ADI NEWS

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If You Can Read My Lips

(An Editorial in Verse)

by Tom Besson
Radical Clam Publishing Co.*

Author's note: Ignorance and poverty are complex issues. However, teachers do have the power to deal with them effectively in the classroom. My reason for writing these lyrics is due to my anger and frustration with a system that gives itself credit for "educating" advantaged middle-class students, while letting the culturally and economically disadvantaged slip through the rather large cracks in its structure. Today, I see transients walking the streets of my city, young males anesthetizing themselves to the pain of not being able to succeed with their limited skills, and teenage girls opting for pregnancy or prostitution over continuing a course in institutionalized futility. My hope is that these words provide a basis for discussion and change in America's schools. To those of you who already use effective instruction in your classrooms, my continued encouragement. To those of you who aren't adequately meeting your responsibility of teaching all children the way they deserve to be taught, a plea to change before it's too late.

When I was young my mama was so proud of me
I learned to talk at one and sing some songs at three
She knew I'd have a life that she had never had
And grow up to be a man who wasn't like my poor old dad

What I looked at with my small blue eyes was always good
The things that I was asked to do I knew I could
My mind was always active 'till I went to school
That's the place that taught me how to act just like a fool

So, if you can read my lips, thank a teacher
They helped to make me what I am today
I'm the hopeless, I'm the homeless, I'm the kid without a chance
I hope you teachers listen because I've got a lot to say

My first grade teacher spent more time with kids who got things right
In second, I got noticed only if I'd start a fight
By the time I got to fourth grade they all thought that I was slow
But it only goes to show you that those teachers just don't know

So, if you can read my lips, thank a teacher
They kept me down when everyone stood up
If they cared they'd teach me something new to take home every day
Now all I get to take home is the few coins in my cup

By the time I got to high school I was way behind
I lost my self esteem and then I lost my mind
I didn't fail the system, I swear the system failed me
It pointed to the streets and said, "That's where you ought to be"

So, if you can read my lips, thank a teacher
Because they're the ones who passed me out the door
When teachers say, "I taught him, but he didn't learn"
I tell them, "If you really taught, I'd know a whole lot more"

If you teachers think you're helping all the kids get smart
Teach them with your brains, as well as with your heart
Because each of us deserves to be all that we can be
It's the best thing you can teach us if you want us to be free

So, if you can read my lips, thank a teacher
They helped to make me what I am today
I'm the hopeless, I'm the homeless, I'm the kid without a chance
I hope you teachers listen because I've got a lot to say

*Tom Besson is a former SRA staff associate who is presently teaching in the Middle East.

Letters. . .

Dear Editor:

It finally happened. One of our own, that is a BIG D/ Big I teacher, got recognized and won Delaware's Teacher of the Year. (See attached.) Of course, much of the publicity was lost either because most people did not recognize the Direct Instruction materials or simply because they chose to focus on other stuff. Obviously, reporters fail to recognize the maximum knowledge assumption and therefore fail to compensate by invoking maximum contrast for their naive readers. At any rate, Ellie—a former student of mine—deserved the honor for she makes the programs shine. Thought you'd like to know.

Now say the whole thing, George.

Yours,

George A. Smith, Ph.D.
State Supervisor/Instructional Systems
Dover, Delaware

Eleanor Schmidt Named Teacher of Year

The Fifth-Graders assigned to Room 213 in Colonial's McCullough Elementary School worked productively throughout a recent blustery Monday. The nine boys and four girls—all handicapped—lost no time to misconduct, thanks largely to the concern, insight, and skill of their teacher, Eleanor A. Schmidt, Delaware Teacher of the Year for 1989.

Mrs. Schmidt, an attentive, self-possessed person, wove many bright moments into the children's day. Two boys read parts from a play. The class watched and talked about a 15-minute video that dramatized subjects with a strong appeal for them. The children spent a delighted 45 minutes in McCullough's computer room, running programs about prefixes and suffixes on Apple IIe's they loaded and got working within a minute. Mrs. Schmidt got instructional mileage out of the $5000 state grant that comes with her title—she asked the students to write an essay giving their opinions about how best she could use the funds. She discussed their suggestions and promised to take them into account.

The children gave spirited choral answers in spelling drills—a sample of the direct instruction method that Mrs. Schmidt says works especially well with handicapped pupils: the choral responses assure that all students take part; help them attend to the task; and use the time more efficiently than a teacher's asking each child singly.

During the long day, discipline matters took up less than 60 seconds. Once Mrs. Schmidt reminded a boy that fifth-graders use their necks to keep their head erect, not their hands. Just before the 1 p.m. lunch period, two girls whispered to one another. Mrs. Schmidt stopped that with a look and one word: "Girls?"

Mrs. Schmidt assigns parents a major role in helping their children succeed. As a Grade 5 routine, each child keeps a notebook for homework assignments, and parents must initial it nightly. For nearly all Mrs. Schmidt's students, the parents come in for a conference during the first weeks of school; those who don't show up she visits at home.

Close contact with parents is vital in teaching handicapped students, Mrs. Schmidt believes. "Many parents are well informed about special programs," she said, "But there's always the chance of misunderstanding. Once we had a student who had been classified as educable mentally handicapped. When I told the mother that meant he was retarded, she cried; her husband had been beating the child because he never got marks better than 'D's.' They never understood that was all he was capable of."

The children in this year's class all look healthy and well-cared for, but Mrs. Schmidt knows that theirs is a difficult world. "One student has attended ten schools in five years. If you're open and warm with the students, they'll let you know about the realities of their home life—they'll talk about the time their brother had a gun or their sister used drugs."

Mrs. Schmidt said she is very careful in writing the individual educational plans for their students, and she sees no basis for complaints that children are misassigned to special classes. "A few parents drag their heels when we propose a special placement, but most of them beg for help. Because of their disabilities, these children can't keep up with the pace in a regular fifth-grade class. They would just tune out and withdraw from the world. Parents realize their children cannot succeed in a regular class and they are grateful for the opportunity that special education provides."

Mrs. Schmidt has a serious view of the mission of today's educator: "My message for Delaware teachers is, 'Take a positive approach every day, in every classroom.' The schools are the only institution that will have these children as a captive audience in their lives. We have to touch the hearts and minds of these children. Each of us must try our hardest to reach them, or we will lose so many." ◆

Carnine's Lecture in Italy and Discover a Quality Special Education Program

by Doug and Linda Carnine

We recently completed a series of lectures in three Italian cities: Rome, Alatria, and Ancona. This summer, the organizer, Professor Paulo Menzinni, Professor of Psychology at the University of Rome, will be at the University of Oregon for six weeks to look into applications of Direct Instruction in Italy.

