ADI NEWS

VOLUME 9, NUMBER 4 THE ASSOCIATION FOR DIRECT INSTRUCTION SUMMER, 1990

The **Direct Instruction News** is published Fall, Winter, Spring and Summer, and is distributed by mail to members of the Association for Direct Instruction. Membership and subscription information may be found on page 41 of this newsletter. Readers are invited to submit articles for publication relating to DI. Send contributions to: The Association for Direct Instruction, P.O. Box 10252, Eugene, Oregon, 97440.


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# The Only Theory of Instruction—Revisited

*Editors note:* *Theory of Instruction* has been out of print for nearly one year. ADI is contracting to publish it during the next four months. If you are interested in getting one or more copies, let ADI know of your interest and we will notify you when it is available.

by Bob Dixon

In 1983, Marty Siegel and I reviewed Engelmann and Carnine's sometimes infamous "Orange (or red) Book" *Theory of Instruction* for the *ADI News* (Spring, 1983). We concluded: "*Theory of Instruction*, in our most thoughtful opinion, should become a classic in the field of education." A bit later, Jere Brophy said of *Theory of Instruction*,"This is an ambitious, important book" (*Contemporary Psychology*, 1984, 29(8), pp. 622-4; reprinted in the Winter 1984-85 issue of the *ADI News*.) In retrospect, I judge those evaluation as understatements, a position I will elaborate on shortly.

The reaction to *Theory of Instruction* in the intervening years has been interesting. Outside of the Direct Instruction "circle of friends," there has been minimal detectable reaction. More intriguing, however, has been the reaction among supporters of Direct Instruction. At one ADI awards ceremony during the Eugene DI conference, one award recipient was introduced as "...someone who has actually read the orange [or red] book!" The implication, which I've detected elsewhere, is that people own this book, but don't read it—or at least not all of it.

I hasten to add that if owners of the book don't read it, that usually isn't for lack of trying. A question I hear frequently is, "How is it that Engelmann and Carnine can write programs that are so comprehensible for even very low children, but they can't write a book that's comprehensible for highly educated adults?" Well, both Engelmann and Carnine have proven that they can write quite clear books for adults. Consider this possibility: *Theory of Instruction* is perfectly clear for its intended audience, which raises the question, "Who is the intended audience?"

In order to answer that question, I have to take a deep breath as I publicly express an opinion of *Theory of Instruction* that could eventually prove me to be somewhat insightful or a raving lunatic: *Theory of Instruction* could easily be the most important educational book ever written, bar none. (Yes, I am aware of Aristotle and Dewey and Piaget and Skinner, etc.) If these are the musings of a lunatic, however, they are not simply based upon unbridled fanaticism. My argument, briefly, goes like this:

1. After all the chaff is blown away, instruction is at the core of education.

2. *Theory of Instruction* is a *theory*, in the sense that philosophers of science use the term "theory."

3. *Theory of Instruction* is the *only* theory of instruction.

4. When a field of human endeavor has been in a pre-science phase forever and its first theory appears, written down, that written theory becomes the most important document in that field to date.

If there is a terrible weakness in this argument, it is in the premises: principally, is *Theory of Instruction* a theory, and is it the only theory of instruction?

Obviously, I believe these premises to be true, but here I can give only the scantiest of indication why. First, Engelmann and Carnine's theory evolved the same way original natural science theories have evolved, through the scrupulous application of logical analysis to existing empirical observation. The Engelmann and Carnine theory possesses the most critical attributes of natural science theories: (1) it is *exhaustive*, in that it covers everything from the most basic motor skill instruction to the highest of the "higher order" thinking skills, and (2) it does so *economically*. (If another theory of instruction does emerge, it will be compared with the Engelmann and Carnine theory just on these points: exhaustiveness and economy, usually referred to collectively and *parsimony*.)

The most difficult aspect of the Engelmann and Carnine theory to communicate is that the entire theory builds logically from just two initial assumptions: that learners perceive qualities, and that they generalize upon the basis of *samenesses* of qualities. (This is not unlike the way Euclidian geometry dervies logically from a minimum of unproven and unprovable assumptions about points and lines.) One implication of this logical interdependence among the elements of the Engelmann and Carnine theory is that in *theory*

(used now in a different sense), we all are in a position to "reinvent" the theory from the ground up. If we accept Engelmann and Carnine's simple assumptions and if we were to employ rigorous logic to any instructional problem, then the instruction we would derive would fall within the constraints of the Engelmann and Carnine theory. We wouldn't come up with *the same instruction*, but rather, with instruction illustrative of the same principles. Neither Engelmann nor Carnine has ever claimed that there is only one way to do anything.

Think about that. Engelmann and Carnine don't look at the book when they develop instruction; the developed most of their instruction before they wrote their book. They haven't memorized various sequences from their own book, either. They simply (well, not so *simply*, really) apply their own theory to new content, and essentially recreate manifestations of their own theory. Put another way, one very good indication that Engelmann and Carnine are operating within the framework of a theory is that *they are constrained to adhere to their own theory.* One can only religiously conform to a theory that exists. It strikes me as absolutely fantastic that the published Direct Instruction programs—before or after the theory book—are consistent in terms of how examples of given types are ordered and sequenced. (Some variations exist due directly to refinements in the theory.) Absolutely no other published programs of any type demonstrate such consistency, at such a level of detail. Absolutely no other published programs have an underlying, consistent rationale for the examples they use and the order they use them in. None. Period. It's quite likely that few authors of published educational materials have ever given the slightest thought to the *fact* that when we change examples, we change the information that is communicated to the learner. (Most of the inconsistencies we do observe among the published Direct Instruction programs—different ways of numbering steps, wording changes from program to program, etc.—are unrelated to the Direct Instruction theory. They are basically production matters that are primarily influenced by experience.)

This notion of logical consistency has a more practical and compelling implication: the Engelmann and Carnine theory provides a basis for making predictions that can be tested. In the absence of a theory, experimentation is driven by random hypotheses based upon "plausible ideas." If such hypotheses prove to be false, little is gained, save the rejection of one of an infinite set of plausible (but wrong) ideas. If such hypotheses prove to be true, very little is *still* gained: there's an idea that shows some promise, but where does it fit? How does it relate to other ideas that show promise?. The current state-of-the-art in educational experimentation is characterized by this kind of tinkering with plausibility.

If a hypothesis generated by a theory proves false, on the other hand, not only is the hypothesis itself questionable, but because of the logical interconnectedness of the theory's components, the entire theory becomes questionable. But if a hypothesis is generated by a theory proves true, then the veracity of the entire theory is strengthened. Theory-based research is worth the time and effort, plausible idea-based theory isn't. When *Time* magazine charged that the longest running joke on most university campuses is the Education Department, this black humor tended to obfuscate the reason why so many non-education academics might feel that way; namely that conducting research in the absence of a theory might be funny, were it not for the unconscionable waste of money and human resources.

Any research on instruction can be interpreted in terms of Engelmann and Carnine's theory, regardless of how far afield that research may be from concerns and interests of "Direct Instruction People." For example, I recently read a cognitive study concerned with teaching students to prove that the three angles of any triangle add up to 180 degrees. The instruction in the experimental condition entailed endless activities in which students dabbled in discovering various properties of triangles, with the goal of the students "constructing knowledge" of triangles for themselves.

My interpretation of the effectiveness of the instruction was that the broad range of examples used contributed more to effect than all other factors combined. In addition, the *need* for students to dabble—measure over and over again was due to the fact that they hadn't been taught to measure individual angles in the first place. (If they had been, and if they could add, then they would have "constructed" quite quickly and efficiently that the three angles of *any* triangle always adds up to 180 degrees.) That study, in short, contributes to the validation of the Direct Instruction Theory, in spite of the fact that doing so was no doubt about the farthest thing from the researcher's mind.

Given my main premises—that *Theory of Instruction* is a theory, and is the only theory of instruction in existence—I can speculate on the questions raised

above. Why is the orange (red) book hard to read? In general, any written theory, in the presence of either no competing theory or no similar theory, will be hard to read. The reader will not possess a frame of reference necessary for easy comprehension. That's one way of characterizing the purpose of a theory: to create a new frame of reference. Newtons *Principia*, Lavoisier's *Chemistry*, and similar works were no one's leisure reading when they first appeared.

Engelmann and Carnine's *Theory of Instruction* is as clear as it can be for the intended audience: principally, Engelmann and Carnine. Imagine carrying around in your head a theory that exhaustive, that economical, on a subject that complex. My conjecture is that a crucial stage in the development of a theory is for the theory to be written down, first and foremost for the benefit of the theorist(s), and then only secondarily for any of the rest of us who might be interested.

Speaking for myself—someone loosely reputed to have some understanding of *Theory of Instruction*—I enjoy the misconception that any understanding I have is evidence of unusual intelligence, but the fact is, I had the frame of reference for reading the book literally (almost) pounded into me before I ever read the book. The people I admire the most are those who have kept reading and reading the book until the proper frame of reference began to emerge for them, at which time comprehension no doubt increased dramatically.

I've held this opinion of *Theory of Instruction* for some time, but by and large, I've kept it to myself, probably out of the fear that most would interpret it as lunacy. But the unbridled lunacy of education in the 1990's dissipates any fears I may have of that. Children—even including low-performing children—are supposed to rediscover and construct for themselves mathematical truths originally articulated by geniuses. Start with story problems and the learning of computation will will take care of itself. Start with wonderful stories and reading (and spelling and writing) will take care of themselves. Mix all subjects in a hodge-podge of activity centered around a single theme and—something—will take care of itself. Lunacy. Who cares if someone thinks I'm nuts?

When I was a kid in school, learning about scientific developments, such as the switch from Ptolemiac to Copernican astronomy, I'd wonder how the believers in geocentrism could have been so foolish to persist in their belief. Now, in 1990, while education is in the midst of being swept over by perhaps the greatest wave of soft-headedness ever, I finally understand. Those predisposed to Direct Instruction find *Theory of Instruction* challenging, but those whose frame of reference includes beliefs in a mysterious learner, spurious learning, and a limitless, mystifying plethora of instructional gadgetry, cannot comprehend even the general notion of a theory of instruction. They are neither stupid or poorly motivated. The are simply . . . unprepared, not unlike the majority who, through the ages, have by fortune been unprepared to recognize a viable theory when it first appeared. ◆

# The Effectiveness of Direct Instruction in a Third-World Context

by Bonnie Grossen
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Direct Instruction (DI), as developed by Engelmann-Becker at the University of Oregon in America, may have much to offer third-world education. Difficult third-world problems include under-qualified teachers in over-crowded classrooms and often a mother tongue with little or no written tradition. Manuals with scripted wording, such as DI provides, may be particularly advantageous with less qualified teachers, especially those who must teach in a non-native language. Material-specific teacher training with scripted DI teaching manuals may require less teacher-training time than other general training programs require to produce noticeable improvements in pupil performance.

Research has demonstrated that the DI curriculum evaluated in the following report is effective in American settings. In the largest educational study ever funded by the United States Government, the University of Oregon DI curriculum was found to result in higher achievement for disadvantaged children than eight other widely acclaimed methods (Abt Associates, 1977). The DI curriculum (SRA, 1987, 1988, 1990) emphasizes small-group face-to-face instruction by a teacher using carefully sequenced, daily lessons in reading, arithmetic, and language. To achieve efficient teaching, the teacher needs only to concentrate on effective presentation techniques using the scripted program materials.

The purpose of the current study was to test the effectiveness of this DI curriculum in the Black homeland of Gazankulu in South Africa. The educational problems in the homelands are comparable to those of many third-world settings. In Gazankulu the mother tongue of the pupils and teachers is Tsonga, a language with no written tradition. After the first four years of instruction, the medium of instruction is mandated as English. Of the students who reach the twelfth grade and take the state examinations that are required for a certificate of school completion, only 65% of the Black students pass in South Africa (Kunstel, 1990). The level of education is so poor that standards have been lowered to reduce failure rates. According to Kunstel (1990) students who pass the twelfth grade and come to teacher-training colleges barely speak and understand English. Teachers who attain their teaching diplomas are still poorly qualified by the standards of most countries, and the majority of teachers in the schools have not acquired even these teaching diplomas.

B.F. Kelly and Bonnie Grossen

The schools in Gazankulu are noted for their lack of educational materials and resources and for their large class sizes, ranging up to 120 pupils per teacher. Pupils rarely have textbooks. They also often have no pencils, papers, desks, or chairs. Classroom shortages result in classes often being held under trees with children seated on stones or on the ground.

A significant aspect of the solution to the problem in South Africa is to provide better funding. However, simply increasing funding to solve educational problems has not been effective in producing improved pupil achievement (Purkey & Smith, 1983). The school variables and classroom instruction must change before education can become more effective (Heyneman & Loxley, 1983). The need to improve efficiency and control costs is a very pressing one in developing countries (Tsang, 1988). Providing teachers with scripted manuals and material-specific training in managing oral instruction could potentially be very cost-effective. If a teacher can be made effective in a deprived environment, she will be no less effective in a better-equipped teaching environment.

The present research is part of a larger plan to determine whether DI can be effective in the deprived settings found in the third world. By evaluating the

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implementation of the unmodified American curriculum in one or two cases, we can assess its potential effectiveness and determine possible modifications to make it more suitable for the new population. Only after finding the components for success in one or two cases, can we justify the expense and energy required to implement the curriculum and begin to develop systems for replicating that success on a wider scale. This paper presents the research on the effectiveness of two Black teachers using the unmodified DI manuals from America in the large-group settings of Gazankulu, the first phase of our overall plan. We began this phase by implementing the DI curriculum for mathematics, English language, and English reading with the first grade teacher in an experimental school. The following year we implemented the DI curriculum with the second grade teacher, while the first grade teacher used the DI curriculum with a new group of pupils. The following results were gathered while the first group of DI pupils was in the second grade. The report of the method and the results of these studies is preceded by a description of the critical differences between DI and more traditional forms of instruction used in Gazankulu.

