save millions of dollars on large-scale implementations of approaches that would not produce worthwhile performance gains in a small-scale test.
4. It would protect large numbers of students from being subjected to shoddy instruction by limiting the number of students used in the "experimental" test of new approaches.
5. It would establish a basic professional standard for the district, which is that nothing is adopted until it demonstrates its worth in a small-scale, carefully monitored study.

The litmus test is not only the scientific or logical way for districts to discover how effective various approaches are and what's wrong with the district practices. The litmus test is also what any smart business would do—make prototypes and test them rather than launch into full-scale production without having any solid performance information about the product or how to use it effectively.

Ironically, some urban school districts claim that they fashion themselves after hard-nosed business practices. They have CEOs instead of superintendents, and their rationale for doing things makes reference to business. For instance, Chicago's CEO, Arne Duncan, contends that Chicago's new direction is consistent with sound business practices. Unfortunately, Chicago's practices seem to be no more sound than those used by the man who assembled the bike his way. To date, not one large urban district has taken anything like the litmus test, but if a district really is based on sound business practices, the litmus test would be one of the district's top five priorities. ADI

Everyone likes getting mail…

ADI maintains a listserv discussion group called DI. This free service allows you to send a message out to all subscribers to the list just by sending one message. By subscribing to the DI list, you will be able to participate in discussions of topics of interest to DI users around the world. There are currently 500+ subscribers. You will automatically receive in your email box all messages that are sent to the list. This is a great place to ask for technical assistance, opinions on curricula, and hear about successes and pitfalls related to DI.

To subscribe to the list, send the following message from your email account:

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The list is retro-moderated, which means that some messages may not be posted if they are inappropriate. For the most part inappropriate messages are ones that contain offensive language or are off-topic solicitations.

Success Stories

Direct Instruction Reduces Special Education Referrals in Louisiana School District by Half

Rapides Parish School District educators were certain the district needed early intervention services to address its disproportionately high number of students in special education. But the rapid, dramatic improvements after introducing two SRA/McGraw-Hill Direct Instruction programs came as a pleasant surprise.

At the start of the 2006–07 school year, educators introduced *Reading Mastery* and *Corrective Reading* in three targeted elementary schools. Once early intervention began, students referred for special education evaluations at the end of the 2006–07 school year compared to the end of the 2005–06 school year decreased by 50% (see Figure 1). Even more impressive: of the number of students who were referred for special education evaluations, the percentage that actually qualified for special education services decreased by 58% between the two years.

Debbie Morrison, director of special education, worked with Eddie Mae Washington, director of federal programs, to fund the Direct Instruction implementation for early intervention. Both said pooling resources was an efficient use of funds allocated by the Individuals with Disabilities Education Act (IDEA) and No Child Left Behind (NCLB).

"Direct Instruction has been one of the best things we have done to help at-risk students with reading problems advance beyond special education," Morrison explained. "We targeted just a few schools at first. Students in these schools had low test scores and were at high risk for qualifying for special education services. Since implementing Direct Instruction, the percentage of students requiring special education services has dropped dramatically.

"Young children, especially in kindergarten and Grade 1 who would have been referred to special education in the past, are less likely to be identified because of early intervention. The program has been so successful that we are expanding it to 15 additional schools at the start of the 2007–08 school year," said Morrison.

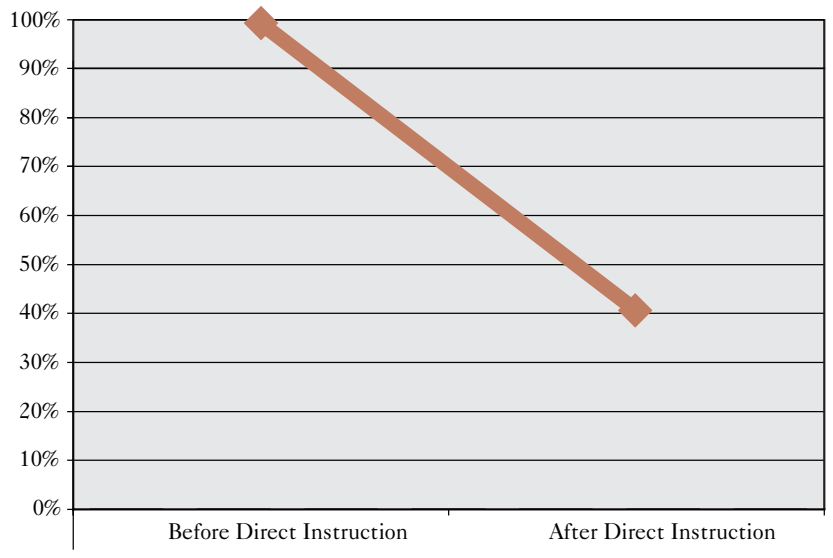
The district's overall goal was to improve instruction and academic achievement in reading for all students, including special needs, economically disadvantaged, and minority, Washington said.

"We wanted to give them an extra push to improve their reading ability, as well as give them a lifelong love of reading. The process has been most successful. It's easy to see the improvement students have made, and we credit this improvement to Direct Instruction," continued Washington.

A few months after intervention began, Superintendent Gary L. Jones visited one of the classrooms, which included both regular education students and

Figure 1

Percentage of Students Qualifying for Special Education After Being Referred



Rapides Parish School District, Alexandria, LA

About the District:	
Grades:	PreK-12
Number of students:	23,980
Test(s):	LEAP
Reduced-price lunch:	63%
About the Students:	
African American:	44%
Caucasian:	53%
Hispanic:	1%
Asian:	1%
Other:	1%
ELL:	—

those targeted for special education, to witness their success in person.

"I had promised them a pizza party, so I brought in several pizza boxes," he explained. "After each child read fluently, I wondered how someone would do with completely different material. I asked one little boy to read the pizza box, and he read every single word with ease, including a very long word, which he sounded out successfully."

Then Jones asked that same group of children to read before the school board at their next meeting.

"Each student read in succession, and the board was really impressed. That started a trend for the next four months. Teachers called asking if they could bring their students to board meetings to read. We even had a pre-K class read to us. Their teacher had used Direct Instruction's *Language for Learning*, and 12 of the 20 students read proficiently."

Standardized Tests Show Marked Improvement

Progress is evident throughout the district, including Grade 4. The percentage of students meeting promotional standards on the Louisiana Educational Assessment Program (LEAP) continues to improve. During the 2005–06 school year, just 45% of Grade 4 students at Acadian Elementary School and 47% of Grade 4 students at North Bayou Elementary School met LEAP promotional standards. After one year with Direct Instruction, those percentages increased to 49% and a whopping 70% respectively, as shown in Figures 2 and 3.