During our stay, we visited Italy's treatment center for deaf, blind, and multiply handicapped individuals. We were so impressed that we helped assemble an article for American readers. Unfortunately, the article cannot capture the extremely positive atmosphere of the center, created by both the staff and the clients. For example, the number of profoundly deaf individuals producing near normal speech was astounding. To see such a wonderful example of education for the severely handicapped outside the United States was a very valuable experience we want to share with members of ADI. We only wish an article could capture the uplifting spirit of the "Lega del Filo d'Oro".

Background Information on the School*

The "Lega del Filo d'Oro" is a private association legally recognized by the Italian State. The aims of the Association are the assistance, rehabilitation, an, whenever possible, the mainstreaming of deaf-blind and multiply-handicapped individuals. Within this context, research activity as well as teacher and parent training also take place. The Institute involves medical, psychological, and reliabilitation intervention. It is the only one in Italy to concentrate its activities on deaf-blind and multiply-handicapped individuals.

At present, the Institute hosts 26 preschool and school children (School Department), 18 adolescents (Post-school Department), and 12 adults (Kalorama Community).

Treatment of school children is aimed at the following:

- acquisition of cognitive skills
- acquisition of gross and fine motor skills
- learning of nonverbal communication systems and language development
- elimination of behavioral problems such as self-stimulation and self-injury
- development of adaptive-social skills (e.g., toileting, grooming skills)
- social interaction skills
- observation and ongoing evaluation

The adolescents are provided with activities aimed at generalizing abilities already acquired, and developing occupational and home skills. Those are planned in view of the subjects being returned to their families or integrated into sheltered workshops.

The adults live and work in three apartments located in a residential area of the city of Osimo. The objectives pursued with these individuals are:

- independent living skills
- work/occupational skills
- emotional development
- social integration
- further education (social and academic)

The work conducted with all children, adolescents, and adults is supervised by a psycho-educational/medical team.

Teachers receive a two-year course before starting their work with the deaf-blind population. Their preparation is regularly updated through short courses and workshops. Moreover, national and international contacts are used to continue in the exchange of experiences and in the acquisition of new intervention and research techniques. An international conference on staff training will be held at the institute in 1990.

The research activity, coordinated by a Scientific Committee, is performed in the medical, psycho-education, and social/organizational areas. Such activity is carried out in cooperation with national and international Centers (e.g., University of Anocona and Salesi Children's Hospital, Italy; University of Nijmegan and University of Leiden, Holland; State University of New York, U.S.A.). Some of the research issues to date explored are:

- diagnostic methods for early detection of sensory and behavioral disorders
- teaching techniques suitable for multiply impaired children
- nonverbal communication systems
- strategies for integrating severely and multiply impaired individuals in school, work, and community.

Our Observations

All instruction at Lega del Filo d'Oro is designed to develop positive independent living behavior. The instructional staff is comprised of two groups. One staff works for 8 am to 2 pm and a second staff works from 2 pm to 8 pm. The daily schedule begins at 8:00, at which time students rise, put on their own specific robes for washing in individual staffs in the bathroom area. Each student's living space is organized for easy access to personal towel and clothing items. For some students, pictorial representation are posted for their washing schedule, e.g., alternating days designated for full bath or facial washing. Students learn to assist with gradually increasing amounts of the meal preparation including table setting, and washing up. By adulthood at least half of them are able to actually prepare the meals for the others (numbering 6) in their apartment unassisted and almost everyone worked in a sheltered workshop.

Once breakfast and clean-up are completed, the student's begin their morning instructional periods where one teacher works one-on-one with each child (one teacher works with two adolescents at this time). These activities include cognitive training, communication, and gross and fine motor training. But this doesn't convey the consistent, carefully designed curriculum each child receives. Highly skilled teachers utilize a variety of individualized techniques: (1) individual signals to direct attention(orienting the child's head, having the child stand in a box to direct attention to the task, slapping the table, stroking the child under the chin; (2) prompt for correct behavior (e.g., using a flashlight and a piece of biscuit on a block to cue the child as to what block to touch in hand/eye coordination tasks); and (3) reinforcement for correct responding. A creative range and assortment of reinforcers are used on various reinforcement schedules. For example, Francessca is given flashes with two lightly colored lights which stimulate her limited visual perception. Favio is given teaspoons full of juice for tactile matching of various fabric wrapped around batteries. Julia is given facial strokes with a soft brush vibrator. Alberto receives facial strokes with the instructor's hand. If the child is not deaf, the teacher and others may clap or say "bravo" for correct responding.

When tasks are completed, this is communicated to the child by moving a ring off of the ring stand. As soon as possible, the child does this himself. When all the rings are off, a new activity begins.

Activities are sequenced in a variety of ways. For example, they may be pictorially featured around a clock, or using a calendar. Blind students are taught tactile association for finding their way around the school. For example, very rough sandpaper is associated with the path to a particular classroom, while a smooth fabric is associated with the exercise room.

The first objective for students new to the school is toilet training; the second is to teach communication skills using both nonverbal and language development. The staff interacts with the students in a positive manner, yet requires increasing amounts of attention from the child. Self stimulation and self injury are reduced by fast pacing and reinforcing incompatible behaviors. If the child begins tantrum behavior, a short time out procedure is used when the teacher withdraws attention/interaction.

By the time the children reach adolescence, they are able to preform complex routines independently. We observed Favio, who was deaf and blind, performing a series of fine motor activities, each one cued by a small object on a card in one of seven connected boxes with lids. Favio began the task with the first box; he took out the symbol card, closed the lid to the box, matched the card to an appropriate activity box of manipulatives, and preformed the task (e.g., putting marbles in a bottle), moved the completed box to the back of the work table, returned to the next box with a symbol card. Once the seven activities were completed Favio moved automatically to another table and began a second set of activities. Here again, each activity was cued by a tactile symbol card such as a small plastic bottle glued to a card. Favio performed complex kitchen routines in this sequence, e.g., putting plates onto a rack, folding napkins and inserting them into napkin rings and placing them in the appropriate spot on the placemat (cued with outlines), placing bottles in a bottle rack.

A number of fine motor tasks were taught to students of all ages in preparation for the adult sheltered workshop. At the sheltered workshop the handicapped adults wove rugs and baskets. Therefore you saw young children learning the rudiments of basic weaving.

Instructional sessions in communication are interspersed with gross fine motor activities. The length of the sessions is adapted to the child's attention span. For short breaks, the teacher and student take walks, go for recess outside. The older students are given books and pictures to look at.