### Description of Critical Differences in Instruction

DI differs from traditional methods used in Black education in South Africa in several critical ways. First, the DI manuals script everything the teachers say and do. Providing a script to guide the teacher's phrasing and sequencing of instruction facilitates better teaching by underqualified teachers who are not completely proficient in English.

Second, the organization of the instruction is different. The DI method organizes the content into overlapping topics, that continue across many days and weeks and converge in more complex activities at various points. Traditional Black education, especially as prescribed in the official educational guidelines, organizes the content into weekly topics, where one small area of content is studied, then dropped as the class proceeds on to the next topic. The provision of the DI approach for continuous, cumulative review and the integration of content into more complex activities through the overlapping of topics was expected to contribute significantly to overall learning.

Third, the group responses in DI are qualitatively different from the choral repetition often seen in Black schools. A high percentage of the DI group-response questions require discrimination rather than a mere repetition of what the teacher just said. For example, in teaching the preposition on, the DI teacher will show the pupils a pencil *on* the table, *over* the table, *under* the table, and ask them "Is the pencil on the table?" After the pupils have learned several prepositions, the teacher might show a similar range of examples and ask the pupils "Where is the pencil?" In the traditional classroom, the pupils memorize through repetition songs and poems with prepositions in them. The pupils might act out the songs and poems, but no particular focus would be given to the meaning of specific words like on. (The teachers often translate the meaning of the song or poem as a whole; however, many words, such as prepositions, do not occur in Tsonga.)

Fourth, the criterion for performance on any specific activity is much higher in DI. In DI pupils practice a discrimination activity until they perform it successfully before the teacher proceeds to the next instructional task. When errors occur within the whole group response, the teacher makes the correction immediately, by repeating the question and then the whole discrimination activity. For example, the pupils continue to tell if the pencil is on the table or not, until they are consistently getting the answer correct as a whole group before the teacher calls on individuals. The teacher also repeats the discrimination activity periodically until pupils get the answers correct the first time the questions are presented. In the traditional classroom, an individual may make an error, and the teacher may make the correction, but rarely is the pupil asked to do the task again correctly before new instruction continues. It is even more unlikely that the whole class would ever be asked to repeat a task after one individual performed incorrectly, as would happen in the DI method.

## Study 1

### Method

*Subjects.* This first evaluation took place after the experimental pupils had completed one year of DI in the first grade and were beginning the second grade with a new DI teacher. We compared their performance with the third grade pupils in the same school. Besides having the same school and community environment, both the experimental group and the control group had had the same teacher in the first grade. The only differences were that the experimental subjects had that first-grade teacher after she began using the DI manuals, while the control subjects had her before she used DI and they also had the advantage of an additional year of instruction from another non-DI teacher. To gauge if the third grade control group was representative of the educational level of pupils in other Black schools, a sample of third graders from another school was included in the comparison as a second control group.

*Procedures.* The DI teachers and the control teachers were Black teachers who had been assigned to teach the classes from the beginning of the year. The DI teachers received on-site training in DI presentation

techniques, which included seeing models and receiving feedback regarding their own class presentation. Most of the feedback centered on getting the teacher to pace the questions quickly, to listen to a group response for errors, to correct the errors when they occurred, and to make corrections to the whole group by having the group repeat the question-answer sequence provided by the DI manuals. Teachers were monitored on a weekly basis to be sure they were implementing the method appropriately. During this monitoring they were told of errors they were making in the application of the method and told how to change their teaching. The most difficult teaching behavior to obtain was that of requiring the pupils to repeat the learning task until no errors occurred in the whole-group response. On the whole, the teachers learned the presentation techniques quite easily.

The DI English language and English reading programs were used by the teachers as they were designed to be used with disadvantaged American children. The DI teacher began using the English *language* program at the beginning of the first grade. However, she taught Tsonga reading for the first half of the year, and only began teaching English *reading* in the fifth month. The DI arithmetic program was for the most part translated by the teacher and presented to the children in Tsonga. However, whenever the children had the prerequisite English vocabulary (e.g, the numbers), or when a term was used repeatedly (e.g., "plus"), the teacher and the pupils used English.

The traditional curriculum requires pupils to learn arithmetic and Tsonga reading in the first grade. Only in the second grade do they begin to learn to speak and read English.

*Measures.* Three tests covering the mathematics, English language, and English reading content that is prescribed in the official syllabi for Black education for second grade were administered to the three groups of pupils. These syllabi (from the Department of Education and Training) guide the instruction of all of the schools in Gazankulu. Pupils beginning second grade, as the DI pupils were, would normally not be expected to already know the material prescribed for that level, while the pupils beginning the third grade would be expected to be proficient in the second-grade material.

Instructions for the test were given in Tsonga by their teacher. The test itself was administered by a native English speaker. The reading test (coefficient alpha = .81)[1] asked pupils to identify the letter that made the sound spoken by the test administrator, and to match five written words with pictures (*desk, dog, tree, fish,* and *hand*). Individually pupils were asked to read the words *fat* and *with.*

The English language test (coefficient alpha = .85) asked pupils to indicate five body parts named by the test administrator and to indicate the pictures that matched aural sentences which required them to know the words *in, over, on, in front of, full, empty, cup,* and *box.* Individually pupils were asked to name the days of the week, and to answer the questions, "What are you doing?" "What am I doing?" "What are we doing?" and "What is the boy doing?"

The Mathematics test (coefficient alpha = .83) asked pupils to write numbers representing groups of lines, to work single- and double-digit addition and subtraction problems, as well as to fill in a missing addend. They also had to write numbers from 1 to 10, identify the second tree in a row of trees, and indicate a <, >, or = relationship between two numbers. Individually pupils were asked to count orally to 41.

### Results

The DI second graders scored significantly higher than the non-DI third graders in the same school on all three tests. They also scored significantly higher than the third graders from a different school on the English language and English reading tests, but not on the mathematics test. There were no significant differences between the two third-grade groups on any test. Figure 1 graphically illustrates these results as the average percent correct.

These results were obtained by evaluating the differences between the means for the three groups on the three tests (displayed in Table 1) using a 3 x 3 analysis of variance (ANOVA). The between-subjects factor was the treatment group (DI second grade, non-DI third grade in the same school, non-DI third grade in a different school). The within-subjects factor was the type of test (English language, reading, and mathematics). A significant interaction was found, indicating that performance of the three groups varied significantly as a function of the type of test. The effects for each type of test were consequently evaluated in three one-way ANOVAs. Differences between groups were significant on all three tests (language, $F(2,88) = 96$, $p < .00005$[2]; reading, $F(2,88) = 15$, $p < .00005$; mathemat-

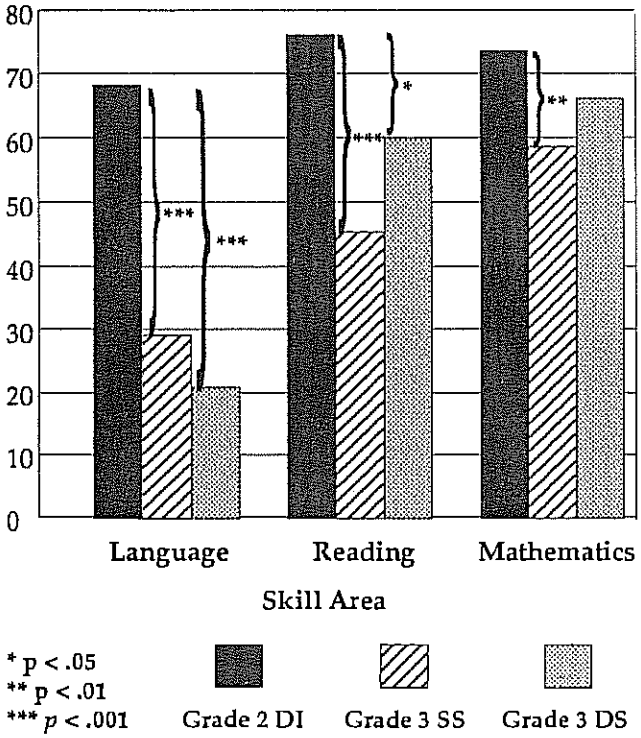
[1]Cronbach's coefficient alpha is a measure of the internal consistency reliability of the test. Alphas of at least .7 are desirable on tests used in educational research.

[2]$p$ is the probability that the differences could have occurred by chance. A $p < .00005$ means that the probability that this difference occurred by chance is less than 5 in 100,000. Probabilities greater than .05 are not considered significant. Probabilities less than .001 are considered highly significant.

Table 1. Average number correct and standard deviations for the DI second grade group and the two non-DI third grade groups on the English language, English reading, and mathematics tests.

| Group | Number of pupils | Language Mean | Language SD | Reading Mean | Reading SD | Mathematics Mean | Mathematics SD |
|---|---|---|---|---|---|---|---|
| DI Second graders | 37 | 20.4 | 4.1 | 17.0 | 3.3 | 18.9 | 4.1 |
| Third graders same school | 34 | 8.6 | 4.4 | 10.2 | 6.2 | 15.3 | 4.9 |
| Third graders different school | 20 | 6.2 | 4.1 | 13.2 | 6.5 | 17.2 | 5.5 |

Figure 1. Average percent correct for the DI second graders, non-third graders in the same school (SS), and non-DI third graders in a different school (DS) on English language, English reading, and mathematics.




ics, $F(2,88) = 5, p < .01$). Bonferroni t tests of the pairwise differences between the means indicated that the DI second graders scored significantly higher than the non-DI third graders in the same school on all three tests (language, $t(88) = 3.15, p < .001$; reading, $t(88) = 5.43$, $p < .001$; mathematics, $t(88) = 3.15, p < .01$). The DI second graders also scored significantly higher than the third graders from a different school on the language ($t(88) = 11.4, p < .001$) and on the reading tests ($t(88) = 2.64, p < .05$).

The DI instructional materials and training resulted in significantly better teaching for the first grade teacher in the experimental school, as seen by the better performance of the second-graders who had her as a DI teacher when compared with a class of third-graders who had her before she began using DI. There was no indication that her teaching skills were different from those of other teachers in Gazankulu as indicated by the similar performance of her former pupils in the third grade and the sample of third graders from another school.

During testing, the third-grade pupils (non-DI) frequently responded to the oral English questions by repeating what the tester said rather than answering the tester's question. All subjects were given three tries before it was concluded that they could not answer the question. The third-grade pupils typically could not answer the questions at all, even after three trials. Differences were less dramatic for reading. Pupil proficiency in Tsonga reading could have affected their scores for English reading. Some of the questions on the reading test would be answered the same, whether the pupils had learned to read in Tsonga or in English. The pictures may have also provided clues for some pupils.

Pupils in all groups correctly derived the answers for many of the mathematics problems. However, the strategies they used to solve the mathematics problems differed between the DI pupils and the non-DI pupils. Non-DI pupils solved double-digit addition and subtraction problems by counting their fingers and toes or by drawing lines. An excessive amount of time was required to count fingers and toes to numbers approaching 100. DI pupils used the more efficient strategy of working each column in the double-digit problems.

## Study 2

We did a second study when the DI pupils were finishing the second grade. This time we included a comparison with instruction delivered by a well-qualified teacher fluent in English to Tsonga-speaking children in classrooms with smaller class sizes and with more educational resources.

### Method

*Subjects.* The same group of DI pupils who were now finishing the second grade was compared with a

class of Tsonga-speaking children in the second grade of a multiracial school, and with a sample of children from a second-grade class taught by a Black teacher with no DI training or materials. The children in all three groups lived in the same homeland with Tsonga as their mother tongue. The children in the multiracial school (MR) were taught by a teacher whose mother tongue was English, who had been educated in the white system of South Africa, and who had graduated from an English-speaking University. The MR class size was smaller; the 17 Tsonga-speaking children learned alongside 2 Afrikaans/English-speaking children. The teacher made use of commercial instructional programs, and of the abundant educational resources at her disposal in the new school located in the homeland. The school had only been in existence for one year, so all of the children in the second grade had had the benefit of the multiracial environment for one entire year.

The DI pupils had been taught by now by two Black teachers who, as most teachers in Gazankulu, had been educated in the Black homeland system. The class size of the DI group ranged from 45 to 55 during their two years in school. Of 17 newcomers who entered the DI class at the beginning of second grade, several were demoted to the first grade after four months, because they simply could not catch up. Eight newcomers remained in the DI second grade and were included in the data for this study. The only materials the DI teachers used for the subjects of English and mathematics were the DI manuals for English language, English reading, and mathematics.

A sample of 12 subjects randomly selected from a regular Black second-grade class served as a control group. These children were taught in a class of 53 pupils by a Black teacher who had no DI curriculum or training. For English language and reading instruction this teacher used a manual and textbooks applying the "communicative approach" to English language instruction.