Direct Instruction Reduces Discipline Referrals

Direct Instruction improves discipline as well, Jones said. Before the programs began, North Bayou Rapides Elementary School averaged 70 disciplinary referrals each year. After implementation, that number dropped to zero.

"Direct Instruction brings structure to the teaching environment, which is critical in getting young students to stay on task. The programs are great academically, and they obviously work well on other levels, too."

Teresa Arratia, principal at North Bayou Rapides Elementary School, has seen firsthand the disappearance of discipline referrals.

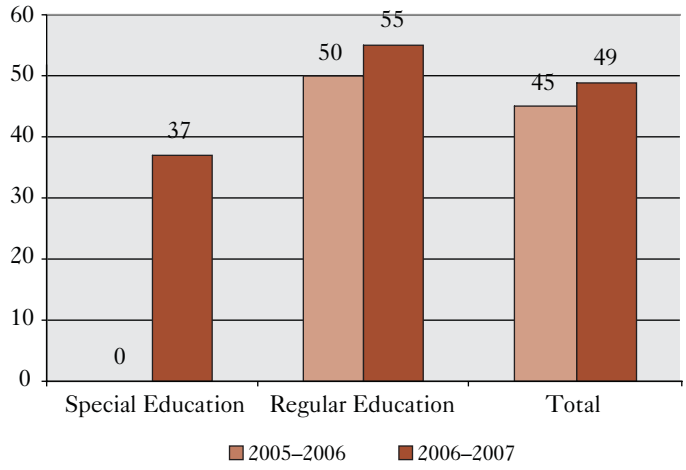
"Students struggled to master the skills needed to be successful readers before we adopted Direct Instruction," she explained. "They displayed inappropriate behaviors in the classroom and acted out so others would not see they were struggling to read or master the skills."

Arratia said now students are actually excited about their accomplishments and strive to achieve success not only in reading, but in all subject years.

"Direct Instruction has increased the overall teaching and learning at our school. The programs address different learning styles, allowing each stu-

Figure 2

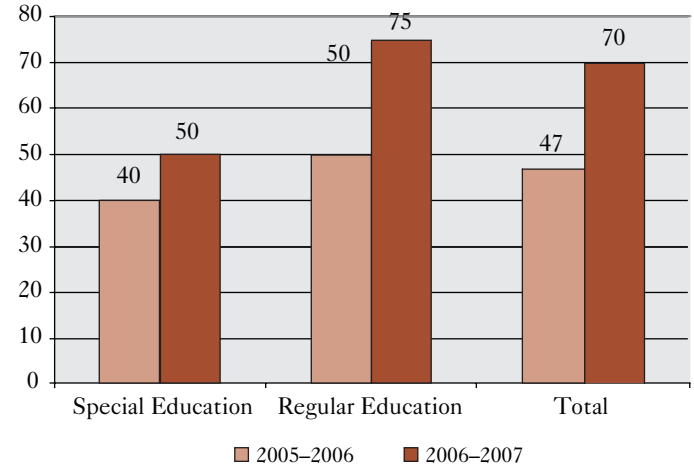
Percentage of Acadian Elementary Grade 4 Students Meeting Promotional Standards



Source: Louisiana Educational Assessment Program (LEAP)

Figure 3

Percentage of North Bayou Elementary Grade 4 Students Meeting Promotional Standards



Source: Louisiana Educational Assessment Program (LEAP)

dent to excel academically. Direct Instruction offers meaningful, engaged learning that is not left to chance. Students are actively involved in a tailor-made program that is not boring, holds their attention, has high expectations, and has reduced disruptive behavior," she said.

Dr. James M. Patton, professor of special education and leadership at The College of William and Mary, has worked with Rapides Parish School District since October 2006 to reduce disproportionality. Specifically, he is helping the district decrease the number of students misdiagnosed for special education. Patton uses a metaphor about a Roman god named Janus to explain disproportionality. Janus was the god of gates, doors, doorways, beginnings, and endings.

"Janus had the ability to look in two different directions simultaneously," Patton said. "If he were involved with American education today, he would see something very ironic. If he looked to his left, he would see overrepresentation of certain ethnic groups (like African Americans) in special education. If he looked to his right, he would see the same individuals underrepresented in gifted education."

Dr. Patton said Rapides is no different from other districts across the United States.

"We can reduce disproportionality if we drill down deeply into the problem," Patton stressed. "One cause is reading difficulty, and Direct Instruction, as well as committed teachers, address this problem. If pre-referral programs, pupil appraisal programs, and a solid reading curriculum are in place, there is a great likelihood the number of students who are 'false positive' will be reduced, especially in the category of mild mental disabilities. I've observed educators teaching Direct Instruction passionately, and I've seen students use their reading ability to enhance their life skills and problem-solving abilities. Many actually read for enjoyment, not just for understanding."

About the Rapides Parish School District

Serving approximately 23,980 students in Grades pre-K–12, this district's student population is 53% Caucasian, 44% African American, 1% Asian, 1% Hispanic, and 1% multicultural. Sixty-three percent of students qualify for free or reduced-price lunch, and 14% are classified as disabled. For more information about this district, please visit www.rapides.k12.la.us.

For More Information

If you would like to learn more about success with Direct Instruction programs in your school or district, please contact SRA at 1-888-SRA-4543. ADI

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Success Stories

Miami Elementary School Boosts FCAT Scores with Reading Mastery

At Parkway Elementary School in Miami-Dade County, FL, the percentage of Grades 3-5 students reading at or above grade level soared from 7% to 57% between 1997 and 2005!

Principal Patricia Zell said the school scored the lowest in the region before implementing SRA/McGraw-Hill's Direct Instruction program *Reading Mastery*.

"The teaching staff decided a systematic phonics-based reading program would be the best choice for our students," Zell said. "So when the district offered to pilot *Reading Mastery* in our school, we jumped at the opportunity." Now all grades use *Reading Mastery* at Parkway Elementary School.

Zell said one of her most memorable moments occurred when a pre-K student said the only thing she wanted for her birthday was to read to the principal. "Not only did she read to me, but I took her to practically every classroom, so she could read to other teachers as well," said Zell. "They showered her with praise and birthday treats."

Other Parkway Elementary School children also have success stories with *Reading Mastery* to share: "Almost every child at our school probably thought at one time that he or she would never read," Zell explained. "But *Reading Mastery* empowers children and gives them confidence. It also improves their self-esteem, which in turn improves discipline school-wide. We even have Grade 5 students reading on a Grade 6-7 level."

FCAT Scores Soar

Since 1999, Florida has graded its schools based on how students score on the annual Florida Comprehensive Assessment Test (FCAT). The FCAT includes five achievement levels, with Level 1 being the lowest and Level 5 the highest.