At 12:30, preparation for lunch begins. All activities are used as opportunities for teaching independent living skills; thus, students participate as much as possible in preparation. After lunch and a rest period, less intensive afternoon sessions begin at 2:30 in which

there is one teacher working with every two children. The same types of instructional activities as well as more recreational/play activities are scheduled until 6:30, when preparation for dinner begins. At 8:00 the students go to bed and a night shift takes over.

At the sheltered workshop, the handicapped adults live in two large apartments. One is comprised of very high functioning deaf-blind men who can independently take care of all their grooming needs and find the way to work (2 blocks away), prepare their own meals and even do some limited shopping. The apartment has six bedrooms, each one tastefully and uniquely decorated and very clean. They take care of their own washing and cleaning needs. At frequently held meetings they plan the execution of basic household chores and other activities, such as replacing light bulbs, planning for particular festivities, and so forth. Although there are adult supervisors with this group of men, they basically function independently.

In an adjoining apartment lives a second group of adults, four of the six who are very low functioning with severe handicapping conditions. These people require more assistance from staff, for example, special eating spaces with large bibs. Again, each one of their rooms is individually decorated. Fighting depression is one of the biggest challenges, especially among the two higher functioning adults, deaf blind women in their sixties. The staff involves them in games, knitting, typing, and writing when possible, and encourages their own self-directed communication.

The Institute has an excellent service for non-residential clients. Parents (who are from all areas of the country) are periodically invited to stay at the Institute along with their child and the special education teacher from the child's local school. The teacher learns interventions to use at the local school; parents learn interventions to use at home. The stay lasts two to three weeks. For this purpose, the Institute uses three apartments. Parents are also offered follow-up courses (twice a year) dealing with intervention and interaction issues.

As noted at the beginning, we were impressed by the quality of the training we saw happening. ◆

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Jobs. . .

Special Education Teacher

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Director of Human Resources
Devereux Hospital and Children's Center
8000 Devereux Drive
Melbourne, FL. 32940
(407) 242-9100

EOE

California Textbook Adoption Chooses Myth Over Research

by Dr. Patrick Groff
Professor of Education
San Diego State University*

Every six years in California a state Curriculum Commission recommends to the California State Board of Education the names of valuable basal reading textbooks that the Commission judges are acceptable for use in this state's elementary schools. The Commission is required to follow a set of guidelines developed for this purpose by yet another California body, called the English-Language Arts Curriculum Framework and Criteria Committee. It should be noted, the California State Department of Education masterminds this entire process, thus exerting influence on textbook selection. It is evident that publishers who wish to sell in California must traverse a tortuous, uncertain, and enigmatic bureaucratic maze. In brief, the state level basal reader selection proceeding in California is a tricky jungleland.

All this complicated, costly, and time-consuming maneuvering is totally unnecessary, of course. Over half of the states now allow teachers in local school districts to decide which basic readers in the marketplace best fulfill the needs of pupils in their individual schools. This is found to be a satisfactory arrangement, saving scarce school money for satisfying truly important needs of children.

The state-level adoption of textbooks in California is an unwieldy, unstable anachronism whose reason for existence has long disappeared. When there were many isolated, rural, and ill-managed school districts whose teachers were often educated barely longer than their eldest pupils, there was some decent motive for having a centralized, state-level decision making process; but this need no longer exists. California thus maintains its balky, expensive, dragged-out, special interest-ridden procedures purely on the basis of tradition. There has been so much power and prestige accumulated in maintaining this superannuated process, however, that this practice, while demonstrably clumsy, unfair to publishers, a contributor to ineffective teaching, and guilty of a number of other disenabling faults, apparently will continue to operate unless it is repealed.

There are even hints of financial entanglements and conflicts of interest. The latest of these, for example, involves the Harcourt publisher which donated $50,000 to help achieve passage of a pet piece of legislation of the present California state superintendent of public instruction. His critics charge that he hopes passage of the bill will boost his future chances of becomming governor of California. Not surprising, therefore, is the fact that Harcourt got more of its books on the 1989 Curriculum Commission's list of books that may be used in California classrooms than did any other publisher.

Six years ago I strenuously protested the selection of basal readers for California schools by its State Board of Education, in the *Los Angeles Times* and by letter to appropriate state agencies. Six years ago reading programs that involved the intensive teaching of phonics were systematically stripped by the board from the list of basal readers that local teachers were permitted to use. The 1989 list of these approved readers has received the same treatment from the state's Curriculum Commission.

The 1989 list of textbooks recommended by the Commission is even more worrisome because the 1989 listing is based on guidelines formulated by the California English-Language Arts Framework and Criteria Committee that are more out of keeping with logical reason and experimental evidence than were those in play six years ago.

The set of rules governing what basal readers can be used in California public schools from 1989 to 1995 was developed by the English-Language Arts Framework Committee, and is thus called the English-Language Arts Framework (ELAF). The Curriculum Commission of California was directed by this state's Board of Education to adhere to the dictates of the ELAF when weighing the merits of the basal readers submitted for inclusion on the 1989 authorized list of such books.

*Reprinted from *The Reading Informer*, Jan., 1989, Vol 16(1), pp. 1,8, with permission of the editor.

This ELAF is the basic reason why certain basal readers were given approval by the Curriculum Commission while others were not. It can be detected very soon into the ELAF why California primary grade teachers are prohibited for the next six years from using basal readers, like the Open Court series, which emphasize the intensive, direct, early and systematic teaching of phonics. (See footnote at end.)

The ELAF prescribes only basal readers using the so-called "meaning centered approach" to be sold to California public schools. Readers of Jeanne Chall's comprehensive and accurate analyses of the research on reading *Learning to Read: The Great Debate* (1967 and 1983) will recall, however, that the experimental research consistently indicates that the meaning-centered approach is inferior to the systematic, intensive phonics approach for teaching reading skills. Controlled comparisons of these two methods reveal that the phonics method consistently develops greater reading achievement.

In the opening pages of the ELAF, one learns, nonetheless, that unless a basal reader program violates what the empirical evidence says about reading instruction it will not be approved for use in the primary grades in California classrooms. It is immediately clear the the supposed "leading English-language arts educators" appointed by the California State Department of Education to write the ELAF were educational professionals who favor what the research has indicated is a second-rate system for teaching young people to read.

The views of the ELAF writers stand in sharp contrast, for example, with the conclusions of the experts who wrote the commendable *Becoming a Nation of Readers*. This book, which bases its conclusions firmly on the findings of research, sharply contradicts the advice about reading instruction given in the ELAF. For example, BNR correctly notes that research indicates "a high proportion of the words in the earliest selections children read should conform to the phonics they have already been taught." The fact that the Open Court readers were in accordance with this authentic research finding was the major reason given by the California Curriculum Commission for prohibiting California primary grade teachers from using the Open Court texts!