*Measures.* Tests were developed to assess mathematics and English language and reading skills. The 41-item mathematics test (coefficient alpha = .93) included a timed addition facts subtest to be completed in one minute, 2 single-digit addition problems, 2 single-digit subtraction problems, 2 single-digit missing addend problems, 2 three-number single-digit addition problems, and 2 double-digit addition problems with no carrying. It also required pupils to divide circles into pieces to represent simple fractions (2/3, 4/4, 3/2), to indicate a <, >, or = relationship between four pairs of numbers less than 100, and to write and solve equations for four story problems in English, such as "Bill had 6 toys; he lost 4 toys; how many toys does he have now?" (The story problems were not translated into Tsonga.)

The verbal test had two parts, receptive and expressive language. Instructions for the test were given in the children's first language and practiced on several examples until all children demonstrated that they understood the directions. The 24-item receptive test (coefficient alpha = .88) had two pictures. The first picture showed three different cats, one sleeping on a couch, one eating, and one playing with a ball. The children heard statements describing one of the cat's activities, appearance, or position, and were required to write the letter of the described cat on the line. The second picture showed various animals in a barnyard. The children heard the name of an animal and numbered it as directed. Pupils also had to circle or cross out to demonstrate discrimination of singulars and plurals. The 10-item expressive test (coefficient alpha = .72) required pupils to respond to a series of commands, such as "hold your hand behind your head" and answer questions about what they "are doing" and what they "were doing."

The reading comprehension test (coefficient alpha = .82) required pupils to indicate that they understood a statement they had read (e.g., a little bug sat on a big dog) by correctly answering questions about the statement. Word recognition scores were also calculated for oral reading.

## Results

The DI group of children scored much higher than the children in the multiracial environment on the mathematics test. However, the multiracial group scored higher than the DI group on the receptive English language test. There were no significant differences in the performance of these two groups on the expressive English language test and on the two reading measures (comprehension and word recognition). The control group scored significantly lower than both groups on all 5 tests. Figure 2 graphically displays the scores as the average percent correct.

The differences in the performance of the three groups on the mathematics and English language and reading skills tests were evaluated using a 3 x 5 repeated measures analysis of variance (ANOVA) carried out on the means displayed in Table 2. The interaction was significant. Consequently, the pairwise differences on each test were analyzed using Bonferroni *t* tests ($df = 68$). The mean of the DI group on the mathematics test was significantly higher than the

**Figure 2. Average percent correct for the DI pupils taught by Black teachers, the MR pupils taught by an English-speaking teacher, and Control pupils taught by a Black teacher without DI training or materials on tests of mathematics, English receptive and expressive language, and English reading comprehension and word recognition.**

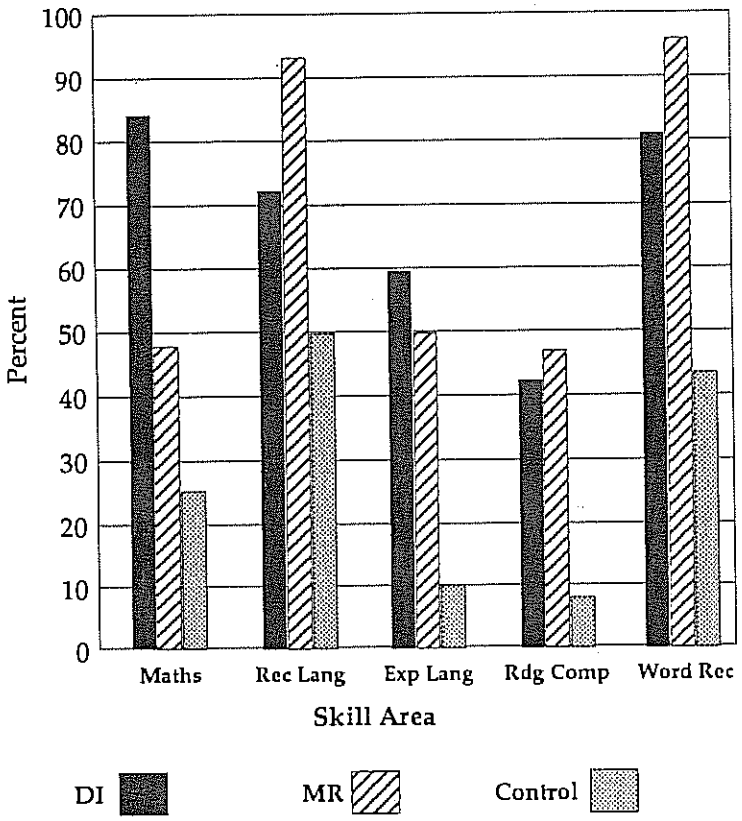



**Table 2. Mean percent correct and standard deviations of the Direct Instruction group of pupils (N = 42), the pupils in a multiracial classroom (N = 17), and pupils in a regular Black classroom (N = 12).**

| | Direct Instruction | | Multiracial | | Control | |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD |
| Mathematics | 86 | 11 | 47 | 16 | 26 | 11 |
| Receptive language | 73 | 16 | 93 | 5 | 49 | 21 |
| Expressive language | 59 | 21 | 49 | 26 | 10 | 7 |
| Reading comprehension | 42 | 19 | 47 | 23 | 7 | 11 |
| Word recognition | 81 | 22 | 95 | 8 | 45 | 28 |

mean of the MR group; $t = 10.9, p < .00005$. The MR group scored significantly higher than the DI group only on the receptive English language test; $t = 4.63$, $p < .00005$. On the other tests there were no differences between the DI and MR groups. The control group scored lower than the DI group on all five tests ($p < .00005$): mathematics, $t = 14.6$; receptive language, $t = 4.7$; expressive language, $t = 7.2$; reading comprehension, $t = 5.5$; word recognition, $t = 5.4$.

## Study 3

### Method

*Subjects.* The mathematics and English performance of the above DI and MR groups along with the entire class of 53 children in the control group was compared with two additional groups of second-grade children. The additional two groups were as follows:

The *privileged* group was a class of English-speaking second graders with an English-speaking teacher in an urban school in South Africa. The children came from advantaged families, attended a school with abundant resources and small class sizes, and had a well-trained teacher whose first language was the same as the children she taught.

The *further training* group was a Gazankulu second-grade class with a Black teacher who did not use the DI curriculum. However, she had participated in an afternoon inservice program for further teacher training over the past two years. The training occurred during three afternoons a week and included instruction in all of the curriculum areas, including mathematics and English. In that training she had received some instruction on DI presentation skills and had seen some examples of instruction, but had not been given any DI manuals to use in her classroom.

*Measures.* For these additional comparisons only the receptive language subscale of the verbal test from Study 2 was administered, as well as the same mathematics test from Study 2.

### Results

The DI pupils taught by Black teachers outperformed even the privileged group of second-graders taught in the urban English school on the mathematics test. In turn, the privileged group scored significantly higher than the children in the multiracial school, where the Tsonga-speaking children learned

Table 3. Means and standard deviations for the five second grade groups on the receptive test of English and on the mathematics test.

| | | Mathematics | | English Verbal | |
|---|---|---|---|---|---|
| Group | N | Mean | SD | Mean | SD |
| DI | 42 | 35.4 | 4.6 | 17.4 | 3.8 |
| MR | 17 | 19.2 | 6.6 | 22.2 | 1.1 |
| Privileged | 29 | 30.3 | 4.2 | 22.9 | 7 |
| Further training | 48 | 13.3 | 5.1 | 12.0 | 4.4 |
| Communicative | 53 | 12.9 | 4.4 | 12.8 | 4.3 |

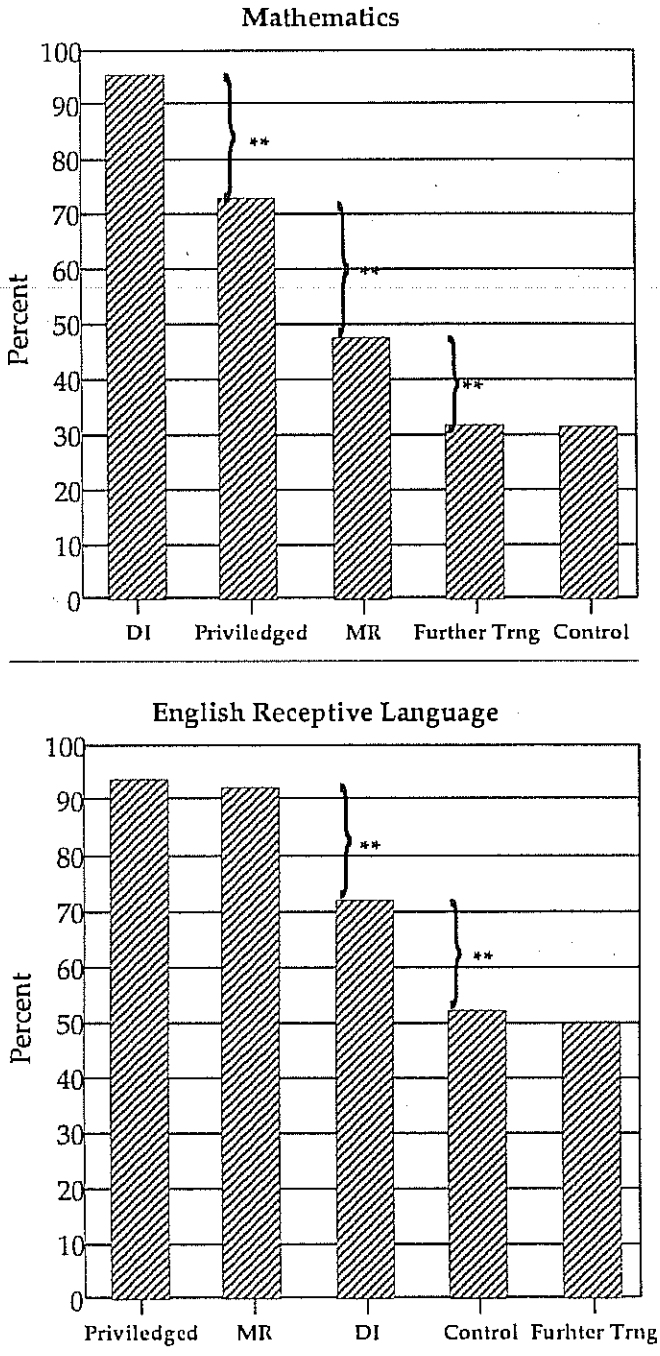
mathematics from an English- speaking teacher. Furthermore, these children in the multiracial school performed better than the children in the two other Gazankulu classrooms.

On the receptive English language test, the DI group did not score as high as the privileged or multiracial groups, but did significantly outperform the other two groups of children from Gazankulu classrooms. Figure 3 graphically displays these results as the average percent correct for each group. The scores are presented in descending order with significant intervals between the means indicated with asterisks. Table 3 summarizes the means and standard deviations used in the statistical analysis of the performance of the five groups.

## Discussion

It is possible for DI to significantly improve the effectiveness of an average Black teacher with a poor educational background. The first study demonstrated that one Black teacher's performance could be significantly improved through the use of the DI curriculum. The second study showed this success maintained as the pupils received instruction from a second DI teacher. The performance of the experimental DI pupils is impressive and well exceeds that of other pupils taught by Black teachers in Gazankulu in the areas of mathematics and English. Not only the test results attest to this fact. The parents and teachers of the DI children note that these children have more skills than their older siblings. Visitors observing the class test their initial disbelief by asking questions directly to pupils to check if the pupils understand what they are doing, and find that they do. The principals of neighbouring schools are begging that their schools also become project schools.

Figure 3. Average percent correct of the five groups on the mathematics test and the test of receptive English language skills.




** Significant at a $p < .01$ level using Tukey tests with Cramer adjustment for unequal sample sizes.

The pupils taught by Gazankulu teachers using the DI curriculum also performed competitively with children from other settings with more resources and where pupils were from more advantaged backgrounds. Their performance on the mathematics test not only exceeded that of Tsonga-speaking children in a multiracial school, but also significantly exceeded that of privileged English-speaking children in an urban school.

The expressive English language skills of the pupils taught by Gazankulu DI teachers seemed equivalent to those of other Tsonga-speaking children taught by the English-speaking teacher in the multiracial setting. Repetition is included in the DI curriculum as a component of learning to express oneself in English. In the multiracial classroom, the pupils are more often expected to demonstrate understanding, and rarely are given practice in simply repeating useful English expressions until they feel confident in using them.

The DI pupils were not able to match the pupils in the multiracial school on the test of receptive English comprehension, although they did significantly exceed the performance of other Gazankulu children. The DI language curriculum was designed for American children whose mother tongue is English, but who have language-based learning problems. For this reason the programming in the language curriculum may not be the most appropriate programming for Gazankulu children. Many concepts taught in the program seem to be overpracticed, while other vocabulary words are not systematically taught. Also several American usages are inappropriate. For example, mad does not mean angry in the English language community of South Africa. With appropriate changes in the language programming we believe better results might be achieved in English language skills than those found in this study.

## Implications

The encouraging implication of this study is that replication of the DI success is much more feasible, than is replication of the other alternatives. The wide provision for multiracial classrooms, well-educated teachers fluent in English, or abundant educational materials would require time, in addition to massive structural changes in the society. Even in the light of promising political reforms in South Africa, the time it takes to raise the educational standards of the teachers and to develop funding sources makes the likelihood of immediate wide-spread educational impact remote.

Replication of the DI success is feasible, but an efficient system for achieving replication of the success must be developed. Some low-cost alternatives have been tried. The DI manuals were reduced to abbreviated forms. In one four-day workshop 92 teachers were introduced to the methodology, given the abbreviated manuals, and provided opportunities to practice the teaching formats (scripts for teaching a certain type of skill such as naming objects, or adding). In classroom follow-up, the teachers' success in using the presentation techniques was randomly checked. Individual feedback was given at the site and video tapes were made of their teaching. In two follow-up sessions the video tapes were used to give general correction feedback to all trainees on the basis of the random field observations. With this training method the teachers seemed to master the presentation techniques rather quickly.