In 1999, only 29% of Grade 4 students scored at or above Level 3 on FCAT reading. By 2005, that percentage more than doubled to 60% (see Figure 1).

What Teachers Say

Parkway Elementary School teachers agree that *Reading Mastery* was the best choice for their students.

"Every teacher in this school backs the program because they can see the results," Zell said. "We don't teach to the FCAT. We teach reading—we teach the standards and benchmarks through *Reading Mastery*. That's why we've been so successful."

Parkway Elementary School, Miami, FL

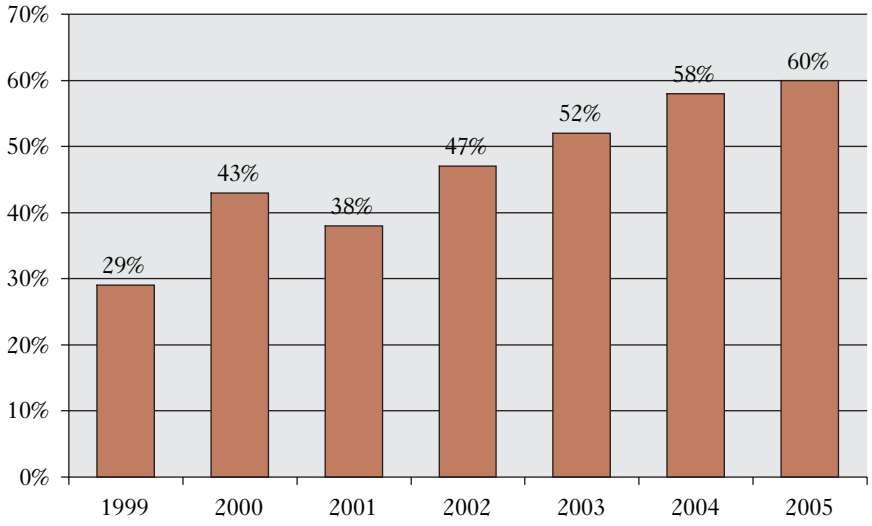
About the School:	
Grades:	PreK-5
Number of Students:	554
Test(s):	FCAT
Reduced Price Lunch:	91%
About the Students:	
African American:	94%
Caucasian:	1%
Hispanic:	3%
Asian:	1%
Other:	1%
ELL:	3%

About Parkway Elementary School

Parkway Elementary School is part of the Miami-Dade School District and serves roughly 554 children in Grades pre-K–5. The student population is 94% African American, 3% Hispanic, 1% Asian, 1% Caucasian, and 1% multicultural. Ninety-one percent of the children are eligible for free or reduced-price lunch, and 3% are English Language Learners. For more information about Parkway Elementary School, visit pwe.dadeschools.net. ADL

Figure 1

Grade 4 Students Scoring At or Above FCAT Reading Level 3



GEORGE A. CLOWES, School Reform News

GEORGE A. CLOWES, School Reform News

If the Children Aren't Learning, We're Not Teaching: Siegfried Engelmann

One of the most vigorous continuing debates in elementary education is over which teaching method produces the best results.

Is it teacher-directed learning, where the teacher conveys knowledge to his or her students? Or is it student-directed learning, where the teacher encourages students to construct meaning from their own individual learning experiences?

Although a considerable body of research shows student-directed learning is ineffective, the debate rages on because many educators—and especially teachers of educators—choose to ignore the research.

Siegfried Engelmann has been one of the key participants in this debate over the years, and a major contributor to its resolution. He first became interested in how children acquire knowledge when he was research director for an advertising agency trying to understand more about the learning process.

Pursuing this interest, Engelmann quit the advertising business in 1964 and became senior educational specialist at the Institute for Research on Exceptional Children at the University of Illinois at Champaign-Urbana. There, his research into the effectiveness of different teaching methods in the education of underprivileged children led him to develop the Direct Instruction method of teaching.

The Direct Instruction method involves teaching from a tightly scripted curriculum delivered via direct instruction to the class; i.e., giving children small pieces of information and immediately asking them questions based on that information. While Direct Instruction is teacher-directed instruction, it does not

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encompass all the possible varieties of teacher-directed instruction, including the common situation where a teacher delivers a content-rich curriculum to students but decides exactly "what" will be taught.

Engelmann's research in the 1960s into the effectiveness of different teaching methods was subsequently confirmed by the massive federal Follow Through project in the 1970s and 1980s. In 1999, the American Institute of Research looked at 24 education reform programs and concluded Direct Instruction was one of only two that had solid research vouching for its effectiveness. But despite all the research findings, Direct Instruction is used at only 150 of the nation's more than 114,000 schools.

After developing the Direct Instruction method, Engelmann became a professor of special education at the University of Oregon, in Eugene, OR, where he established the National Institute for Direct Instruction. He recently spoke with *School Reform News* Managing Editor George Clowes.

CLOWES: What approach did you first take to understanding the mechanics of the learning process?

ENGELMANN: I studied philosophy when I was in college, and I was much influenced by the British analytical approach that required very careful parceling out of what caused what, and also what kind of conclusions you could draw from what kind of premises. That had a big impact on how I viewed this process initially, particularly the notion that we are responsible for whatever children learn. We can't just take credit for what they did learn; we have to take credit for what they didn't learn, or mis-learned, also.

We assumed that children were logical, reasonable beings in terms of how they responded to our teaching, and that their behavior was the ultimate judge of the effectiveness of whatever went into our teaching. If the way we taught didn't induce the desired learning, we hadn't taught it. But if children learned stuff that was wrong, we were responsible for that, too, and it meant we had to revise what we were doing and try it out again. That's the formula we used from the beginning.

Just because you covered the material doesn't mean the children learned the material. That tells about what you did. It doesn't tell about what you taught. If you want to know what you taught, you have to look at what the children learned.

CLOWES: Which means you have to test the children.

ENGELMANN: It means you would not wait to test the children. You would design the instruction so that you were testing them all the time. You would design the instruction so that you received feedback on what they were learning at a very high rate. You would present instructions so that the children's responses carried implications for what they were learning. And you would design the instruction to be efficient, so that you're not working with just one child.

All of this means that, for young children, you would use procedures involving oral responses where the children can respond together, and you get information about what they're learning from their responses. That's the test.

For very simple responses, the paradigm that we use is: Model, Lead, and Test. You first show them what the task is and how they're supposed to respond to it. Then you test to see if they can respond properly. It all happens very quickly.