In my book, *Preventing Reading Failure* (National Book Co., 1987), I describe in detail how it is that reading educators who consistently and persistently misinterpret and ignore the research evidence in their field can be chosen as members of powerful tribunals, such as the California English-Language Arts Framework and Criteria Committee. It is not surprising, therefore, to find that such a clique managed in 1988 to gain the power to impose on California teachers its misguided notions of how children best learn to read. Of course, the California Sate Department of Education could have easily chosen reading educators to write the ELAF who were devoted to what the research says about the teaching of reading, rather than those who appear to be driven by an unsubstantiated ideology about this matter. That the Department of Education chose to do otherwise reveals the extent to which devotion to the myths of reading instruction has penetrated even the highest levels of the educational hierarchy in California.

To cover all the bases, the State Department of Education included eleven of its own staff members who "contributed" to the production of this document. One can imagine who would win out in any argument over what should go into this set of guidelines between, for example, the teacher-member from Buckeye Elementary School and the Director of Curriculum, Instruction, and Assessment Division, California State Department of Education. One would have to be highly naive to assume that these two persons had equal input and influence on the deliberations and decisions made in the writing of the ELAF. It is not unreasonable, in fact, to presume that the ELAF was by and large the creation of the California State Department of Education, which disguised the extent of its control over the content and form of the piece by carefully selecting acquiescent members of the educational community to act as mouthpieces for the Department's previously devised intentions of what should be in the ELAF.

The ELAF determines that there shall be no official place in California classrooms for basal readers that are "skill-based," that is, designed to teach "independent skill," that focus "at a time" on exclusively teaching reading skills, and direct pupil practice on skills through "worksheets" for this purpose. To the contrary, it is now a certified regulation in California the only basal readers that have "simple" phonics programs will be warranted for use in its classrooms. Moreover, the ELAF proclaims that any teacher training scheme that does not wholly agree with this ELAF fiat will be duly charged as "ineffective."

The ELAF preference is one based on the supposition that in learning to read "almost all the rules, the cues, and all the feedback can be obtained only through the act of reading itself." If this remark sounds highly reminiscent of those made by Frank Smith, the leader of the new anti-phonics movement, the reader

is correct in this inference. This comment is only one of several taken from Smith which the ELAF proudly endorses. Smith is well remembered by advocates of phonics teaching for his astoundingly fallacious declarations that one of the easy ways to make learning to read difficult is to ensure that children learn phonics and how to apply it.

"The most effective teaching techniques," the ELAF goes on, "helps students get to sense quickly, often leaving the more difficult task of learning individual words until after students have experienced the delight of understanding meaning in sentences." In short, this official guide to the kind of basic readers California teachers are compelled to use to instruct the next generation of elementary school children stoutly defends the preposterous notion that readers can gain the meaning expressed by a sentence. There is undoubtedly no better statement one can choose from the ELAF to illustrate the outrageous extent to which this document contradicts what the experimental research says about the topic on which the ELAF poses as an expert commentator.

As expected, therefore, the ELAF agrees that students learning to read can easily handle those disagreeable individual words in sentences that they cannot recognize by simply guessing them from context. In this respect, the ELAF conveniently ignores the growing body of empirical evidence that suggests teaching context cues does not aid in the development of mature reading skills. Able readers, it turns out, do not need to use context cues since they decode words quickly and accurately. So, directing beginning readers to guess at words from context retains them at a primitive, crude level of word recognition, while delaying their advancement toward mature, automatic word recognition ability. With automatic word recognition ability the capable reader is able to devote his or her full mental energies toward determining what an author intended a sentence to mean. Guessing at words, on the other hand, diverts this mental power into a relatively unproductive activity.

Knowing its basic orientations, it is not surprising to find that the ELAF also repeats the discredited hypothesis that teachers must be prepared to teach reading to "visual" as versus "auditory" as versus "kinesthic" learners. Acceptable basal readers must offer "a balance and variety of materials" that cater to these different learning styles, the ELAF maintains. As with context cue instruction, this guideline on learning styles will set teachers off into a highly time-consuming, impossible-to-manage system of teaching for which there is no convincing evidence there is a need. Worse yet, it will require basal readers to move even further away from what research tells them they should do.

A notable example of the California Curriculum Commission's use of the ELAF to unfairly reject a superior basal reader system that represents an intelligent combination of literature-based, phonics-intensive instruction, was the Commission's rejection of the Open Court basal readers for grades one through three. The Commission objected to the fact that the beginning levels of the Open Court readers are devised to illustrate phonics information and that children are trained to decode words via the use of phonics, rather than context cues. The fact that these phonics skills are presented to children in a hierarchical, ordered manner was also objected to. These readers' practice of testing children to determine if phonics skills taught were actually learned was condemned by the Commission. Also on the list of supposed educational sins in the Open Court program was having teachers determine what should be taught, rather than illiterate pupils deciding this. That teachers are offered specific procedures to follow in this program was the last straw for the Commission.

In sum, the Commission found the Open Court readers in great error for assuming that the direct teaching of phonics and high-quality literature compatible. If a basal reader fully prepares a child to recognize words, the Commission concluded, it cannot possibly offer him or her good writings to read. The ELAF statement that instruction in phonics "should help students," thus was taken by the Commission as lip service and not something to be seriously heeded since the ELAF does in fact continually object to teaching phonics in a direct and systematic fashion.

With the exception of Open Court, the publishers of almost all the other basal readers, especially the best-selling ones, doubtless will be pleased by the standards set in the ELAF, which the Commission followed. In my analysis of how well the previous editions of the best-selling readers (1983) prepared first and second grade children to decode words, I found children who were taught with these readers were able to decode only about 40 percent of the new words presented in their lessons. It is evident from the ELAF standards that this percentage may be quite low without interfering with basal reader sales in California.

"Literature must be at the core of the reading program," says the ELAF. In terms of qualifying for sale in California this means basal readers must not single out reading skills for intensive practice; "teach them in

isolation," as the ELAF puts it. Forget about systematic word recognition instruction. Load up your books with "real" literature, and they will be approved for use in California schools regardless of the added word recognition difficulties this will cause beginning readers. The ELAF promises that the quality-literature advantage in such books will more than compensate for word recognition problems that are created. "Yes, but what is the hard evidence this remarkable counteraction will actually take place?" one must protest. Not to worry, say the ELAF writers. Trust us.