The training time required to make Black teachers competent in the DI presentation techniques seems very minimal. However, the abbreviated manuals did not seem to result in adequately sequenced lessons in many cases. The teachers did not often generalize the learning activities to other topics, but generally remained centered on the topics for the types of formats practiced in the training. It seems that either the training will have to be more extensive and/or the manuals will have to be more complete. With more extensive manuals the above 4-day training program with follow-up sessions would probably be sufficient to have a significant and immediate educational impact. Testing the variables of teacher training to develop an efficient system for replicating DI effectiveness should be the focus of further studies.

The DI curriculum is not incompatible with multiracial environments, well-educated teachers, and abundant educational materials. The favorable results attained by the DI pupils taught by teachers educated in Gazankulu should not discourage funding of additional multiracial schools, of better educated teachers, or of more educational materials in Gazankulu. All of these factors can only improve the quality of education in Gazankulu and in the third-world. However, an affordable system for rural areas of Africa, and one that can effectively make immediate use of the personnel already available in those areas is Direct Instruction. ◆

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# Review of a Book Summary

## Beginning to Read:

## Thinking and Learning about Print

**Authored by Marilyn Jager Adams**
**MIT Press, 1988, 480 pages**

### A Summary

**Prepared by Steven A. Stahl, Jean Osborn, & Fran Lehr**
**Center for the Study of Reading The Reading Research and Education Center**
**University of Illinois at Urbana-Champaign, 1990**

**Reviewed by Wes Becker**

This is a complex assignment—the review of a summary of a technical book on reading. The summary was written so that those in the field of education who are on the firing line, might appreciate what Marilyn Adams has to say from her extensive scholarly efforts. This review is written so that those on the firing line in education might want to purchase the *Summary* or the book *Beginning to Read: Thinking and Learning about Print.*

The *Summary* may be purchased for $5.00 from:
University of Illinois
Summary
P.O. Box 2276—Station A
Champaign, Illinois 61825-2276

Beginning to Read: Thinking and Learning about Print may be purchased for $29.95 (plus $2.75 postage) from:

The MIT Press
55 Hayward Street
Cambridge, MA 02142

In many ways, this book is an updated compliment to Jeanne S. Chall's Learning to Read: The Great Debate (1967, 1983).* In reviews of the research on teaching reading, it has become very clear that approaches to beginning reading which take a systematic phonics approach, while not neglecting progressions to whole word reading and comprehension skills, are most effective.

While reasserting these findings, a main theme of Adams' book is "So why the dispute?" From her review, it would appear that "Whole Language people" often see phonics as a necessary "support" skill and that "Phonics people" do not ignore the importance of reading comprehension skills. The raging controversy must be more a point of emphasis than one of exclusion of the other view. Adams argues very effectively that we are dealing with interdependent skills and we should end the debate and get on with the effective teaching of reading.

Good program design must recognize how the many skills that are important to the goal of reading comprehension (and related writing skills) fit together. It begins with the phonological understanding of oral language, which is then tied to orthographic characters of printed letters and words. This tying together is accomplished by phonics instruction in most cases. Written words, which are "heard" through an inner or spoken voice in the process of phonic decoding, are given meaning through being tied to oral language comprehension. Thus, phonic decoding is seen as a very essential preskill to reading comprehension. (This is not to deny that there are many other components to developing adult reading comprehension skills.) For comprehension to come into full play in reading activities, it is very essential that decoding skills become so well-practiced that they become *automatic*, meaning that they can occur without attending to the decoding process. Attention can then be fully devoted to comprehension activities.

Comprehension involves not only accessing word meanings, but accessing the right meanings given the context. Behaviorist would talk of this latter phenomena as the learning of conditional discriminations. The word *look* in the context of *at* has a meaning of "pointing eyes toward a certain object." The word *look* in the context of *up* and in the context of *sky* has a meaning of "pointing the eyes upward," while *look up* in the context of *dictionary* has a meaning of "finding a definition or spelling in a dictionary." Adams discusses context skills in terms of a separate processing activity in the brain. Context skills might better be considered additional discriminations to be learned.

It is with Adams' choice of language (or model) to describe the reading process that I have the most trouble with her account of reading. Adams presents a model of reading in terms of the four processors shown in Figure 1. These four processors are seen to be integrated in learning reading comprehension. But

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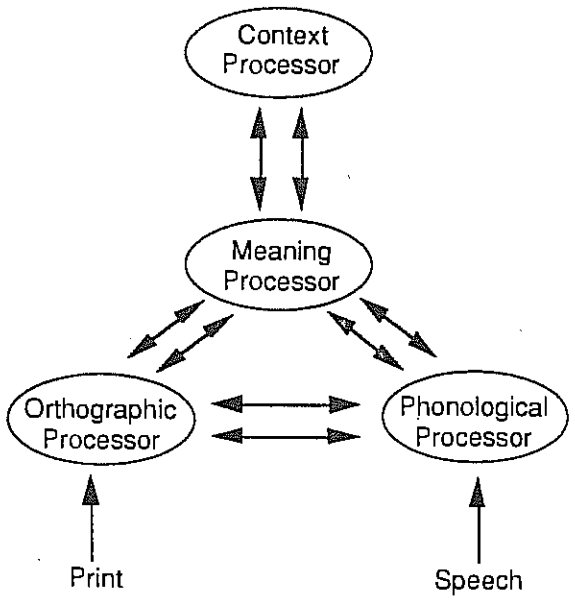
** Articles by Jeanne S. Chall on reading can be found in the Spring, 1989 issue of ADI NEWS and in the Winter, 1990 issue.*

**Figure 1. Modeling the Reading System: Four Processors**




the teacher doesn't deal with children's "processors" but with their responses to print. The teacher has to deal with the discriminations children can make or cannot make to speech sounds, to printed letters or words, and to the environmental *referents* of words (meanings), given the context. Her theory could be objectified by stating the observable conditions under which observable responses need to occur. Such a statement would be more helpful to teachers.

Consider the context processor in Adams' model. "The context processor is in charge of constructing a coherent on-going interpretation of the text. In particular, it is responsible for selecting word meanings appropriate for the text. This is important not just for blatantly ambiguous words (such as soccer *ball* versus inaugural *ball*) but to a lesser extent for almost any word. . . . The context processor works by sending its own stimulation to the meanings it expects. This extra stimulation boosts the contextually appropriate dimensions of a word's meaning, causing them to dominate the reader's interpretation of the text" (Stahl, Osborn, and Lehr, 1990, pp. 2627). It should be apparent that the *causes* for appropriate discriminations have been placed inside of a "little man" inside the head who tells the reader what to do. Suppose the reader fails to discriminate *soccer ball* from *inaugural ball*. This account fails to tell the teacher that specific stimuli in the text control the referent of ball differentially in each case. There is really no need to put the causes inside of the head, when the controlling stimuli are in the text.

Putting aside the author's attempt to integrate the research findings within the information-processing model of cognitive psychology, her basic analysis of the research and their implications for teaching are sound and frankly support the decisions Siegfried Engelmann made in designing *DISTAR Reading I* in 1967 and in his the subsequent work that led to the *Mastery Reading* programs.

I end this review by quoting the conclusions presented in the Summary by Stahl, Osborn, and Lehr (pp. 123-127). They succinctly capture the essence of Adams' review important for teachers.

**Predictors of Reading Acquisition**

- Performance on perceptual tests that do not involve linguistic skills or facility with print does not appear to relate to reading success.
- Letter recognition skills are strong predictors of reading success. It is not simply the accuracy with which children can name letters that gives them an advantage in learning to read, it is their basic familiarity with the letters—though this is typically reflected in the ease with which they can name them.
- Awareness that spoken language is composed of phonemes is an extremely important predictor of success in learning to read.
- Children's general awareness of the nature and functions of print is a strong index of their readiness to learn to read.

**Before Formal Instruction Begins**

- The single most important activity for building the knowledge and skills eventually required for reading appears to be reading aloud to children regularly and interactively.
- Children learn a great deal about both the nature and function of print through thoughtful interactions with adults.
- Language experience activities and the use of big books are excellent means of establishing print awareness (although they are less useful as primary vehicles for reading instruction itself).
- Children recognize a variety of environmental print that they encounter day to day, but environmental print does not seem to contribute to reading success unless a child has first begun to learn about the individual letters.
- Learning to recognize and discriminate the shapes of letters is a difficult process requiring support and encouragement. Ideally, letter knowledge should be well established before children reach first grade.
- Among preschool children in the United States who learn about letters at home, it is typically the names of the letters that are learned first, often through the alphabet song. Learning about their shapes comes later, and their sounds, later still.

- To maximize achievement, children should be given texts that they can read orally with 90% to 95% accuracy.
- Given that a text is at an appropriate level of difficulty, it is preferable that children be encouraged *not* to skip words that are difficult for them. Instead, they should be encouraged to take the time to study a word, and then reread the entire sentence or phrase in which it appears.
- Repeated readings of text are found to produce marked improvement in children's word recognition, fluency, and comprehension.
- Encouraging children to learn to spell words correctly is important because spelling knowledge directly affects their reading ability. ◆

# Identifying At-Risk Kindergarten and First Grade Students: *Recent Developments**

by Roland Good
Ruth Kaminski
Ilsa Schwarz
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Although only a small number of children (2% to 5%) are identified as handicapped at entry into public school, by the age of 8 years, the percentage of children identified as handicapped and receiving special education services peaks at 11% or over 350,000 children (Education, 1989). Not all children experiencing reading difficulty are identified as requiring special education, however, five million children currently receive services through Chapter 1 Programs (Guttman & Henderson, 1987). In addition, many children spend an extra year in kindergarten or first grade through retention, participation in transitional or pre-first grade, or by staying home an extra year until "read" for school. Indeed, Haberman (1989) claims that "reading readiness has become the standard for kindergarten retention" (p. 285). Estimates of the incidence of retention vary dramatically from district to district, ranging from 10% to as may as 60% of children (Shepard, & Smith, 1988). And yet no children enter kindergarten with identified reading problems. Clearly, the early school years are a high-risk time for the development of reading problems in children.

## Need For the Primary Prevention of Early Academic Problems

The focus on remediation of existing reading difficulties is problematic for a number of reasons: (a) reading difficulties tend to persist over time; (b) reading difficulties tend to become more severe over time; and (c) students must acquire reading skills at a faster rate than their peers to "catch-up" or reduce the discrepancy between their performance and that of their peers.

### Persistence of Reading Difficulties

In general, even poor readers make progress as they mature. However, there is little evidence to suggest that they "outgrow" their reading disabilities completely or that they approximate the performance of proficient readers (Rourke, 1978). The persistence of reading problems was documented by Juel (1988) in a study investigating the reading and writing development of 54 children as they progressed from first through fourth grade. The probability of remaining a poor reader at the end of fourth grade given a child was a poor reader at the end of first grade was .88; while the probability of becoming a poor reader in fourth grade, given at least average reading skills in first grade, was .12. These results suggest that "the poor first grade reader almost invariably remains a poor reader by the end of fourth grade" (p. 12). Similar findings regarding the persistence of learning problems were presented by Fletcher, Satz, and Morris (1984b) who found little improvement in problem readers, between second and fifth grade.

### Increasing Severity of Reading Difficulties

Reading problems not only persist, they may actually increase in severity over time. Stanovich (1986), describes an escalating chain of side effects wherein children who have difficulty learning to read tend to fall further and further behind their peers.

*Reprinted from The Oregon Conference Monograph, 1990, with permission of the editors. 

Poor readers, for example, quickly begin to be exposed to less text and fewer opportunities to learn. Juel (1988) reports that by the end of first grade, good readers in her study had seen an average of 18,681 words in running text in basal readers. In contrast, poor readers had been exposed to 9,975, or about half as many, words. This difference in exposure to print between good and poor readers grew larger with each grade. Further exacerbating the discrepancy are wide differences in the amount of reading done out of school. For example, in third and fourth grade, reading after school became frequent for good readers, but not for poor readers.

### Catchup

By the time a poor reader is identified as needing support services, a severe discrepancy already exists between the child's reading abilities and the reading abilities of his/her peers. The child then must acquire reading skills at a faster rate than peers if the discrepancy between the child's performance and that of his/her peers is to be reduced. The child, however, already has displayed a slower rate of progress in order for the discrepancy to develop in the first place and is not experiencing success in the curriculum at a rate that will allow optimal progress. Further compounding the problem, as the discrepancy between the child's and peers' performance increases over time, the child's rate of progress must also increase. For example, to "catch up" in a year at second grade, a hypothetical poor reader's rate of progress, or slop, must be 200% of peers while at fourth grade, to "catch up" in a year his or her slope must be 300% of peers!

### Primary Prevention of Early Academic Problems

Educational outcomes have been found to be more favorable for children when learning problems are identified early (Satz, & Fletcher, 1988). For example, Strag (1972) found that nearly 82% of students could be brought up to normal classroom work when the diagnosis of "dyslexia" was made in the first two grades of school. In contrasts, 46% of the "dyslexic" problems identified in the third grade and only 10-15% of those observed in fifth to seventh grades were remediated successfully.