It's something like, "My turn: What am I doing? Standing up. Your turn: What am I doing?" It's a model and then a test. But if they can't produce the response, then you do a model and lead the test. For example, "My turn: What am I doing? Standing up. Your turn: What am I doing? 'Standing up.' Say it with me: 'Standing up.' Once more: 'Standing up.' Your turn: What am I doing?" So "your turn" is the test.

CLOWES: When did you decide to develop this into an instructional package for beginning learners?

ENGELMANN: Initially, we took programs people were using or were being talked about and evaluated them according to our criterion: If the children aren't learning, we're not teaching.

For the most part, the children we were working with were disadvantaged pre-schoolers. They represented a particular challenge because they didn't come in with very high levels of knowledge and they didn't learn things very well. Their performance on the programs that were available led to the conclusion these programs just didn't work—the language experience program, the sight-word approach—none of them worked. They were horrible.

The sight-word, or look-say, approach is particularly bad because there is no method for correcting mistakes. If a child reads a word incorrectly, what do you tell them with the sight-word approach? "Look at the unique shape of the word," or "Look at the beginning letter and ask yourself what that word could be." That's it. They're not taught that the word is a function of the arrangement of specific letters. It's like taking average people off the street and trying to teach them calculus by showing them different curves with different answers. "What's this one? .03. And this one? .05. Good." It's that stupid.

With sight-word, children develop all kinds of misconceptions about what reading really is. They think reading

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means looking at pictures and guessing what the words are, because that's what they've learned to do. The misconceptions are induced because the children are given highly predictable text for reading practice, which then reinforces for guessing on the basis of context. But when they're given text that's not predictable, they can't make out what the words on the paper say because they really don't know how to read.

The only programs that showed any promise were the ones based on the International Teaching Alphabet, where you taught children to read using the phonetic pronunciation. You could teach disadvantaged kids to read that way, but then you had a terrible time transitioning them out because they were absolutely unprepared to deal with the high rate of irregular pronunciations among the most common words. The reading strategies they had developed with the phonetic alphabet weren't any help to them and a great deal of re-teaching was necessary.

But what they had learned was a function of what we had taught. We were responsible for so seriously mis-teaching these children that they could not easily transition and learn the irregular side of the reading game. So that meant we had to (a) introduce some version of irregulars very early, so that children get the idea not everything is perfectly regular, and (b) keep the sounding out, but treat it more as a sop for spelling the word. You don't want them to spell the word for initial reading. You want them to be able to sound out the word. But if you do it rigorously, they can easily understand that a particular sound means a particular letter.

The notion that you somehow recognize the word as a lump has been thoroughly discredited by research. When words are presented on a screen at the rate of about four or five hundred words a minute, experienced readers still can identify misspelled words. They can't do that without understanding the arrangement of letters in the word, and that each word is composed of a unique arrangement of letters. They're not looking at the shape of words.

CLOWES: When did you decide to publish your findings?

ENGELMANN: When we were working with the children, our objective was to teach them reading, math, and language. We wanted to make sure we taught them well, and so we made up sequences that compensated for what was lacking in other programs. Pretty soon we had prototype versions of the reading program, the math program, and the language program. Our rule was that we would not submit anything for publication until we were sure that if the script was followed and presented as specified, it would work. We never submitted anything for publication that was not absolutely finished.

Outcomes have never been a priority in public education, from its inception. That's the way the public education system is. The system is more concerned with the experience of the child.

Also, the publisher was not allowed to edit any of our material. The publisher would say, "There's a better way to phrase it." No, there isn't! We've tried different ways. This way is efficient and it ties in with things we're going to do later on.

Another thing that happened was the federal government's Project Follow Through, which came out of President Johnson's War on Poverty and was aimed at evaluating programs that provided compensatory early education to disadvantaged children. We were one of 13 major sponsors, with the others representing the full spectrum of philosophies about instruction: developmental, Piagetian, the British open classroom, natural learning processes, and so on. The results showed those other programs don't work in any subject. Direct Instruction beat them in all subjects. We beat them in language, in math, in science, in reading, and in spelling. And our students were the highest in self-image. And although Follow Through went only through third grade, additional follow-up showed an advantage through eighth grade and a statistically significant increase in college enrollment.

We also have some more direct information from places we worked with in Utah, where the Direct Instruction sequence goes through sixth grade. For example, when the children in Gunnison Elementary School entered junior high, they skipped seventh-grade math and went directly into Algebra I, which was scheduled for eighth grade. At the end of the year, the children from our program were first, second, fourth, fifth, and sixth in performance in Algebra I.

CLOWES: So Project Follow Through confirmed what you had already found about the ineffectiveness of those other programs. Yet those programs still are being promoted in teacher colleges and they still are widely used, while Direct Instruction is not. Why?

ENGELMANN: The answer is really simple, but it's very difficult for most people to accept: Outcomes have never been a priority in public education, from its inception. That's the way the public education system is. The system is more concerned with the experience of the child: "Let the child explore," "Let the child be his or her self," "Don't interfere with the natural learning process," and so on.

The rhetoric is wonderful, but the test is: Does it work? Quite clearly, it doesn't. The ones who are victimized the most by this are children from poor families.

But anyone who does not view the child in this way is portrayed as some kind of redneck Republican with no real human concern.

CLOWES: What about Advantage Schools? I understand they're using your approach, too.

ENGELMANN: They're doing some pretty good things, but I think they're probably a little light on initial training. Part of that is because they're installing a school from scratch, and so you have to teach the teachers and the administrators a lot more than you would if you were just moving into an extant school. That's a tough job. It takes months to get the routines down.

CLOWES: Do you have any recommendations for state policy-makers who want to raise the quality of U.S. K–12 education?

ENGELMANN: My first recommendation would be to use only data-based material; that is, material that has a track record and can demonstrate it works. My second recommendation would be to evaluate test results skeptically. Don't rely on state tests and the like to give you an indication of what's really going on. To produce quality, you have to have quality control. That means having random samples, just as you would in a business.

You would go into a school and randomly test one out of five students in randomly chosen classrooms. In reading, you would give each student a passage to read and then ask them some questions about it. You could get the information you need out of a classroom very quickly—I'd guess no more than 10 minutes. If you sampled six classrooms, that would give you a pretty good idea of what is going on in that school. Then you would compare the performance of the students you had sampled with their achievement test scores and note any discrepancies.

In many cases, you will discover great discrepancies—where the children performed well on the test and yet when sampled they can't do math or they can't read. Schools can do all kinds of things to make their scores look better than they really are, so they need to be evaluated skeptically, preferably with this quality control approach. *ADI*

MARTIN KOZLOFF and MONICA CAMPBELL

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Cognition, Logic, and Instruction

Examine the usual curriculum materials in education. Read especially the preface or introduction. What are the fundamental ideas? They are usually airy abstractions:

"We believe that a curriculum should be holistic, seamless, and naturalistic."