This reassurance suits perfectly almost all basal readers on the market since they have never engaged in the proper procedures for teaching phonics. It is relatively easy for them, therefore, to make the simple reform of placing better pieces of literature in their books, thus meeting the standard for acceptance in California schools. It obviously was more difficult for the Open Court publishers, considering their general adherence to research findings, to suddenly de-emphasize the direct teaching of phonics, and to thereby discourage teachers from using word-recognition instruction that the empirical evidence suggests. As noted, Open Court publishers paid the penalty for their ethical defense of scientific fact about reading teaching over ideological, subjective opinion by not having their books recommended by the California Curriculum Commission for use in that state's primary grade classrooms.

It is predictable, however, the the California children will be worse victims of the ELAF than will the Open Court publishers. The loss in reading skills will not be compensated for by improvement in the literary quality of basal readers recently approved of by the state's Curriculum Commission. So instead of satisfying the "new demands to provide students the best that education can offer," as the ELAF boasts it does, the implementation of this document's pronouncements will set back this instruction.

In fairness to the ELAF, it must be said that it does take a step forward in proclaiming the need for better literature to be included in basal readers. Regrettably, it also takes two steps backward by proposing regulations that doubtless will handicap the development of reading skills that children must have in order to be able to comprehend and enjoy first-rate literary materials.

In light of the alarming, and increasingly ominous statistics on illiteracy, it was unfortunate, indeed, that the writers of the ELAF refused to consult the reliable research on the teaching of word recognition, substituting in its place an ideological opposition to intensive phonics instruction.

This is the situation that brings us back full circle to the opening statement of this discussion that deplored the unnecessary, financially extravagant, partisan, and ultimately dangerous practice of choosing basals at the state level rather than in local school districts. The spectacle of the state-level selection process in California very probably will be repeated every six years, unremittingly, unless the people in that state rebel against it. Unfortunately, the legislature of California will not take action, on its own, to repeal this law. The California State Department of Education, and its cohorts in the educational establishment of the state, lobby too effectively for its retention. What California desperately needs is an initiative placed before the voters to settle this matter. I have no fear that once the general population of the state is apprised of the issues involved in state-level school textbook selection that it would readily vote to ban it.

A footnote to this deplorable proceeding: A partially redeeming aspect of the California selection of basal readers was the fact the the California State Board of Education rejected the Curriculum Commission's decision to exclude the Open Court readers from the State's schools for the next six years. Some reading experts testified before the Board about the defenseless nature of the attack on direct phonics teaching by the California Framework which the Curriculum Commission used as a guide in its efforts to blackball Open Court readers. Only at the last moment and by the barest of margins, however, was it made possible for the children of California to have access to basal readers that teach phonics properly. The hectic and precipitous nature of the Board's action, while highly appropriate, only underscores the basic wretchedness of this process and the urgent need for abandonment of state control of textbook selection. ◆

"Reading Without Nonsense"
is pure nonsense—full of dangerous fallacies

by Mary Johnson*

In late March, our own Mary Johnson of Winnipeg, Manitoba, Canada, wrote to CBC/TV to compliment that network on an outstanding documentary on education shown nationwide the evening before. She took occasion to quote at length a book written by Dr. Frank Smith, Lansdowne Professor of Language in Education, University of Victoria, British Columbia. Mary mentioned in her letter that she had heard Dr. Smith speak in Winnipeg in Febraruy and said, "What he said was so appalling in its ignorance that I sent away for his book, 'Reading Without Nonsense.' Perhaps you would like to hear some of the dangerous fallacies that our teachers are being brainwashed into accepting."

Mary then cited numerous quotations from the book. They were as follows (Note: the boldface sentences below are Mary's own words. The quotes that follow are taken directly from the book):

1. **Mistakes in reading should be accepted.** Page 34: ". .. a good reader is quite likely to make quite conspicous misreadings sometimes, like reading 'apartment' rather than 'house.' . . .This is the way fluent readers read."

2. **Don't teach phonics.** Page 51: "...I want to show that phonics . . . just does not work." Page 55: "in my judgement children who believe they can read unfamiliar words just by 'blending' or 'sounding' them out are likely to develop into disabled readers." Page 56: "I think it would be difficult to exaggerate the complexity and unreliability of phonics." Page 58: ". . .it must be shown not only that phonics is ineffective but also that phonics is unnecessary."

3. **Don't teach the alphabet.** Page 59: ". . .millions of people succeed in reading languages that do not have an alphabet." Page 62: "Reading printed words in Chinese is no more difficult than reading them in English." Page 63: "Readers do not need the alphabet. For centuries people have learned to read without knowing a thing about letters, and millions still do."

4. **Teach children** how to guess. Page 67: Guessing has a bad reputation in education and especially among reading teachers, partly through misplaced puritanism. . . Guessing . . . is the most efficient manner in which to read and learn to read."

Mary Johnson

5. **Don't expect children to figure out new words for themselves — tell them what the words are.** Page 129: "If children cannot read well enough to learn by reading, then someone else has to do their reading for them..." Page 136: "There is no need for concern that children who have the words on candy wrappers or the text of schoolbooks read to them will become lazy and reluctant to reaforthemselves." Page 139: "And discovering what a word is in the first place is usually most effectively accomplished by asking someone, listening to someone else read the word, or using context to provide a substantial clue." Page 143: "What does a teacher do about a child who cannot read at all? How does a teacher get the child started? . .. the solution requires that the teacher should read for children what they cannot read for themselves."

6. **Grammar is not important.** Page 77: "...a child who reads 'John didn't have no sweets' when the text is 'John had no sweets' may well be reading better than a child who is more literally correct."

Mary's letter continued: "I should add that Dr. Smith's book is totally undocumented — there are no footnotes of any kind, no bibliography, and not even references to the supporting views of other educators. However, educational gurus are like the unclothed Emperor — their subjects do not dare to point out the obvious." ◆

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The Silenced Dialogue—

More on DI versus Process Approaches

Reported by Wes Becker

In the August, 1988 issue of *Harvard Educational Review*, Vol. 58 (3), pp. 280-298, Lisa D. Delpit of the Baltimore City Schools enters the battle now being waged between process-oriented (including Whole Language) and skills-oriented (usually teacher-directed) instruction. Her major theme is the analysis of power as it effects the school culture, and her major concern is that all kids get taught. She sees special problems in meeting the educational needs of Black and poor students on all levels. Her article is entitled "The Silenced Dialogue: Power and Pedagogy in Educating Other People's Children."