What is needed to stem the tide of increasing incidence of reading difficulties among children is the Primary Prevention of Early Academic Problems (PPEAP). Students at risk for later reading problems need to be identified and provided with effective services and support before reading difficulties reach the "problem" level. If students at-risk for later learning problems can be provided with effective, non-intrusive services and support in regular education settings before reading difficulties reach the problem level, a much smaller change in the slope of pupil progress is necessary. With early intervention shown (middle of kindergarten), the discrepancy between a student with reading problems and the average peer's performance is not severe and they need only progress at a much lower rate to maintain adequate progress.

### Assessment

For PPEAP to be feasible, there must be reliable and valid assessment procedures to identify those students who are "at-risk" for later reading problems. Currently, standardized, norm-referenced tests and teacher ratings are the procedures most often used for the early identification of reading problems (Lindsay, & Wedell, 1982; Mercer, Algozzine, & Trifiletti, 1989), These procedures are used as the basis for decisions regarding classification, retention, and promotion of students. According to Meisels 91989), the use of standardized, norm-referenced tests and teacher rating scales for the classification of students qualifies them as "high-stakes" tests. Unfortunately, research has not supported the efficacy of these high-stakes identification procedures (Adelman, 1982; Fletcher, & Satz, 1984a; Keogh, & Daley 1983; Lindsay, et al., 1982; Satz, et al., 1988)

#### *Standardized, Norm-Referenced Tests*

Norm-referenced test of readiness, achievement and intellectual functioning are similar in content and focus on language skills, visual and auditory perception, motor skill, perceptual-motor functioning, and letter recognition (Lindsay & Wedell, 1982). The best tests have modest predictive validity, with correlation coefficients between tests used as predictive measures and outcome measures ranging from .30 to .60. Although statistically significant, these results do not permit the classification of individual children according to outcome. In fact, use of these tests for classification has been found repeatedly to result in many false positive and false negative errors (Adelman, 1982; Satz & Fletcher, 1988).

#### *Teacher Rating Scales*

The rationale for teacher rating scales is that a teacher who works closely with a child over a long period of time should be reliable and accurate evaluator of risk. While teacher rating scales typically assess a wide range of academic and behavioral indicators of risk similar to those assessed by standardized test, they are less time consuming than standardized, norm-referenced tests (Glazzard, 1977). Teacher ratings

have been cited as being "as good as the best available psychometric procedures" (Adelman, 1982, p. 258) and "the best predictors of subsequent success or failure in school" (Algozzine, & Ysseldyke, 1986, p. 395). Unfortunately, little data exists to support claims of the efficacy of teacher predictions (Fletcher & Satz, 1984; Satz & Fletcher, 1988). In a review of four studies comparing teacher-based and test-based predictions of risk, Satz and Fletcher (1988) found that although the overall hit rate was almost identical between test and teacher predictions (approximately 75%), teachers made fewer risk predictions and generally missed more of true positive cases. These findings are similar to those reported by Fletcher and Satz (1984) who found that teacher predictions resulted in missing 87% of severely disabled readers.

### Slope of Pupil Progress as a Measure of Risk

A fundamental flaw in the use of both standardized, norm-referenced tests and teacher ratings for the identification of children at-risk for academic difficulties is their exclusive focus on level of student performance, rather than on the rate or slope of student progress. Traditional test and rating scales measure how an individual is performing at a given point in time rather than how an individual is changing over time. Howell (1986) provides a good description of the necessity of assessing change rather than simply level of performance:

> Achievement is the product of learning, it is not learning itself. Students' achievement levels are determined by the rate at which they learn material and the amount of available learning opportunity or instructional time. When a student is not achieving as expected, it is due to inadequate learning rate or opportunity to learn. Therefore, most effective corrective interventions are based on decisions about increasing the learning rate and/or providing more opportunities to learn. These decisions should not be based on static measures of what a student knows, but on dynamic measures of hows/he responds during instruction. (p. 326)

In addition, standardized tests and teacher rating scales are generally administered only once or twice a year, providing an infrequent measure of student performance. Such infrequent measures of performance are insensitive to environmental variables and emphasize only summative (e.g., pre- and post-intervention) strategies that, at best, identify ineffective programs only when they have been completed and when it is too late for modification (Deno, et al., 1982; Fuchs, & Fuchs, 1986; Howell, 1986). According to Adelman (1982) "It is clear that no currently available procedures intended for large-scale use can claim to identify a large number of problems without making many false positive errors" (p. 257). Alternatives to "high-stakes" testing clearly are needed.

One low-stakes alternative that has been suggested by Meisels and other (e.g., Adelman, 1982; Lindsay & Wedell, 1982; Mercer et al., 1988) is the monitoring of students' progress over time. Rather than making "high stakes" decisions based upon a student's performance at one point in time, the monitoring of pupil progress allows for sequential decision-making. Assessments of the rate of change over time can be used to differentiate children who are making adequate progress in school from children who are not making adequate progress. Individual instructional programs then can be designed to enhance the efficacy of instruction for those children who are not making adequate progress. Interventions can be non-intrusive and non-stigmatizing and the decision regarding whether to intervene can be reexamined on a frequent basis. If a student is making adequate progress, intervention can be discontinued. With continued monitoring of progress over time, the decision to intervene can also be made at any point a student demonstrates a low slope of progress. As such, "the concept of sequential decisions is fundamental, permitting fallible data and resulting decisions to be evaluated over time, and modified as necessary, in an iterative fashion" (Macmann, Barnett, Lombard, Belton-Kocher, & Sharpe, 1989).

The need for frequent and ongoing monitoring of pupil progress is especially relevant when one considers the range of skill levels and abilities with which children enter kindergarten and first grade. Most have experienced extremely different learning environments. As described by Anderson, Hiebert, Scott, & Wilkinson (1984):

> Children enter a typical kindergarten class with very different levels of knowledge about printed language, and instruction needs to be adapted for these difference.5 One or two children, and sometimes more, may already be able to read simple stories. A handful may be totally unfamiliar with such basic concepts as a word, a sentence, and a letter, and may not even know that to read you hold a book right side up and turn the pages from front to back (p. 31).

Based upon measures of level such as standardized, norm-referenced tests of readiness, a prediction could be made that one student is at risk for reading problems while another is not. It is more difficult to make a prediction about some students whose performance is close to the mean classroom performance; a prediction could be made that they are not at risk.

Children can be expected to progress in the school curriculum at differing rates, however. Even when they test at the same starting level, some children learn at a faster rate than others (Babad, & Budoff, 1974; Campione, & Brown, 1987). For young children in particular, level of skills and rate of progress may be unrelated. Thus, children who are at-risk for academic failure may initially be indistinguishable from children who are not at-risk.

Assume, for example, that Gabby is a child with a

sufficient to meet the needs of PPEAP.

This pilot study examined the utility of slope estimates based on three curriculum-based measures of pre-reading skills (CBM-P) that permit frequent, repeated assessment. Subjects were 13 children between 4 and 5 years of age who were enrolled in a University-based early intervention program for language delayed kindergarten children.

### Measures

The first two CBM-P measures, letter naming fluency and number naming fluency, are adaptations of CBM readiness tasks described by Marston and Magnusson (1988). These measures were selected because of the finding that letter and number indentification are highly related to later school achievement (Simner, 1983). The third measure, picture naming fluency, measures expressive language skills, which play a critical role in achieving school success (Simner, 1983). Language deficits are a common characteristic of children who are later identified by schools as handicapped (Schiefelbusch, & Bricker, 1981). Therefore, development of adequate language skills is frequently a focus of early intervention programs for handicapped preschoolers (Scruggs, Mastropieri, Forness, & Kavale, 1988). Because measures for progress monitoring need to be administered frequently and repeatedly, measures were developed to meet the following criteria (Deno, 1985):

1. Are easy to administer by teachers, parents, and students.
2. Have many parallel forms that are frequently administrable to the same student.
3. Are time efficient.
4. Are inexpensive and easy to produce.
5. Are unobtrusive with respect to routine instruction.
6. Are simple to teach to teachers, parents, and children.
7. Are linked to target/goal competencies in the student's local curriculum.

#### *Letter Naming Fluency*

Two sets of the alphabet (one upper and one lower case) were randomized and printed in block form on an 8.5" by 11" sheet of white paper. Following standardized procedures, the examiner showed the sheet of letters to the student and directed the student to name as many letters as he/she could within one minute. The number of correct letter names per minute was calculated for each letter naming task.

#### *Number Naming Fluency*

A set of numerals from 1 to 20 were randomized and printed in block form on an 8.5" by 11" sheet of white paper. Following standardized procedures, the examiner showed the sheet of numbers to the student and directed the student to name as many numbers as he/she could within one minute. The number of correct numbers per minute was calculated for each number naming task.

#### *Picture Naming Fluency*

Pictures of words selected from the Harris-Jacobsen word list were randomized and arranged in block form on an 8.5" by 11" sheet of white paper. Following standardized procedures, the examiner showed the sheet of pictures to the student and directed the student to name as many pictures as he/she could within one minute. The number of correctly named pictures per minute was calculated for each picture naming task.

### Procedures

All measures were administered to each subject two times a week over a six-week period. The rate of pupil progress was estimated by the slope of the least-squares regression line fit to the repeated measurements. Criterion measures included the Metropolitan Readiness Test (MRT), the Peabody Picture Vocabulary Test-Revised (PPVT-R), and the Test of Nonverbal Intelligence (TONI).

### Results

The correlations among the CBM-P estimates of slope and level are reported in Table 1. With few exceptions, the estimates of level were significantly correlated, as were the estimates of slope. However, the slope estimates were not significantly correlated with the level estimates.

The independence of the slope and level estimates is illustrated in Figure 1 for the Picture Naming Fluency task: Level is portrayed by the height of the line, and the rate of pupil progress is portrayed by the slope of the line. Children with a low level of skills displayed both positive and negative slopes, as did children with a high level of skills.

Correlations with criterion measures are reported in Table 2. The MRT was significantly correlated with the Number Naming Fluency and Picture Naming Fluency estimates of level, but not with any of the estimates of slope.

## Conclusions

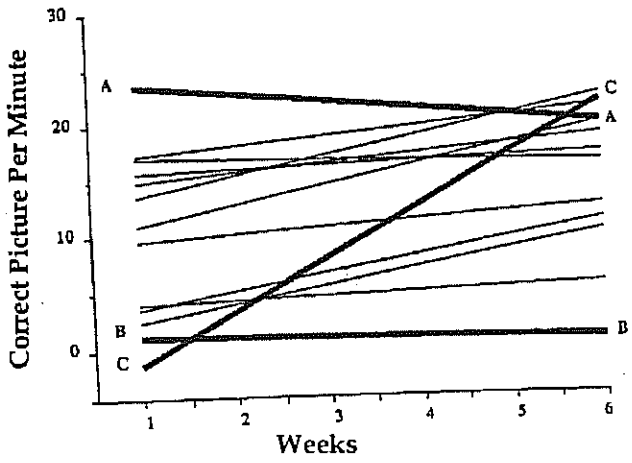
Measures of the slope of pupil progress provided information that was not provided by the measures of level, including existing measures of risk (i.e., readiness and intellectual functioning). Thus, obtaining an estimate of the slope of pupil progress may contribute substantially to the evaluation of risk. In Figure 1, for example, students B and C are initially performing at the same level. However, student C is making ad-

**Table 1. Correlation Coeffecients Between Level and Slope of CBM-P Measures**

| CBM-P Measure | Number Level | Number Slope | Letter Level | Letter Slope | Picture Level |
|---|---|---|---|---|---|
| Number Slope | -0.00 (11) | | | | |
| Letter Level | 0.80** (10) | -0.13 (10) | | | |
| Letter Slope | -0.22 (10) | 0.52 (10) | -0.58 (10) | | |
| Picture Level | 0.93** (11) | -0.,34 (11) | 0.74* (10) | -0.34 (10) | |
| Picture Slope | -0.20 (11) | 0.64* (11) | -0.51 (10) | 0.95** (10) | -0.14 (13) |

*$p$< .05 **$p$<.01

**Figure 1. Skill Level and Slope of Pupil Progress for Picture Naming Fluency**




equate progress and is not at risk for academic problems. In contrast, student B is not making adequate progress and is at risk for academic difficulty. In fact, student A would appear not to be at risk based only on initial skill level; however, the negative slope provides reason for concern. These findings support the notion that level of skills and slope of progress may be unrelated to each other for young children and that risk may be defined best by the slope of student progress rather than the level of student skills.

In addition, the CBM-P measures were sensitive to the learning and growth that occurred during this six week study. Repeated assessments of skill were able to provide an estimate of the slope of pupil progress over the short period of time involved in this study. Procedures that are sensitive to learning are critical to the assessment of pupil progress.

Further research is indicated to determine if the CBM-P measures provide an accurate identification of

**Table 2. Correlation Coefficients Between CBM-P Measures and Criterion Measures**

| CBM-P Measure | Criterion Measures PPVT-R | TONI | MRT |
|---|---|---|---|
| Number Level | -0.22 (9) | 0.11 (7) | 0.78* (8) |
| Number Slope | -0.76* (9) | -0.43 (7) | -0.46 (8) |
| Letter Level | 0.23 (8) | 0.46 (6) | 0.66 (7) |
| Letter Slope | -0.46 (8) | -0.32 (6) | -0.07 (7) |
| Picture Level | 0.55 (11) | 0.27 (7) | 0.88** (8) |
| Picture Slope | -0.24 (11) | -0.41 (7) | -0.23 (8) |

Note: PPVT-R= Peabody Picture Vocabulary Test-Revised. TONI = Test of Nonverbal Intelligence. MRT = Metropollitan Readiness Test.