"Our programs are child-centered and facilitate inquiry."

"Our methods appeal to all learning styles and intelligences."

These notions have nothing to do with students acquiring and using information. The assertions are merely designed to impress the reader and to evoke pleasant feelings. In contrast, Direct Instruction programs rest on propositions about the nature of knowledge itself and how knowledge is acquired via **inductive reasoning**.

First grader: "We sounded out all of our words by saying the first sound on the left. Then we looked at the next sound and then said that sound. And then we said the last sound on the right. Ah *ha*! That must be the way to sound out *all* words that look like our words."

And knowledge is *applied* via **deductive reasoning**.

Same kid: "I know how to sound out all words that look like the ones we read. These *new* words look **just like** (they are in the same class as) the ones we read. Therefore, I'll sound out these new words *that* way, too."

DI programs are then designed to enable students to *use* inductive and deductive reasoning easily and quickly. **It is as though the structure of DI programs (how the teacher communicates information and how tasks and lessons are sequenced) is mapped *upon* the structure of knowledge itself.** And this, we believe, is why DI programs are so powerful and are effective with all learners.

This paper is an example of **epistemology** (theory of knowledge). It will make you real smart. [Writing it certainly made us real smart.] Your family, colleagues, friends, and even passersby who hear you talking to yourself will think you're a genius.

Hang on! Here we go.

1. We usually focus on texts we are reading; words we are hearing, speaking, or writing; and activities we are engaged in.

   Teacher: "We're working on geography—focusing on the northern vs. southern hemisphere."

   But this is **superficial**—on the surface. The northern and southern hemispheres are **examples** of something larger—namely, the **concept** of hemisphere. Does the teacher **know** that? Does she teach that our planet is **merely one example** of things with hemispheres?

   In fact, **everything you *use* when you teach is an *example* of something larger**. For instance, when you show your students how to solve 10 equations having one unknown ($x = 3 + 12$; $6 \times 5 = y$), **do not think** you are teaching the routine for solving those 10 **particular** equations. Know that you are teaching the **general routine for**

solving *all* equations of that *type*. *The 10 problems and their solutions are* ***examples*** *of the general type of problem and its solution.* That (the general idea) is what you **really** want students to learn. (Otherwise, how can they generalize to new examples?)

2. **The classical role of teacher is to educate—*to lead students out*** of the cave of illusion (superficial knowledge of *particular* and changing things) to knowledge of what is *general*—universal, stable, and enduring. You teach about the Revolutionary War, Civil War, first and second World Wars, and Cold War—not so your students can think and talk about these **particular** wars *only*, but so they can think and talk about concepts, rules, and theories of war *generally*. Likewise, you teach students to sound out slip, slim, man, rim, lip, lamp, and ram, **not** so they can read **these** words only, but so they learn the **general routine** for sounding out **all** words.

But we can't teach the general itself. We can't see the concept red—only red things that are examples of the concept red. The concept is in the head. It is cognitive. It is an idea ***abstracted from*** (taken out of) the examples. We can't teach or learn the sounding-out routine itself—without words to sound out. We can't see a rule relationship by itself, for example, how price decreases when supply increases or how temperature of a gas increases when pressure increases. We can only abstract a rule from **examples** of the rule relationship.

We are stuck in the here and now of particular, concrete events (objects, problems). These particular, concrete events (examples) are the only **means to reveal**—or to help students to grasp or to induce (discover, construct, say)—the general *ideas* that are behind, woven through, revealed, or embedded in the examples.

The question is, How do you get students' minds (what Zig Engelmann and Doug Carnine call the "learning mechanism" in their book *Theory of Instruction*) to move from concrete things (examples) to cognitive knowledge of general ideas revealed by or embedded in the things—and how do you do this in the surest and fastest way? The answer is, **Logically precise design of communication.**

Our true project as educators is philosophy.

3. Fortunately, **there are only four kinds of general ideas, or cognitive knowledge,** that can be revealed by examples. In fact, there are four and *only* four **kinds** of **cognitive knowledge** that human beings can think and communicate.

   These four forms of cognitive knowledge (ideas) are (a) verbal associations (simple facts, verbal chains, verbal discriminations), (b) concepts, (c) rule relationships (propositions), and (d) cognitive routines.

4. Each form of cognitive knowledge (see above) is a *logical form* or has a *logical structure*. And each form involves certain *logical operations*—**mental steps**, you might say. For example, you have to perform certain logical operations or mental steps in order to move from seeing examples to getting (grasping, understanding, knowing) and then using (applying, generalizing) a concept.

5. Following is the logical structure and the logical operations (mental steps) involved in getting and using (applying) the four forms of *cognitive* knowledge. That is, **these are the mental/logical steps in moving *from* examples (things) *to* ideas (cognitions)—from the superficial to knowledge.**

   a. The logical structure of a **verbal association** is *this* ***one thing*** *goes with that* ***one thing***. To "get" a verbal association means to get *that this* ***one thing*** goes with *that* ***one thing***. Therefore, the most effective and fastest way to teach a verbal association is simply to say that *this* ***one thing*** goes with *that* ***one thing***.

   "That (point) is blue. … What is that? ... *Blue.* … Yes, point to blue."

   "The six New England states are Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut. … Your turn. Name the six New England states. … What are Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut? … Where are they?" …

   b. The logical structure of a **concept** is *all of these examples have something(s) in common. They share a sameness* in their features.

   So, to get a concept (a general) means to **get the sameness** that is common to the examples (particulars) but that is *not* found in the *nonexamples*. The mental steps for moving from examples to the general idea (concept) are:

   (1) **Identifying** (locating, pointing out) and **recognizing** ("This…") the features of examples (in all examples labeled "crystalline") and the features of nonexamples (all called "not crystalline"). The features of each piece of rock might be color, size, hardness, and molecular structure.

   (2) Comparing and contrasting the identified features of labeled examples ("This *is* crystalline") to find the **features that are common to them**. For example, molecular structure is the same in all examples named crystalline, but other features (size, color) vary from sample to sample. Therefore, we **hypothesize**, it **may be** that molecular structure is the feature that makes the examples crystalline.

The question is, How do you get students' minds to move from concrete things (examples) to cognitive knowledge of general ideas revealed by or embedded in the things—and how do you do this in the surest and fastest way?

   (3) Comparing and contrasting the labeled examples and labeled nonexamples ("This is *not* crystalline") to find the common features that are in the examples but are **not** in the nonexamples. For example, there is a different molecular structure in the nonexamples. Therefore, we **conclude** (induce, infer, generalize) that a certain molecular structure is what makes things crystalline vs. not crystalline. We now get the concept embedded in the examples.