The dialogue that is silenced is that between White and non-white educators. The Black, the Native American, the Native Alaskan, etc. quit talking to White educators *because they don't listen.* Ms. Delpit describes and examples the many power issues that underlie the culture of schools and interfere with communications between class and racial groups. One of these has to do with the directness of instruction in the classroom, and she describes DISTAR as the "ultimate expression of explicitness and direct instruction in the primary classroom" (p. 284). While there is considerable documentation that DISTAR works, Ms. Delpit indicates that the "primary issue of the conflict over DISTAR . . . [is] the expression of explicit power in the classroom. The liberal educators opposed the methods—the direct instruction, the explicit control exhibited by the teacher. As a matter of fact, it was not unusual (even now) to hear of the program spoken of as 'fascist'" (p. 285).

Ms. Delpit describes some of the issues of DISTAR and direct instruction in general, because they serve to highlight some of "the differences between progressive White educators and educators of color" (p. 285). The liberal Whites want children to become more autonomous and to develop a positive self-image "without outside standards being forced upon them." This is a very reasonable goal for people whose children are already participants in the culture of power and who have already internalized its codes.

"But parents who don't function within that culture often want something else. It's not that they disagree with the former aim, it's just that they want something more. They want to ensure that the school provides their children with discourse patterns, interactional styles, and spoken and written language codes that will allow them success in the larger society" (p. 285).

This is a familiar refrain for those of us who were with the Direct Instruction Follow Through Model and have worked with low-income groups over 20 years. The parents of our students supported us because they wanted more for their kids. They wanted them to learn to read and to think and to write. They wanted them to have a better chance in life than they had themselves.

Ms. Delpit points out that the outcry against "dialect readers" was because they prevented Black children from learning "linguistic aspects of the culture of power, thus dooming Black children to a permanent outsider caste. As one parent demanded, 'My kids know how to be Black—you all teach them how to be successful in the White man's world'" (p. 285). The author goes on to describe a suspicion by many blacks that the goal of many liberal educators is to keep Blacks out of the dwindling pool of good jobs. In my view, whether this suspicious intent is true or not, the effects of the liberal educational panaceas (usually based on a philosophy rather than data) are the same in restricting the future opportunities for the economically disadvantaged.

Ms. Delpit gives an example of the difference between what happens in DISTAR and in a progressive program focusing on higher-level thinking skills. The higher-level program introduced the sounds *m* and *e* in an early lesson, had the students write them, and put them together to make *me*. This would likely be too much for a low-performing student to learn in one lesson. DISTAR covers this information (and more) over the first forty lessons. The point is that the DISTAR approach made sure the low performers were not lost on day one. If students had the skills already, the lesson provided a test of this and they could move on quickly.

Another example: "A doctoral student in my acquaintance was assigned to a writing class to hone his writing skills. The student was placed in the section led by a White professor who utilized a process approach, [write essays and edit each others' papers]. That procedure infuriated this particular student.... In his words:

> I didn't feel she was teaching us anything. . . absolutely nothing. . .We understand how to improvise, how to express ourselves creatively . . . I'm looking for structure, the more formal language.

> Now my buddy was in [a] Black teacher's class. And that lady was very good. She went through and explained and defined each part of the structure. This [White] teacher didn't get along with that Black teacher. She said that she didn't agree with her methods. But *I* don't think that White teacher *had* any method.

When I told this gentleman that what the teacher was doing was called a process method of teaching writing, his response was, 'Well, at least now I know that she *thought* she was doing *something*. I thought she was just a fool who couldn't teach and didn't want to try'" (p. 287).

Many Blacks feel cheated by the system and it appears that there is more of it to come. We must work harder to keep the dialogue with all groups open and to promote an educational system that is effective for all. ◆

Reading & Early Childhood Education: *The Critical Issues*

by Jeanne S. Chall*

Here are some thoughtful answers to the five most important questions about teaching.

The evidence keeps growing on the critical importance of the early years in the development of literacy. Indeed, the recent National Assessment of Educational Progress[1] confirms earlier research that if we wish to have junior and senior high school students read better, we must see to it that they do better in preschool and in the early school years. But there are still a number of controversial issues concerning the teaching of reading—particularly early reading. Some of these issues are relatively new while others have been debated and researched in the past. I believe that a discussion of new and classic issues in the teaching of reading will assist principals and teachers of young children in making reasoned judgments about policy and instruction. I have selected five issues that seem to most concern teachers and administrators, and that are often the themes of journal articles and conference presentations:

Is reading always the same or does it undergo developmental changes?

This is a classic issue that has been discussed and debated for generations. Some scholars have viewed reading as essentially the same from its beginnings to its most mature forms. Others have viewed it as a process that changes as it develops.[2]

Each viewpoint leans on theory to support its view. However, from my study of the issue, there is more evidence from research and successful practice for a developmental view. What recommends a developmental view most is its usefulness. It provides help in what and when to teach, for developing reading materials and tests, and for ways to find and diagnose those with reading difficulties.

In *Stages of Reading Development*,[3] which is being used in planning school-wide reading curricula, instructional materials, the construction of reading tests, and research, I have proposed a developmental scheme that includes six stages, from 0 to 5, covering prereading to highly skilled reading. Although I am concerned here with reading in the early childhood years, I present all of the reading stages to give insight into what precedes and follows the early school years.

Stage 0, Prereading, from birth to about age six, is characterized by growing control over language. Current estimates are that average six-year-olds can speak or understand about 5,000 words. During the prereading stage, most children living in a literate society acquire some knowledge and insight into print, and learn to recognize letters, common signs, and common words. Many can write their names and pretend they can read a story that has been read to them several times.

Stage 1, Initial Reading or Decoding (Grades 1-2), involves the alphabetic principle—developing skills and insight into sound-letter relations and into the decoding of words not recognized immediately. Chil-

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dren learn to recognize the words in their books, and to "understand" the material they read. But what they can read at this stage is considerably below what they can understand in speech. Their ability to decode and recognize printed words is limited but growing rapidly.

Stage 2, Confirmation, Fluency, and Ungluing from Print (Grades 2-3), consolidates what students have learned earlier in the recognition of words and in the use of decoding skills to help them gain further insight into the reading and comprehending of familiar texts. By the end of this stage, they have developed fluency and ease in recognizing words, in "sounding" others they do not recognize immediately, and in "predicting" still others from context. The material that they can read fluently is basically within their knowledge linguistically and cognitively.

Stage 3, Learning the New (Grades 4-8), marks the beginning of reading as a tool for acquiring knowledge, feelings, values, insights, and attitudes. It is at this stage that the books students read go beyond their everyday vocabularies, beyond their background knowledge, and beyond simple narrative presentation.