*$p$< .05 **$p$<.01

children at risk for academic problems. In particular, it is important to investigate whether the CBM-P measures are related to meaningful outcome measures, whether they are sensitive to the effects of interventions, and whether improvement on the CBM-P measures is associated with a reduction of risk. Successful outcomes of this research will make a significant contribution toward the primary prevention of early academic problems. This will be accomplished by the provision of valid "low stakes" assessment procedures that are characterized by monitoring the slope of student progress and sequential decision-making. ◆

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# The Effect of Direct Instruction on Reading and Language Scores of an At-Risk Population

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St. Helens Elementary school has historically served the lowest income area in Longview, Washington. All of the recent types of at-risk students (fetal alcohol syndrome, 1 parent families, teen parents, etc.) are included in the student population of St. Helens. Serving an at-risk school population requires a unique approach to learning at the elementary level. Test scores reveal skill deficits in reading, language arts, and math. Our students score lower than students at the other six elementary schools in this area.

Over seventy percent of the student population receives free or reduced lunches. St. Helens also provides a breakfast program for the students. A community liaison person monitors the attendance by making home visits daily and assisting parents and students with medical and public assistance concerns.

The St. Helens Elementary school population of 330 students is constantly changing. Each month 20-30 students are either entering or leaving. In addition to the transient factor, the school is beginning to receive students who do not speak, read, or write English.

Seventy-six percent of all kindergarten students receive special education instruction in language. Thirty percent of the first grade and 20 percent of the second grade also receive small group, special education in language. They were labeled language handicapped on the basis of standardized tests and state standards. Many other students have language deficits, but these deficits are not severe enough to qualify them for special classes. These deficits in expressive and receptive language skills impact the instruction in regular classrooms by increasing the number of unique needs to be considered when teaching.

Seventy-five percent of the students are in a Chapter I reading program. This offers supplemental reading instruction to the qualifying students based on performance on standardized tests.

St. Helens is also piloting a kindergarten-through-fifth grade year-round school for the 1990-1991 school year. The intent is to increase retention and learning by shortening the summer lapse time from three months to six weeks. One first and one second grade class were placed in the initial trial of this schedule this past school year. Research strongly supports alternative calendars for at-risk students. However, the benefits from this approach will not show up in achievement gains until the second grade and beyond.

Because of the need to provide the optimum instruction possible, St. Helens has also adopted a new curriculum for teaching beginning reading and language skills in grades K-2, the SRA *Reading Mastery* and *Language I* programs. With support from Project Follow Through and Dr. Phyllis Haddox, initial training and a follow-up visit were provided to the kindergarten through second grade teaching and paraprofessional staff.

**Procedures**

Approximately 60 kindergartners. 50 first graders and 50 second graders, ages 5 to 9 years old, attended St. Helens Elementary School in the 89-90 school year.

These students were initially given individual placement test from the *Reading Mastery* and *DISTAR Langauge I* programs. They were then broken into groups according to their performance on these tests (blending, saying the whole word from a blended word, knowing isolated sounds, rate and accuracy passages read aloud, and answering comprehension questions based on that passage).

Students placed in a wide range of levels. These included *Reading Mastery I*, (Engelmann and Bruner, 1988), *Reading Mastery II* (Engelamnn and Bruner, 1988), *Fast Cycle* (a faster paced version of *Reading Mastery I & II* with less drill and repetition), *Reading Mastery III* (Engelmann and Hanner, 1988) and *Reading Mastery IV* (Engelmann and Hanner, 1988). Not all the groups placed in lesson 1. Adjustments were made once teachers and students became familiar with the formats.

Group size was kept to approximately eight students with average group size at five students. First and second grade students were grouped without regard to their grade level. Kindergarten students received only language classes through the Special Education department until December. Then sixteen students were placed in the *Reading Mastery I* series in two groups for the remainder of the year.

Instruction of these groups was given by five teachers, a reading specialist and four educational assistants. Training for these instructors was provided in a two day inservice just prior to the start of the school year. Two teachers and the reading specialist (the author) received training in Eugene, Oregon at the Direct Instruction Conference.

Weekly team meetings took place to discuss methods and instructional techniques. These meetings also allowed students to be regrouped and groups to be reformed as student's individual learning pace and aptitudes for reading changed throughout the year. Instructors were also videotaped while teaching their

groups in October and again in April. These tapes were reviewed by the Project Follow Through supervisor. They were also used for the individual's own analysis of strengths, weakness, and progress in attaining Direct Instruction techniques.

Bimonthly data was kept to monitor the desired goal of teaching one lesson per instructional day. On the average, each group was taught 160 lessons over the 180-instructional-day calendar. Signs were posted on classroom doors during the 90 minute reading period stating "Do not disturb, reading lessons in progress." Interruptions such as special programs, visitors, specialists services (P.E., Library and music), holiday observations or projects were scheduled outside of this "sacred" reading time.

### Tests Given

Three tests, the *Metropolitan Achievement Test*, 6th Edition (MAT6), the *Gates-MacGinitie Reading Tests*, Second Edition (Gates), and the *Wide Range Achievement Test*, New and Revised 1984 Edition (WRAT-R) were each given twice during the school year. The MAT6 was selected because it is used statewide as a measurement tool. The Gates is used by the Chapter 1 reading program for screening and qualifying students. (Chapter I uses the MAT6 scores for pre- and post-test measurements of program effectiveness.) The WRAT-R was selected to allow the students to be in with one individual test-taking setting, as the MAT6 and Gates are given in large groups. The MAT6 was given in October, 1989 and again in April, 1990. The Gates was given in September, 1989 and repeated in February, 1990. The WRAT-R was given in November, 1989 and the retest was given in June, 1990.

### Results

It is instructive to look at the performance of these students compared to the past performance of similar students. In the spring of 1989, St. Helens second grade students had mean NCEs* of 41 in Reading and 33 in Language. These can be compared with scores in the spring of 1990 of 59 in Reading and a 48.7 in Language for a net difference of 18 in Reading and 15.7 in Language. This is certainly impressive for at-risk kids. A similar comparison of results for a prior class was not available for the first graders. However, Table 1 gives the fall-to-spring gains for the first graders. The gains on MAT6 Reading and Gates Reading were positive, but not significant.

For second graders, Table 2 shows significant gains in NCEs for MAT6 Reading and Gates Reading. The gains on MAT6 Language and WRAT-Reading are positive, but not statistically significant. This is to be expected if the competencies being tested are near mastery after the first year.

**NCEs are standard scores with a mean of 50 and a standard deviation of 21.*

**Table 1.** First Graders Normal Curve Equivalent Scores (NCEs)

| | MAT Rdg Oct NCE | MAT Rdg Apr NCE | MAT Lang Oct NCE | MAT Lang Apr NCE | WRAT Rdg I Nov NCE | WRAT Rdg II June NCE | Gates Sept NCE | Gates Feb NCE |
|---|---|---|---|---|---|---|---|---|
| Mean | 31.07 | 37.05 | 32.42 | 63.81 | 27 | 41.16 | 35 | 40 |
| Sd | 11.54 | 31.79 | 15.00 | 20.98 | 16 | 23.08 | 17 | 18 |
| Range | 1-54 | 1-99 | 1-84 | 6.7-93.3 | 0-59 | 1.97 | 0-64 | 7-85 |
| Z | 1.14 | not signif | 7.87 | signif at the .0001 | 3.12 | signif. at the .001 level | 1.33 | not signif. |

**Table 2.** Second Graders Normal Curve Equivalent Scores (NCEs)

| | MAT Rdg Oct NCE | MAT Rdg Apr NCE | MAT Lang Oct NCE | MAT Lang Apr NCE | WRAT Rdg I Nov NCE | WRAT Rdg II June NCE | Gates Sept NCE | Gates Feb NCE |
|---|---|---|---|---|---|---|---|---|
| Mean | 43.18 | 58.99 | 43.54 | 48.72 | 44 | 50.20 | 46 | 53 |
| Sd | 22.23 | 18.70 | 19.88 | 18.37 | 25 | 19.64 | 17 | 14 |
| Range | 1-99 | 19-99 | 7-86 | 17-87 | 1-87 | 1-88 | 7-70 | 27-99 |
| Z | 3.55 | signif at the .0002 level | 1.24 | not signif | 1.27 | not signif. | 2.10 | signif. at the .01 level |

### Discussion

At-risk students at St. Helens Elementary School taught with the SRA *Reading Mastery* and *Language* programs significantly improved their performance in these areas. Implementation of these programs throughout the school, up to grade five is in place for the 1990-91 school year.

Training for staff K-5 will be provided in Eugene at the Annual Eugene Direct Instruction Conference. Some staff will also be attending the Puget Sound Direct Instruction Conference in Seattle in August. Additional inservices on basic teaching formats and on the *Language* program will also be provided during the year.

### Acknowledgements

The assistance of Dr. Jean Custer, director of the Longview School District's Special Education Department, is gratefully acknowledged. She was responsible for taking the raw data and statistically analyzing it. Her help and encouragement were invaluable to this project. ◆

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# Mountain View Elementary School Phoenix, Arizona— *A Case for Restructuring*

Al Shanker, President of the American Federation of Teachers, recently described restructuring as a major change in the way schools educate students.* The movement to restructure has arisen, in part, because the United States must alter its current direction to stay economically and intellectually competitive in the world. Compared to other industrial nations, our academic record is dismal, and simple explanations such as cultural diversity do not suffice. According to Shanker, even the most advantaged students in this country aren't learning what they should. Schools need to change in a way that is not unlike an entirely new mode of production for business.

While many agendas have come to be associated with school restructuring over the last few years, improved working conditions for teachers, incentive systems, and local decision making seem to be the enduring themes. They speak to the enhancement of teaching as a profession. Yet the movement's beginnings were different, emphasizing school reform as the vehicle for a radically improved learning environment. Reconceptualizing schools to better fit the diverse needs of students was one of its original tenets. This form of restructuring has been taking place at Mountain View Elementary School in Phoenix, Arizona, for the last four years.

In 1986, Dr. Joel Davidson became principal of this large elementary school. Davidson had a strong background in special education and a sense of the particular needs of disadvantaged kids. This background was critical, as Mountain View consistently ranks highest for educational risk factors in Phoenix's Washington School District. In fact, almost 75 percent of the students come from low income families (86 percent of the students receive free or reduced lunch), and half of the students who enter Mountain View every year score at or below the 45th percentile on the Iowa Test of Basic Skills (ITBS). Student turnover has, and continues to remain, at discouragingly high levels; almost 40 percent of Mountain View's 800 students come and go every school year.

*On Restructuring Schools: A Conversation with Al Shanker. Educational Leadership, April, 1990.

Like many schools in the Southwest, Mountain View has a high number of second language students. Comprising one quarter of the school, many of them are Southeast Asian refugees who have been relocated to the Mountain View area by Catholic Social Services. This has resulted in the largest English as a Second Language (ESL) program in the district. It has also created the need for intensive programs in language and reading. Test data from the early 1980's corroborate this fact, as students invariably scored well below grade level in reading.

Taking all of these issues into account, Davidson and his staff designed a comprehensive approach that encompassed academic achievement, student attitudes, and school discipline. Today, all of these elements are mutually reinforcing, resulting in a vibrant learning environment at Mountain View. The program has spawned homework and gardening clubs, an extended kindergarten, before school tutoring, and an after school story hour. Many more innovative projects and extracurricular activities have evolved from Mountain View's site-based management effort. Yet much of this reform was based on effective curricular programs, and Davidson feels that the most visible difference is the change in academic achievement.

### Direct Instruction in Language

With so many second language students at Mountain View, particularly those from Southeast Asia, there are not enough native language tutors or teachers. This problem and other related staff decisions have led to a break with common practice. There are no traditional bilingual classrooms at Mountain View. Primary instruction is conducted in English beginning in kindergarten.

All entering students are screened on a language diagnostic test to facilitate appropriate placement for instruction. *Distar Language I* is taught to all kindergarten students and is supplemented with other structured language activities.

Most recently, the staff has begun using *Spelling Mastery* and *Expressive Writing* at the intermediate grade levels. Spelling is even integrated into other subject areas, as words are drawn from science and social studies for spelling practice.

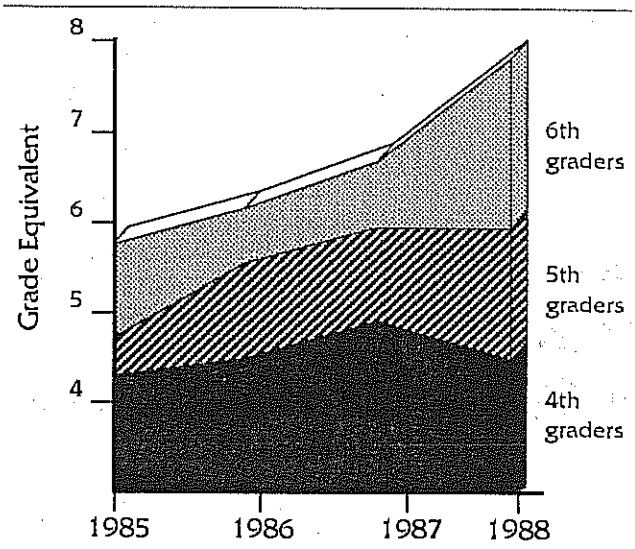
Results of this intensive effort in language arts program have paid off for Mountain View. As the figure below shows, scores for intermediate students have improved since 1985. These scores show consistent rise in mean performance on the ITBS over a four year period. By 1988, each intermediate class was at or slightly above grade level (tests were administered in April). This rise in mean scores must be appreciated in the context of high turnover rates and a large second language population.