   Therefore, the most effective and fastest way to teach a concept is to teach *what the sameness is* that is *common* to the *examples* but that is *not* found in the *nonexamples*. Specifically,

   (1) Teach students **how** to **examine** examples and nonexamples.

   (2) Show examples, label them as examples, and point out the common features that make them "same." "See the planes in the structure."

   (3) Juxtapose examples and nonexamples; label the nonexamples and point out the **absence** of the features common to examples that make the nonexamples different from the examples. "This is *not* crystalline. No planes in the structure."

   (4) Acquisition test. "Is this (crystalline)? How do you know?"

   (5) Later, work on generalization/discrimination with new examples and nonexamples.

   c. The logical structure of a **rule relationship**, or **proposition**, is *this class* (group, set) of examples/things (concept) *goes with that class* (group, set) of examples/things (concept).

   All beings are mortal. [All of the class of beings is *inside* the class of mortals.]

   No terrorist can be trusted in peace negotiations. [None in the class of terrorist is in the class of persons that can be trusted in peace negotiations.]

   The more the enemy's infrastructure is destroyed, the less the enemy resists after being defeated. [The class of events that involves destroying enemy infrastructure *causes* the class of events that involves resistance.]

Examples of degrees of destroyed enemy infrastructure.

Examples of degrees of enemy resistance after defeat.

   The mental steps (logical operations) for moving from examples of the rule to the general rule itself (the idea) woven through

(common to) or revealed by the examples would be:

(1) Identifying (pinpointing) and recognizing the value (amount) of one variable in an example and the **corresponding** value of the other variable in the example. "**Total** destruction of Carthage. [Goes with] **No** resistance."

(2) Comparing and contrasting the corresponding values **across all** the examples to see if there is a **common way** that they go together (**co-vary**).

"Carthage and Rome: Total destruction goes with zero resistance."

"Sherman's march: High destruction goes with low resistance."

"Iraq: Low destruction goes with high resistance."

(3) Stating a rule summarizing the common "goes-togetherness," or **co-variation**.

"The greater the destruction of enemy infrastructure, the less the resistance after defeat."

Therefore, the most effective and fastest way to teach a rule relationship is to teach *the relationship* (*goes-togetherness*) *common* to the *examples*. Here's how:

(1) Teach students how to look at a range of examples. What are the features in each war?

(2) Show examples and point out the goes-togetherness (co-variation) of the corresponding values of each variable in each relationship/example. Or, show examples and have **students** identify the goes-togetherness. [It is better for **you** to do this first—model—and then have students do it with new examples.]

"Rome totally destroyed Carthaginian infrastructure. Carthage then put up zero resistance."

"Sherman burned homes, materials, and fields. The Confederate soldiers put up little resistance after that."

"Grant killed soldiers, not cities. Even though Confederate soldiers died by the tens of thousands, the rest kept on fighting."

"The Marines beat the North Vietnamese and Viet Cong during the Tet Offensive, but they did not destroy Hanoi. The North Vietnamese and Viet Cong came right back."

The fastest and most effective way to teach a cognitive routine is to teach the sequence of steps, the logical necessity of the progression, and all of the concepts, rules, and verbal associations needed.

"The U.S. and British forces made the Iraqi army quickly surrender or scatter but did not destroy their weapons, food, fuel, homes, roads… Resistance began shortly after the defeat."

(3) Have students say the relationship (goes-togetherness) common to the examples. "The greater… the less…"

(4) Give new and/or hypothetical examples and/or have students invent them. Ask what will happen if (there is more or less destruction of infra-structure). Then ask, How do you know? (Students give rule.) And give new examples of more and less resistance after defeat, and ask why.

d. The logical structure of a **cognitive routine** is a sequence of *logically arranged, or progressive, steps* (each next step depends, logically, on accomplishing the earlier ones; and each step, logically, makes the next step possible), *governed by rules* ("If the product is ten or more, write the…"), and *using concepts* (product, tens, ones, column, times, carry) *and verbal associations* (seven times five is 35).

   So, to get a cognitive routine is to get the logical arrangement of steps (and to see the necessary progression) and the concepts, rules, and verbal associations needed.

   Therefore, the fastest and most effective way to teach a cognitive routine is to teach the sequence of steps, the logical necessity of the progression, and all of the concepts, rules, and verbal associations needed. You may have to teach a routine in chunks (forward chaining). 1; 12; 123; 1234… Or 1; 2; 12; 3; 123; 4; 1234…

6. Cognitive knowledge does not exist in the air. It is in thinking, speaking, or writing.

7. Thinking (cognitive knowledge) is talking to yourself—communicating to yourself. You are *instructing* yourself.

   "Seven times five is 35. (A simple fact.) Write 5 (rule) and carry the 3 (rule)…"

8. Speaking is cognitive knowledge that you are communicating to other persons. You are *instructing* other persons.

   "Boys and girls, I look at the ones column first (rule). I say the numbers to myself (rule). The numbers are 7 and 5 (simple fact). Now I multiply 7 and 5 (rule). Seven times five is 35 (simple fact)…"

   "Hey, I'm thirsty." (Simple fact.)

9. Besides physical routines, the *only* things that you can learn, know, and communicate (think, speak, and write—teach) are (a) verbal associations (simple facts, verbal chains, verbal discriminations), (b) concepts, (c) rule relationships (propositions), and (d) cognitive routines.

Therefore, every* sentence *that is thought, spoken, or written consists of verbal associations, concepts, rules, and/or steps in a cognitive routine.

"Yesterday was a great day." (Rule: categorical relationship. Yesterday is in the class of events that are great days.)

"I stayed up too late. I'm really wasted today." (Rule: causal relationship. Staying up late caused being wasted.)

"If you really love me, you will share your feelings." (Rule: causal relationship.)

"I think it's raining." (Concept.)

"My name is Achilles." (Verbal association.)

"This is no accident. It's murder!" (Concept. Part of the conclusion of a long inductive routine of homicide investigation in which examples/evidence point to murder.)

"So, all the evidence clearly says, She is guilty." (Concluding rule of an argument—a cognitive routine.)

"Three times four is twelve." (Verbal association.)

"To be or not to be? That is the question." (Rule: categorical relationship. To be or not to be is inside the category of things that are questions.)

"Thus, conscience doth make cowards of us all." (Rule: causal relationship.)

10. Please note that solving a math problem, sounding out a word, analyzing a document, doing an experiment, and writing a paper involve the mental steps (thinking, talking to yourself) called cognitive routines. ***Perhaps the largest cognitive routines are deductive reasoning and inductive reasoning.***

11. Deductive reasoning (one thinking and communicating routine) is reasoning that **begins with a general rule** (i.e., All beings are mortal), **then gives facts** (Socrates is a being), and **ends with a conclusion** (Therefore, Socrates—a being—is mortal).