Stage 4, Multiple Viewpoints (High School), requires more complex language and cognitive abilities, since the reading tasks involve more complex texts in many more advanced content areas. Students are also required to comprehend varying viewpoints at ever greater depth.

Stage 5, Construction and Reconstruction (College Level), the most mature stage, is characterized by a world view. Students read books and articles in the detail and depth that they need for their own purposes. Readers in Stage 5 know what *not* to read as well as what to read. Reading here is basically constructive. From reading what others say, students construct knowledge for their own use.

From these very brief characterizations one can see qualitative changes from stage to stage, with a major qualitative change at Stage 3, which marks the end of the primary grades (the early childhood years) and beginning of the intermediate grades. Stages 0, 1, and 2 can be said to represent the oral tradition, in that text read at these stages rarely goes beyond the language and knowledge that the reader has previously acquired through listening and direct experience. Stages 3, 4, and 5 (Grades 4 and beyond) may be viewed as comprising the literary tradition—when the reading content, as well as the language read, goes beyond what is already known.

Thus, reading at Stage 3 can be seen as the beginning of a long progression in the reading of texts that become ever more complex, literary, abstract, and technical, and that require more worldly knowledge and ever more sophisticated language and cognitive abilities. The materials that are typically read at Grade 4 and beyond show distinctive changes in content, in linguistic complexities, and in the cognitive demands on the reader when compared to those generally read in Grades 1 to 3.

It is important to note that teachers and other school personnel have long been aware of this distinction. They have often considered the primary grades as the time for "learning to read" and the intermediate and upper elementary grades as a time of "reading to learn." In the early grades, the main task is to bring students' word recognition and decoding up to their more advanced linguistic and cognitive levels. From Grade 4 on, the main task is to raise students' language and cognitive abilities to meet the demands of their texts—a more difficult task, indeed.

Reading stages can contribute to a better understanding of how reading is acquired and how the total environment, as well as the school environment and instruction, may be made optimal for pupils at the different stages. For example, most children who enter first grade (beginning of Stage 1) need to acquire a knowledge of the alphabetic principle—how the letters relate to the sounds of the language, or how to "sound out" words. While some children may discover this principle by themselves, the research evidence over the past 70 years is overwhelming that direct instruction is needed and contributes to better development of decoding, word recognition, and comprehension, and provides a better transition to later reading stages.[4] This is because the relations between sounds and letters are usually not discovered without instruction by most children, particularly those at high risk. Toward the end of the decoding stage, the knowledge and skills acquired can become self-generative. That is, some growth can be achieved with practice on one's own.

Stage 2 (Grades 2 and 3), the development of fluency, requires a great deal of reading and practice. This would suggest the necessity for providing many books to be read in addition to texts and workbooks.

With the skills and abilities acquired in Stages 1 and 2, the focus of reading instruction in the middle grades should be on literature and on reading in the various subject areas—textbooks, reference works, and other sources.

While a developmental theory does not prescribe methods, it does suggest the need for certain practices

in order for more advanced levels of achievement to take place. Thus, it would appear that a global and playful approach, while suitable for developing "readiness" and "emergent" skills in pre-school and kindergarten, would be less effective in Grades 1 and 2, when children need to acquire decoding and word recognition skills, and should be reading many books to gain fluency.

For the intermediate grades (Stage 3), or earlier if children are more advanced, instruction in reading should go beyond the familiar in content, in language, and in thought. Therefore, reading instruction needs to be given not only from basal readers, which contain mainly narrative fiction, but from texts and books in social studies, science, health, and literature. For most children, a greater focus on word meanings is needed since their reading materials contain a greater proportion of abstract, technical, and literary words not known to them.

Should we teach reading skills or let children learn by "just reading"?

Each generation asks this question in a somewhat different way, and tends to have answers that vary.

At the present time, the question to be decided is whether to provide reading instruction with basal readers and workbooks, or children's story books. Two decades ago, the question was: Which is better, individualized reading (self-selection of trade books) or group instruction? Another related question that has been debated for more than a century, concerns the use of phonics. Is it necessary to teach phonics? Don"t children learn better without sounding or decoding words?

All of these questions have one essential point in common: Do children learn to read better, and love it more, if they are taught *how* to read, or if they figure it out by themselves by "just reading"?

The evidence from research would seem to indicate that both are needed for optimal reading development. Knowing how (reading skills) is necessary, but not sufficient; and learning from "just reading" bogs down when the student's skills are deficient. The mass of the research on reading indicates that better results are achieved when young children are taught skills systematically and directly, and use these in reading. It also shows that being read to and reading and writing stories, poems, and informational selections—to which they apply their newly gained skills—are also important for reading development.

At each of the reading stages, a balance of "learning how-to" with "practicing and doing" is needed. Too great an emphasis on skills may deprive children of time to read. Similarly, a diet of "just reading" without instruction in the skills may slow down development. The research does not support the claims of some that skills and know-how develop naturally from "just reading." Indeed, it shows that development is *enhanced* by skills, particularly among those making slower progress—children from low-income homes and those at high risk for learning disability.[5]

Ironically, although the strongest argument proposed for the "just reading" view is a love of reading, there seems to be no evidence to back it up. Indeed, negative evidence can be found from the fact that some of the greatest writers and readers have been educated in schools that taught reading mainly as skill development.

How easy or hard should instructional reading materials be?

Research and theory during the past decade have found that books that are challenging—at or somewhat above the student's reading level—produce higher reading achievement than easier books, particularly when the teacher provides instruction. Research in the Harvard Reading Laboratory which related the difficulty of school textbooks, used from Grade 1 to Grade 12, to SAT verbal scores found that when harder textbooks were used, the students achieved higher SAT scores. Easier books produced lower scores. Further, the difficulty of the *first-grade* books seemed to exert the greatest effect.[6] Why should first grade be so important? We suggest that it is probably because it is when the child is introduced to the alphabetic/writing system of our language. It is difficult for most children to discover the system for themselves. Hence a stronger, more difficult program in the first grade prepares the child for later stages, which can be practiced even if less direct instruction is provided.

These findings are backed up by the Russian psychologist Vygotsky, whose theory of proximal development proposes that the optimal level of instruction is one above the student's current development, but at which the student can learn when instructed by a teacher.

Thus, teachers should take pains to see that the books used for instruction are not too easy. In our study of the reading, writing, and language of low SES children in grades 2 to 7, we found that the greatest reading gains were made by students who were learning from basal readers at or above their reading level—but not below.[7] And yet children continue to receive

instruction from basal readers below their level. Since most instructional time for reading involves the use of basal readers, it is essential that these readers contain materials that challenge all students—including those who read above level.