### Direct Instruction in Reading

Most Mountain View students begin reading in kindergarten, and all of them are in *Reading Mastery Fast Cycle* or *Reading Mastery I* by the first grade. Students continue in the *Reading Mastery* series through the sixth grade. Reading is blocked for 90 minutes a day, with no pullout programs and no interruptions. Aides assist in instruction. Students in grades two through six also are placed in reading groups across grade level according to ability. However, the placements are flexible, and those performing well above or below their group are moved to a more suitable placement.

By the fourth grade, students are reading novels in conjunction with their *Reading Mastery* lessons. Formats for teaching the novels appears in the teacher's guides to the *Reading Mastery* series. Top sixth graders who finish *Reading Mastery VI* move on to various enrichment activities in basals and other novels. This gives the students an even broader range of reading activities by the time they complete elementary school. Science concepts found throughout the *Reading Mastery* programs are investigated or discussed in laboratory experiments and math problem solving exercises. Thus, the *Reading Mastery* "experience" carries across the curriculum.

Mean Scores on the ITBS Reading Subtest 1985–1988




*Reading Mastery* and its integration across the curriculum has been so successful that Mountain View is the only school in Phoenix's Washington School District to use this series as a primary reading adoption. The superintendent and school board fully support this exception to curriculum policy not just because it exemplifies restructuring. Test scores, such as those on the chart to the left, are one big reason. As with

language, reading scores on the ITBS have risen steadily since 1985.

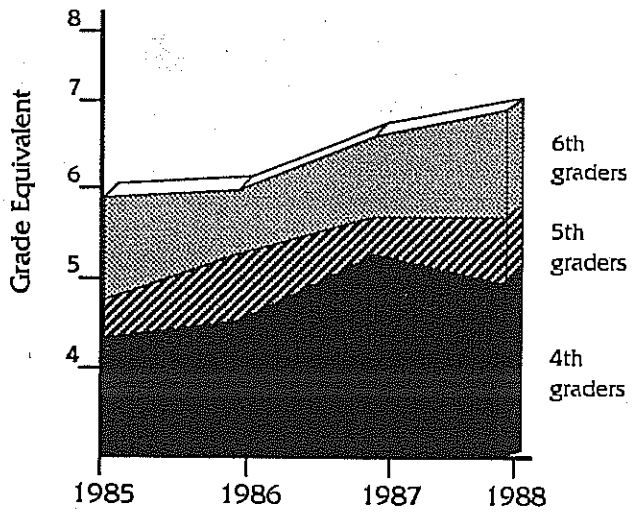
At a more local level, Mountain View's scores on the district's Basic Skills Test show a remarkable level of student achievement. The Basic Skills Test measures higher order thinking as well as basic skills competencies. On the average, 84 percent of the fourth, fifth, and sixth graders were in the top quartile in reading. This was true for 66 percent of these students in language; no small accomplishment for a school with the largest ESL program in the district. Only two percent of all of the intermediate students, on average, were in the second quartile, and none were in the bottom 25 percent.

### Statewide Recognition

Success can be measured in many ways: through parental support, teacher enthusiasm, or kudos that comes from the school board and superintendent. Mountain View has all of this and more. For almost 10 years, the Arizona Department of Education, the Arizona Educational Foundation, and the Southland Corporation (parent company to 7-Eleven Convenience Stores) have selected what they consider to be the top ten "A+" elementary schools in the state. To be a finalist for this elite group, each school must submit extensive written applications that document the school's philosophy and goals; its organization and leadership style; and the curriculum, instruction, and student outcomes. Reading and mathematics scores for half of the students must be at or above the 50th percentile and scores must have improved five percent each year for the preceding three years.

Mountain View has been chosen not once, but twice for this honor: in 1989, and again in 1990. Over 800 schools in Arizona are eligible for the award, and acomplishing this feat two years in a row is extraordinary.

**Mean Scores on the ITBS Language Subtest 1985–1988**




### Continued Restructuring

When Mountain View was awarded its first A+ honors, Davidson sensed an attitudinal change in the staff and the community. Many of the parents — and even some of the teachers — had politely suggested that he not apply to the competition, that it was a waste of time. The awards seemed to have crystalized the long, effortful changes that had been taking place at Mountain View since 1986. Restructuring, and the emphasis on academics through effective instructional programs, have been at the heart of this.

Perhaps the best indicator of change is the community. According to Davidson, "When I came here you'd be lucky if three or four parents attended a school meeting. Now we have as many as 800, and we've had to move from the school gym to a community building for the meetings." Every day there are parent volunteers in the school and many act as instructional aides. Mountain View is even looking to a full year program and its own school bond to upgrade the facilities. The changes at the school are a creative blend of the two strands of restructuring: increased teacher professionalism and a dramatically improved learning environment for kids. ◆

# Procedures for Preventing Serious Acting-Out Behavior in the Classroom*

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Acting-out is a common problem behavior reported by classroom teachers. This behavior has many forms: Violence, physical and verbal aggression, serious tantrums, loud talk, screaming, escape (slamming the door on the way out), loud arguing, fighting, head banging, and self-abuse. These behaviors are often explosive and are of serious concern to teachers because of safety concerns for other students, staff, and the acting-out student. In addition, the behaviors are highly intrusive and disruptive to teaching. Consequently, these students have many problems in the classroom and the conclusion, in many cases, is that public schools are not appropriate placements for these students.

The purpose of this article is to present a procedure for managing these behaviors in a classroom setting. The basic approach is to consider acting-out behavior as the last step in a chain of behaviors. Initially this chain consists of less serious and possibly "harmless" behaviors. However, the behaviors at the end of the chain are quite serious. The basic approach is to design interventions that target behaviors early in the chain. In this way the chain is interrupted and a new chain comprised of acceptable behaviors may be established. Consequently the serious acting-out behaviors at the end of the chain are pre-empted.

*There are four steps in the procedure:*

1. Identify the chain of behaviors leading to the serious acting-out behavior.
2. Arrest the chain at an early step.
3. Teach strategies to manage agitation (given the student is agitated).
4. Teach the student alternative behaviors early in the chain.

### Step 1: Identity the Chain of Behaviors

A chain of behavior can be described in terms of levels. The levels can be defined in terms of intensity or severity. In this sense the behaviors, or levels, early in the chain are viewed as less serious than the behaviors or levels at the end of the chain.

Table 1 presents an example of a behavior chain that may occur in a classroom. The chain is presented as successive teacher/student interactions and the student

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**Table 1. An Escalating Chain of Interactions Between Teacher and Acting-out Student**

| Teacher | Student | Behavior |
|---|---|---|
| Michael, you need to start on your assignment. | What assignment? | Questions |
| The work you didn't finish during class. | I did finish it. | Argues |
| Well, let me see it then. | I don't have it now. | Continues arguing |
| You will either have to do it again or show me the work. | I am not going to do it twice It's not fair. | Noncomplies |
| You will have to do it now. | Make me. | Defies |
| If you don't do it now, you will have to do it in detention. | F___ you. | Verbally abuses |
| That's disrespectful (teacher begins to write office referral). write office referral). | Throws books on floor; pushes desk over; says I'm going to kill you. | Intimidates |
| That's it! | Grabs the teacher by the wrist jerks arm down, swinging at the teacher. | Physically abuses |

behaviors are classified in terms of a behavior level. The example is analyzed and procedures are presented for avoiding such an escalation leading to acting-out behavior. Procedures for teaching an alternative set of behaviors are also described.

During independent work in English, the class is expected to complete written answers to some questions from the textbook. Michael is sitting slouched in his seat, staring at the floor. In the following interaction look for this chain: agitation, questioning, arguing, noncompliance, verbal abuse, physical abuse. The interaction which follows is shown in Table 1.

The chain of behaviors in this example can be described in terms of the following levels: questioning, arguing, noncompliance, defiance, verbal abuse, intimidation, and physical abuse. While the student's overall behavior may be regarded as highly unacceptable and warranting severe consequences, the whole scene could have been prevented had the teacher managed the earlier steps in the chain differently. The next steps are recommended for managing and preventing a behavior chain.

### STEP 2: Arrest the Chain at an Early Step

Once the teacher became engaged with the student's questioning routine in the example above, the chain was likely to run its course. The critical step here is for the teacher to avoid getting engaged with the student at this step. The assumption is that the student has these quite effective routines for engaging the teacher and it is the successive interactions that escalate the student. It is necessary for the teacher to identify these engaging behaviors and develop strategies for preventing the successive interactions.

In the example above, the student initiates the chain by asking a question. The question serves to engage the teacher. The teacher needs to introduce a different response for dealing with the student's questioning routine. For example, the teacher could say before the lesson begins, "OK, now when I explain the work, I will allow two minutes for questions" or "You need to try by yourself first before you can ask a question." In this way, the teacher controls how and when questions are to be presented. We don't want to discourage questions if students are seeking information. Rather, we wish to discourage using questions to engage the teacher. Other examples of verbal engagers commonly used by students are: "I need help;" I can't do this;" "This is too hard for me;" or "Do we have to do all of this?" In addition, students often use nonverbal engagers. That is, they exhibit behaviors that "force" a response from the teacher such as: pencil tapping, stopping and starting work, staring at a book without any apparent response, wasting time routines, interfering with other students, and aimless wandering in the room.

The general approach for managing these "engager behaviors" and arresting the chain as early as possible is to:

1. Identify the behavior the student uses to engage the teacher.
2. Identify the teacher's typical or predictable response to that behavior.
3. Establish a new rule or redefine the expected student behaviors.
4. Studiously avoid getting engaged with the student. Stay firmly detached from the student's routines and stay focused on the expected behavior or new routine.

### STEP 3: Teach Students Strategies to Manage Agitation

Even though we may be successful in arresting the chain by not responding to the engager behaviors, the student may develop other engager behaviors. The reason is that the student is often agitated and the only way he or she knows how to manage agitation is to engage the teacher and ultimately exhibit serious acting-out behavior. In other words, when the student is agitated it is highly likely he or she will exhibit the engager behaviors. It is necessary then to teach the student how to manage agitation in ways that are acceptable and to utilize procedures that can be implemented in the classroom.

In the example above, it is evident the student is agitated at the beginning of the chain since the student is slouched and staring at the floor. Common indicators of agitation are the hands, eyes and speech. The hands are constantly moving, indicated by: finger tapping, rubbing knees or thighs, picking things up, putting them down. The eyes typically dart: focus here, focus there and, in general, move around. Speech is generally cryptic, noncommittal or evasive. For example, when asked "How was your weekend?," the response could be "fine" or "I don't know."

The overall plan for helping a student to manage agitation is first to teach them how to prevent agitation, and second how to regain control once he or she becomes agitated.

To prevent agitation, the student will need assistance to identify the sources or causes of agitation. In many cases the sources are unresolved conflicts. The student may have been in a quarrel with a parent or had an altercation with the bus driver or was bumped

into by another student. The student will then need help to deal with these situations either at an individual level or through programs such as those found in social skills curricula. Overall, the goal is to teach problem–solving strategies and social skills.

While the student is learning these strategies, there may still be occurrences of agitation in the classroom. The step here is to teach agitation reduction strategies. The best strategy for this is to assist the student to become engaged in an appropriate task. The assumption is that if students are attending to or concentrating on a task, then there is less chance for them to attend to their agitation or anxiety. The tasks should be relatively easy. Other strategies that have merit are to provide the student with quiet time, easier work, an area where the student is left alone for a short time, a modified schedule, and an opportunity to visit and talk about options or choices. All of these strategies need to be monitored carefully, as it is possible for the student to use "agitation" to avoid work or other responsibilities. If these avoidance behaviors become evident, then the teacher might put a cost on using these privileges such as the time has to be make up.

### STEP 4: Teach Alternative Behaviors Early in the Chain

Given the teacher has utilized procedures to arrest the chain at an early step and has implemented strategies to address agitation, the final step involves teaching alternative behaviors. In effect, the goal now is to teach a new chain of expected behaviors. For example, the student who uses questions to engage the teacher could be directed to begin work before questions may be asked, or the teacher could allow two minutes for questions. In this way, the student is given a different behavior early in the chain (i.e., to start work in place of asking questions). Another student may constantly interrupt the teacher when directions are presented. The student could be directed to wait until the directions are completed before questions can be asked, or to put up your hand and wait until asked to talk. Again, the teacher is providing the student with alternative behaviors (hand raise instead of interrupting). Once an alternative behavior is identified, the major teaching steps include the following components:

1. *Precorrection.* The teacher spells out the expected behaviors clearly and names the unacceptable behavior before the student has a chance to exhibit either the acceptable or unacceptable behavior. The timing is critical. This information has to be presented to the student prior to entering the context where the unacceptable behavior is likely to occur. For example, just before reading class, the teacher may tell the class, "If you wish to talk, you need to put up your hand and wait for me to call on you" (expected behavior), "you are not to interrupt" (unacceptable behavior). In effect, the teacher describes the expected behavior (put up your hand and wait) and names the unacceptable behavior (remember you are not to interrupt). It may be necessary to use role playing to practice the desired behavior. The teacher should explain to the student all the details, such as the positive consequences for exhibiting the expected behaviors and the range of negative consequences for continuing to display the unacceptable behaviors.

2. *Acknowledgement of students who follow the rule.* As early as possible in the lesson, the teacher should immediately acknowledge the students who exhibit the expected behavior (in this case raising their hand to ask a question). This practice serves to reinforce students who are cooperating and also serves to remind other students of the expected behavior.