    But deductive reasoning can be a much longer **chain of sentences**. The *Declaration of Independence* is a long chain of deductive reasoning. Whole books, courses, and curricula may be organized as a deductive argument—a logical progression of sentences leading to a conclusion.

If you speak and write in a logical fashion, then your students will quickly learn the logical structures in and the mental steps needed for getting verbal associations, concepts, rules, and cognitive routines you are trying to teach.

    For example, we could begin with a general theory of conflict and then show how it applies to (explains) specific conflicts—examples of the theory—just as Socrates' death is an example of the rule that all beings are mortal.

12. Inductive reasoning (another thinking and communicating routine) is reasoning that **begins with facts** and gradually **builds (induces, discovers, figures out, constructs) general rules that *account* for the facts.**

    For example, when you show kids examples of red things and not red things, and call them red and not red, the kids figure out (induce) the *concept* redness. Their mind (thinking, speaking) goes from specifics (examples) to a general idea.

    Likewise, you could examine many different examples of social conflicts and gradually help students to develop (induce) a general theory of conflict that accounts for (describes, explains) the examples.

13. Rule relationships (propositions) are one of the four forms of cognitive knowledge. Propositions are asserted in sentences.

    There are two kinds of relationships asserted by rule relationships or propositions.

    a. **Categorical propositions, or rules.** These propositions assert that one class of things (concept) is inside, partly inside, or outside another class of things (concept).

       All mammals are warm blooded.

       Some bacteria are helpful.

       No music by Madonna is worth listening to.

       [You may have to think about a sentence to see that it asserts one or more of the above categorical propositions. "Love hurts" implies "All love hurts."]

    b. **Causal propositions, or rules.** These propositions assert that one class of things (concept) causes, fosters change in, yields, or is followed by another class of things (concept).

       If the rate of reinforcement increases (or decreases), then the rate of the reinforced behavior increases (or decreases). [This asserts a **direct** relationship.]

       If the rate of punishment increases, then the rate of the punished behavior decreases. [This asserts an **indirect**, or **inverse** relationship.]

       If and only if the material is hot enough will the material burn. [necessary condition]

       Whenever a nation is attacked, social cohesion increases. [sufficient condition]

       After you add numbers in the ones column, add numbers in the tens column.

14. So, one of your jobs as a teacher is to do a **knowledge analysis** of the

objectives (analyze a poem, calculate the slope of a straight line, state the main rule in each of the first Ten Amendments to the U.S. Constitution, conjugate a new verb).

Ask: What are the forms of knowledge contained in *doing* each objective? What verbal associations, concepts, rules, and steps in a cognitive routine must students know/do?

Your second big job is to figure out how to teach (communicate) these in (a) **a logically clear way** (i.e., precise wording and a range of examples/nonexamples that unambiguously ["It can **only** mean this…"] and quickly reveal the associations, relationships, ordering, features) and (b) **a logically progressive (deductive or inductive) sequence**. See numbers 5, 11, and 12, above.

15. And now *the finale*…

    If all cognitive knowledge is (nothing but) thinking and speaking and writing verbal associations (This goes with that.), concepts (This *is* a that.), rules (These go with those in this way.), and cognitive routines (e.g., explanations, arguments, problem solving)—often in the form of *sentences* (Even doing math problems is a series of sentences.)…

    …And if getting each form of cognitive knowledge involves certain *logical operations* or mental steps—moving from examples to the general (e.g., concept or rule)…

…Then (besides physical routines) *all* teaching boils down to *teaching students to think and speak and write in logically clear sentences arranged in a logical sequence*.

If ***you*** speak and write (model, ask questions—teach) in a logical fashion, then your ***students*** will quickly learn the logical structures in and the mental steps needed for getting verbal associations, concepts, rules, and cognitive routines you are trying to teach (the objectives).

But if you don't, they won't. Their thinking, speaking, and writing will be *illogical*—invalid, incomplete, false, inept, ignorant.

They will not have knowledge. They will have illusion. ADI

SRA/MCGRAW-HILL

Success Stories

Reading Mastery *Helps Florida Students Advance Two Grade Levels in Reading*

How can the majority of Gulf Elementary School students in Grades K-5 go from reading below grade level in the mid-1990s to reading above grade level by 2004? Many teachers credit SRA/McGraw-Hill's Direct Instruction programs, *Reading Mastery* and *Reading Mastery Plus*.

Because students at this school in Cape Coral, FL, were going through the motions of reading in the mid-1990s but their test scores were not improving, teachers implemented Direct Instruction during the 1996-97 school year in Grades 1-5. According to Rob Stratton, curriculum and technology specialist, students were reading one or more years below grade level before Direct Instruction was adopted.

Stratton said the use of Direct Instruction began in resource rooms, where special education students are combined with students following the general curriculum. "We found that the special education children were learning to read and that the regular education students were greatly improving their reading," he explained. "We added *Reading Mastery* to kindergarten the following year."

Moving to Reading Mastery Plus

Every year since the adoption of Direct Instruction, Gulf Elementary School students have progressively improved their reading skills. "Our low-end reading groups are getting smaller, and our high-end groups are getting larger," Stratton said. "Now we use a mix of *Reading Mastery* and *Reading Mastery Plus* in Grades K through 1 and *Reading Mastery Plus* in Grades 2 to 5."

Reading Mastery Plus provides students with the skills and explicit instruction needed to master the fundamentals of reading with oral language, phonemic awareness, and systematic phonics. In addition to reading above grade level, students demonstrate increased scores overall on the Florida Comprehensive Assessment Test (FCAT). The FCAT includes five achievement levels, with 1 being the lowest and 5 being the highest. The percentage of Grade 4 students scoring at or above level 3 on the reading portion of the FCAT went from 59% in 1999 to 86% by 2005 (see Figure 1).

What Teachers Are Saying

"Our teachers love *Reading Mastery Plus*," Stratton said. "We know we can

meet children's needs, regardless of where they are. If we work with students who are learning English for the first time, we put them into a Fast Cycle group to learn basic sounds. This way we meet their needs immediately."

Stratton said educators at Gulf Elementary School are thrilled with the overall improvement. "We're even raising the bar in the primary grades. Now, some kindergartners are moving into Level 1 of *Reading Mastery Plus* and some Grade 2 students are moving toward Level 2 of *Reading Mastery Plus*. By Grade 2, our students amaze us with their reading abilities."