3. *Reminder.* The teacher provides a brief reminder of the expected behavior immediately before the student enters the setting. For example, if a student constantly talks out in group work on reading, then just before they go to the group the teacher might say, "Now remember the rule, if you want to talk, put up your hand. No interrupting, please."

4. *In context prompt.* These prompts serve to interrupt the student who begins to make the unacceptable behavior once he or she is in the target setting. For example, the student may begin to interrupt in the group. The teacher might give a "shhh" sign and gesture a hand raise, then nod approval when the student's hand is raised. We have to remember it is difficult for the student to do the hand raise when he or she has the habitual behavior of interrupting.

5. *Consequences.* When the student exhibits the expected behaviors, the teacher should strongly acknowledge the student. For example, "Thank you, Michael, for raising your hand" and give him your fullest attention in what he has to say.

Conversely, it is important to use a hierarchy of negative consequences if the unacceptable behavior occurs a second time (i.e., after the in context prompt). It is best to name the behavior then deliver the consequence. For example, "Michael, you are interrupting. This is a warning." If the interruption occurs again, name the behavior and deliver a penalty. "Michael, you have interrupted again. Take a time out." When the time out is over and the student returns to the group, the teacher should remind him of the expected behavior; e.g., "Michael, remember to put your hand up if you wish to speak." (Note: The student would have been informed of these procedures at precorrection, No. 1). In addition, the teacher needs to be ready to reinforce Michael as soon as he complies with the rule.

As a rule, in managing escalated behavior, it is better to deliver the negative consequences as early in the chain of behavior as possible. The reason is that chains of behavior are weakest at the beginning. Students have more self–control early in the chain compared to later in the chain.

Clearly, if the chain of behaviors continued to develop into more serious behaviors, then additional consequences need to be in place. These consequences are typically tied into the classroom or school discipline plan or to the individual eduction plan in the case of special education students as appropriate. If the student's behavior continues to escalate on a frequent basis, then it is likely that the interventions are occurring too late in the chain and more observations and analyses are needed to pinpoint behaviors earlier in the chain.

In summary, serious acting-out behavior in a classroom can be described in terms of a chain of smaller discrete behaviors. If the steps early in the chain are carefully managed, then it is often possible to prevent the student from escalating to more serious behavior. The overall steps in preventing escalated behavior are:

1. Identity the steps in the chain leading to escalated behavior. In particular, identify the engagers, i.e., behaviors the student employs to secure a response from the teacher.
2. Arrest the chain early by anticipating the engager behaviors of the student and providing different planned responses.
3. Assist the student to manage agitation by teaching problem–solving strategies to prevent agitation and by utilizing techniques to reduce agitation and gain self–control.
4. Teach alternative behaviors or replacement strategies for the student to utilize early in the chain. The steps in teaching these alternative behaviors are: precorrection, acknowledgement of correct responses, reminders, in context prompts, and consequences.

The final point to be make is that serious acting-out behavior in the classroom is changed by controlling the successive teacher/student interactions. In effect, the first behavior to change is of the teacher. It is assumed, then, if the teacher can redirect these interactions, the students will be less likely to exhibit serious escalated behavior. Overall, if the procedures are effectively implemented, students who are frequently excluded from public schools may have more chance of complet-

# John Ballantyne Elementary School El Cajon, California

When the administration and staff of Ballantyne Elementary School took a hard look at their reading and math scores, they knew something had to be done. Many ready explanations for the low performance *could have been used* — high transience, low SES (almost half of the students are in the free lunch program), the high enrollment. Instead, the school re-examined its instructional program with the sense that the curriculum and the overall style of teaching could improve. That was in 1983. As the figures show, the situation at Ballantyne has changed dramatically.

The staff decided on direct instruction, which translated into the SRA commercial programs for the primary grades and the ECRI approach for the intermediate grades. The initial implementation was ambitious: reading, language, and math. Ballantyne's initial efforts at making the change — and those to sustain it — tell us why scores have risen so much in such a short time.

### Initial Implementation

Teachers were introduced to the direct instruction approach through an inservice at the beginning of the year. Initial reactions during the first year were typical for any kind of new program or teaching technique. Some teachers were uncertain, others were skeptical, and a few saw real promise in the new approach. But as Adrienne Allen, the educational consultant who has worked with the school's use of direct instruction from the beginning reflects, "the teachers were very smart; they learned the new techniques quickly."

As with so many other direct instruction implementations, the majority of teachers were swayed over the first year by the marked change in student performance. The changes in reading and math were so persuasive, that in a short amount of time, the intermediate grades replaced the ECRI approach with Reading Mastery. They had come to recognize that ECRI was very labor intensive and that modifying and creating a new curriculum took too much time. Ballantyne now uses Reading Mastery in grades K to 6, DISTAR Arithmetic in grades K to 3, and Distar Language in K to 2.

### Efforts to Sustain the Implementation

Unquestionably, student success helped solidify the role of direct instruction programs at Ballantyne. Yet three strategies clearly have helped sustain the use of direct instruction programs since their inception five years ago.

### On-going Technical Assistance

Gradually, the administrators at Ballantyne recognized a need for ongoing assistance, especially as new teachers and aides joined the staff. Fortunately, the principal and vice principal had both taught the direct instruction programs. They have been able to train new teachers and aides as well as refine the skills of the more experienced teachers at Ballantyne. The familiarity with the DI programs, from the principal to the aide, has led to consistent implementations of direct instruction throughout the school.

This coordinated approach is apparent in the organization of daily instruction. With the use of instructional aides as teachers, primary grade students rotate through three groups: reading, language, and independent seatwork. Aides also receive inservice on direct instruction on a monthly basis.

### Program Monitoring

A second strategy involves active program monitoring, a system supervised by Pat Harders, Ballantyne's vice principal. By checking weekly progress, Harders is able to spot difficulties and areas of need such as regrouping. The school's policy of deployment — assigning students to different reading and language groups across each grade level rather than in just one classroom — makes the job of regrouping students (or assigning new ones) easier in this regard. Harders makes sure that the continuous progress tests are administered, scored in a timely manner, and that any subsequent action such as regrouping occurs as quickly as possible. Program monitoring assures a more streamlined and complete implementation of the direct instruction programs.

### Peer Coaching

Finally, Dr. Marr, Ballantyne's principal and part-time faculty member at San Diego State University, has instituted a program of peer coaching to enhance the implementation. Marr finds that with direct instruction programs as a common base and ongoing training, teachers are more "tuned-in" to effective classroom practices as they observe each other. These peer coaching sessions supplant two of the four observations that Dr. Marr conducts for teacher evaluations. She feels that this is a more effective means of staff development than a command performance that often results from formal evaluations mandated by the school. Peer coaching, Marr feels, has not only improved the quality of classroom teaching, but it has

changed the teacher talk in the lounge. She finds that her staff commonly discuss curricular problems and share solutions on an informal basis.

### The Measure of Success

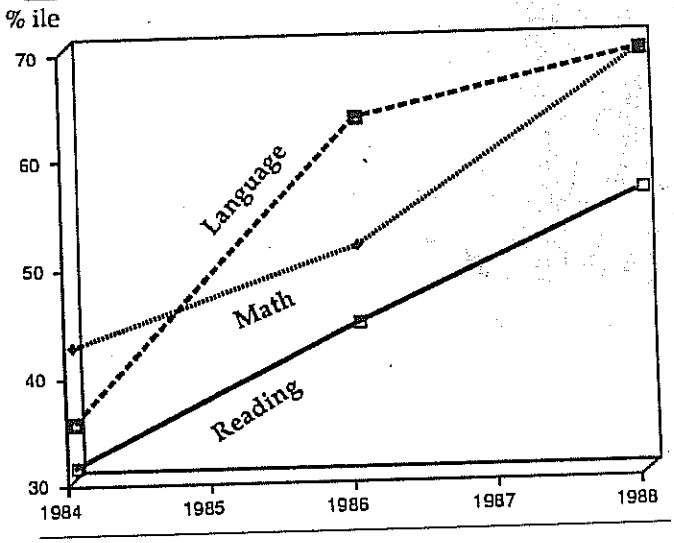
Student success and the staff development activities at Ballantyne have led to marked and unusual changes in instruction. Reading is the number one priority. Other curricular activities — science, social studies, art — are cycled into the day's schedule to insure that reading is taught every day. This prioritizing has even led first and second grade teachers to extend the school day an extra 20 minutes to insure that enough time is devoted to reading. As one teacher put it, "The more I make everything like direct instruction, the more successful I'll be."

Ballantyne's staff also works hard to integrate direct instruction with California's movement toward whole language and literature-based programs. Each grade level uses two literature books in conjunction with Reading Mastery. The staff also complements reading with a variety of writing activities. Using a process approach to writing, ideas that may arise during the reading period are completed—in written form—during langague arts.

Scores such as the ones in the figures show how hard the teachers at Ballantyne have worked to bring about change. Their commitment, and the obvious success that anyone can see in their classrooms every day, allows Ballantyne to be ranked as one of the highest schools of its kind in the state. Third graders average at the 94 percentile for reading, language, and mathematics. Sixth graders average at the 98 percentile for reading and language, and the 84 percentile for math.†

Ballantyne's success is clearly recognized at the district level. As with many other districts, El Cajon is a "one reading curriculum" district. Ballantyne is exempted from the standard basal series because of its outstanding performance. This success has not only impressed the staff, but the school board and superintendent. In fact, since scores have risen so dramatically and consistently, Dr. Marr has noticed an increasing number of inquiries from other elementary school principals about Ballantyne and its key to success. ◆

Third Grade CTBS Scores 1984 - 1988

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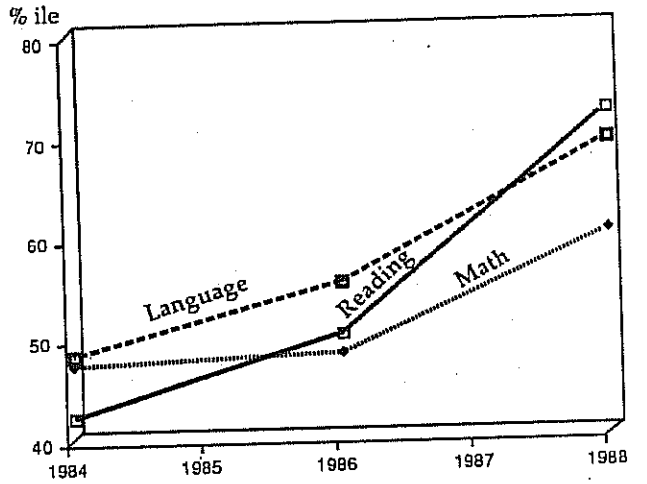


†*As determined by the 1989 California Assessment Program showing the school's relative rank to schools serving students with similar backgrounds.*

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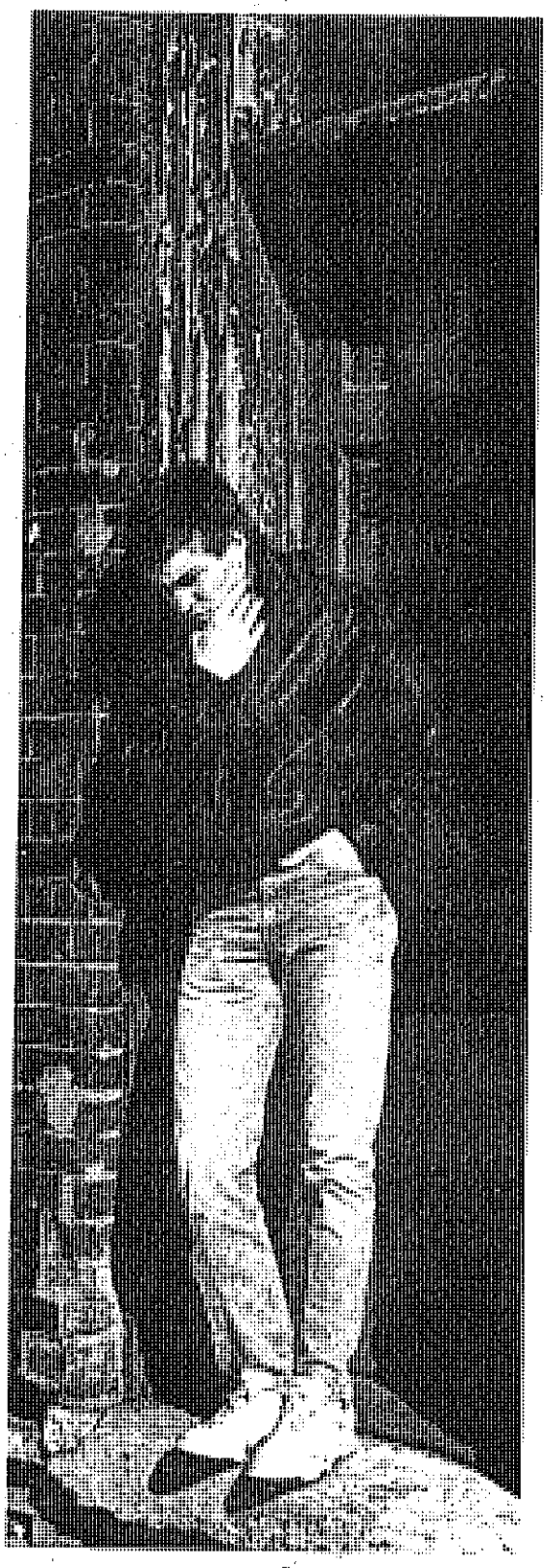

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—John Q. Student, 1990

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