About Gulf Elementary School

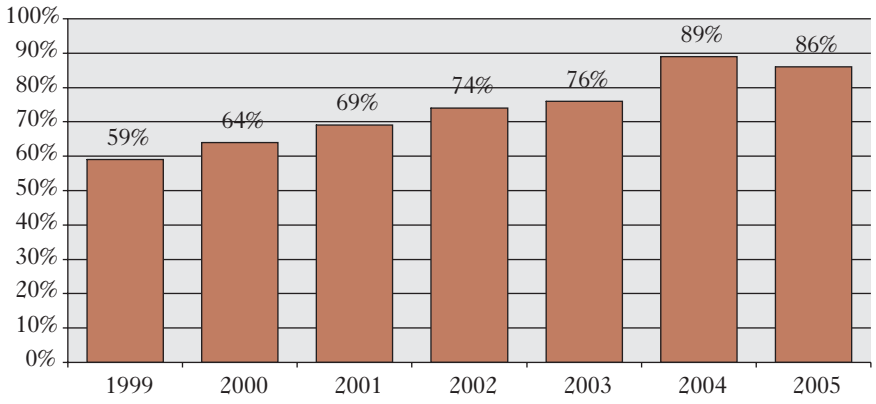
Located about 100 miles south of Sarasota, Gulf Elementary School serves more than 1,500 students in the Lee County School District: 73% Caucasian, 17% Hispanic, 6% multicultural, 3% African American, and 1% Asian. Twenty-one percent of the students qualify for free or reduced-price lunch, and 4% are English Language Learners (ELL). For more information about Gulf Elementary School, visit http://gfe.leeschools.net. ADI

Gulf Elementary School, Cape Coral, FL

About the School:	
Grades:	K-5
Number of Students:	1,577
Test(s):	FCAT
Reduced Price Lunch:	21%
About the Students:	
African American:	3%
Caucasian:	73%
Hispanic:	17%
Asian:	1%
Other:	6%
ELL:	4%

Figure 1

Percentage of Grade 4 Gulf Elementary Students Scoring At or Above Level 3 on FCAT Reading



SRA/MCGRAW-HILL

Success Stories

California Blue Ribbon School Closes Achievement Gap with Reading Mastery

The achievement gap between all students at Richfield Elementary School in Corning, CA, and those who are socioeconomically disadvantaged is closing, thanks in part to SRA/McGraw-Hill's Direct Instruction. By 2005, 41% of socioeconomically disadvantaged students in Grade 2 at Richfield scored proficient or advanced in reading and language arts on the California Standards Test (CST), up from 20% in 2001 (see Figure 1).

Richfield Elementary School teachers adopted *Reading Mastery* in Grades K-8 in the mid 1990s. They implemented two other Direct Instruction programs at that same time: *Language for Learning* in Grades K-2 and *Corrective Reading* for struggling readers in Grades 4-8. *Spelling Mastery* was incorporated into the curriculum in Grades K-6 in the late 1990s.

Since the Direct Instruction programs began, students' reading skills have improved school-wide, and more students now read at grade level. In fact, most students in Grades 6-8 have been placed in regular literature classes to prepare for rigorous English Language Arts standards on the CST.

In addition to watching students' reading skills improve, teachers have also watched the school's overall Academic Performance Index (API) increase. The state implemented the API in 1999 to measure student academic achievement in all public schools. Richfield Elementary School's API was 677 in 1999 and rose to 841 by 2005 (Figure 2).

Cindy Fralin, Direct Instruction coach, curriculum coordinator, and teacher, said the Grade 2 CST score dipped

slightly in 2005 because of an influx of students. "We only have one classroom at each grade level, so if a handful of children leave the school or are new to the school, test scores can vary a great deal. This, in turn, affects our API score, which also decreased slightly. However, we're still ranked number two in the county, and we're proud of our students' progress."

Fralin said Direct Instruction has helped many Richfield Elementary School students become life-long readers and learners.

"I'm a true believer and big advocate of Direct Instruction," she explained. "Its programs have made a very big difference among so many of our students, often turning them into avid readers. The Direct Instruction programs implemented in the lower grades ensure that our students are reading at grade level and are able to be successful in the upper grades. Our local high school reports that our students are well prepared for its curriculum."

State and National Recognition

The U.S. Department of Education named Richfield Elementary School a No Child Left Behind Blue Ribbon School in 2004. The Blue Ribbon School Program recognizes schools that make significant progress in closing the achievement gap or whose students achieve at very high levels. The school also received the Governor's Site Performance Award and the Governor's Reading Award in 2001 and has achieved Adequate Yearly Progress (AYP) every year it has been measured nationwide (2003-05).

About Richfield Elementary School

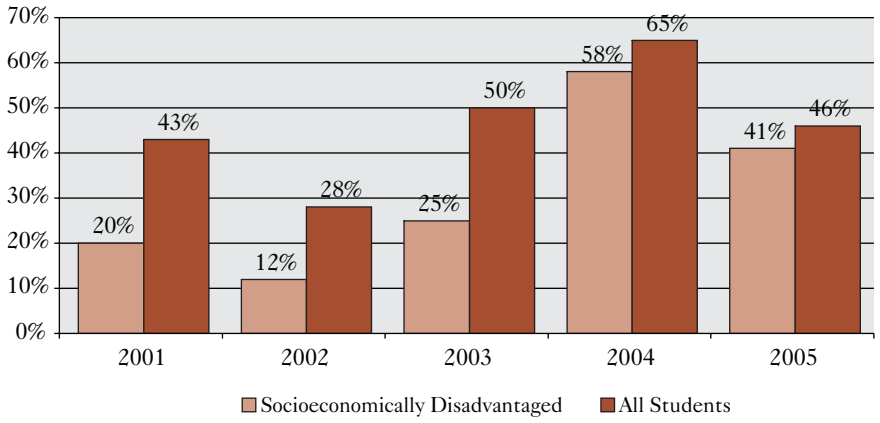
Located among rural orchards and small farms, this Title I school serves more than 200 students in Grades K-8 in the Tehama County School District. The student population is 63% Caucasian and 37% Hispanic. Forty-six percent of the children qualify for free or reduced-price lunch, and 28% have limited English proficiency (LEP). For more information about Richfield Elementary School, visit www.tcde. tehama.k12.ca.us/richfieldsd.html. ADI

Richfield Elementary School, Corning, CA

About the School:	
Grades:	K-8
Number of Students:	220
Test(s):	CST
Reduced Price Lunch:	46%
About the Students:	
African American:	—
Caucasian:	63%
Hispanic:	37%
Asian:	—
Other:	—
ELL:	28%

Figure 1

Percentage of Richfield Grade 2 Students Scoring Proficient or Advanced in Reading



Source: California Standards Test

Figure 2

Academic Performance Index at Richfield Elementary School