Additional evidence for the value of challenging instructional materials comes from recent research on classroom grouping. Several studies have found that when children in the lowest reading group were placed in a group that used more difficult materials, they actually did better.

This concept needs to be considered by all of us, for it goes counter to the conventional wisdom of book selection for the past 50 years—the easier, the better.

To test or not to test?

Attitudes toward reading tests have been quite conflicting. We give more and more tests, and we seem increasingly dissatisfied with them, even to the point of rejecting them and research results that are based on them. There is also a fear that the increasing use of tests will lead to teaching for the tests. And yet, when test scores rise, we are happy to accept the results as evidence of hard work by teachers, administrators, and students.

It is easy to overlook the benefits of tests—for evaluating programs, for assessing children's reading development, for noting their strengths and weaknesses. Tests also help us find those children who are falling behind and need extra help.

And yet, I have found that few schools make full use of the tests that they give. Many do not seem to use the results to evaluate a child's reading development from year to year, to make sure that progress is being made as expected. Although standardized tests leave much to be desired, combined with teacher judgment they can be used constructively for this purpose since they are highly predictive of later achievement. Thus Grade 2 reading scores predict Grade 6 scores, and the Grade 6 scores predict whether students will graduate high school or will drop out—if no special help is given to those who need it.[8]

What about research? Does it improve practice?

The mass of research on reading, and the highly technical way in which it is written, often intimidate school administrators, policy makers, and teachers. I think sometimes that this growing mass of research has tended to produce an attitude that, while it is well and good, it has little to do with practice. One can well understand this view, for it is difficult, if not impossible, to keep up with all the research published.

And yet, my long years in both research and practice have not lessened my confidence in the value of research for informing practice. Knowing is always better than not knowing.

While research can help administrators make teaching and policy decisions, it is wise to realize that one study on an issue, by itself, is usually not sufficient to inform successful practice. It is recommended, therefore, that teachers and school administrators rely on syntheses of research—reports that sift through and interpret related studies on specific topics.

I hope that this brief discussion of major issues in reading will be of some assistance to principals and administrators who must devise and direct early childhood reading programs. It's an enormous responsibility. ◆

Notes

1. National Assessment of Educational Progress, The *Reading Report Card: Progress Toward Excellence in Our Schools; Trends in Reading over Four National Assessments, 1971-1984* (Princeton, N.J.: Educational Testing Service, 1985).
2. For an overview of the two views, see J.S. Chall and S.A. Stahl, "Initial Reading Methods," in *The Encyclopedia of Education*, eds. T. Husen and T.N. Postlethwaite (Oxford: Pergamon, 1985). For views of reading as "unchanging," see K. Goodman and Y. Goodman, "Learning to Read Is Natural," in *Theory and Practice of Early Reading*, eds. L. Resnick and P. Weaver, vol. 1 (Hillsdale, N.J.: Lawrence Erlbaum Associates, 1979), and F. Smith, *Reading Without Nonsense*, 2nd ed. (New York: Teachers College Press, 1985). For developmental views, see J.S. Chall *Stages of Reading Development* (New York: McGraw-Hill, 1983); D. La Berge and S.J. Samuels, eds., *Basic Processes in Reading: Perception and Comprehension* (Hillsdale, N.J.: Lawrence Erlbaum Associates, 1977); C. Perfetti, *Reading Ability* (New York: Oxford University Press, 1985); and R.C. Anderson et al., *Becoming a Nation of Readers: The Report of the Commission on Reading* (Champaign, Ill.: The National Academy of Education and The Center for the Study of Reading, 1985).
3. Chall, *Stages of Reading Development*.
4. J.S. Chall, *Learning to Read: The Great Debate* (New York: McGraw-Hill, 1967; updated ed., 1983); Perfetti, *Reading Ability*; Anderson et al., *Becoming a Nation of Readers*; and *What Works* (Washington, D.C.: U.S. Department of Education, 1986).
5. See in this connection B. Bettelheim and K. Zelan, *On Learning to Read: The Child's Fascination with Meaning* (New York: Knopf, 1982), and J.S. Chall, "Reading and the Unconscious" (review of Bettelheim and Zelan), *Contemporary Education Review* 2 (Spring 1983): 7-11.
6. J.S. Chall, S. Conard, and S. Harris, *An Analysis of Textbooks in Relation to Declining S.A.T. Scores* (Princeton, N.J.: College Entrance Examination Board, 1977).
7. J.S. Chall and C. Snow, *Families and Literacy: The Contribution of Out-of-School Experiences to Children's Acquisition of Literacy*, Final Report to the National Institute of Education, December 1982.
8. B. Bloom, *Human Characteristics and School Learning* (New York: McGraw-Hill, 1976).
9. J.S. Chall, *School and Teacher Factors and the NAEP Reading Assessments*, position paper prepared for the Committee on the Evaluation of the National Assessment of Educational Progress in Reading, August 1986 (available from ERIC).

Review: *CAI Books for the Classroom Teacher*

Microcomputer Applications in the Elementary Classroom—A Guide for Teachers
George W. Bright
Allyn and Bacon, Inc., 1987
198 Pages $28.95

Selecting and Implementing Educational Software
Samuel K. Miller
Allyn and Bacon, Inc., 1987
183 pages $26.95

Reviewed by Pat Rankin
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These two texts are aimed at the elementary teacher who, through interest or necessity, is interested in developing some expertise in the use of computers in the classroom. Both authors sympathetically address the problems inherent in developing new curricula in an unfamiliar field. The material contains enough explanation to help the novice while developing really good standards for goal setting for the not-so-novice reader.

Bright, in *Microcomputer Applications in the Elementary Classroom,* has a realistic approach to the problems and opportunities that one or more computers can bring to the classroom. He mentions the all too frequent problem of purchase of machinery without concurrent planning for their use. Teachers are the ones who ultimately must implement any goals that are developed for the use of computers, so this book is an attempt to develop a knowledgeable teaching staff.

Four chapters are devoted to CAI software programs that supplement curricula such as Drill and Practice CAI, Tutorials, Games, and Simulations. Enough information is provided in each chapter about what they are and how they should be used, based on research findings, to help the classroom teacher decide where each type might fit into the lesson plans. There are sample programs illustrated and evaluation of some specific programs. Although his overviews are clear and pointed, I found the programs listed were rather dated and not too easy to identify with any specific curriculum area.

The utility programs such as word processing, grade books, data bases and diagnosis of errors are covered in separate chapters scattered throughout the book. The chapters on word processing gives a fairly extensive summary of Bank Street Writer. However, the author does not make it clear whether this is Bank Street Writer I or Bank Street Writer II, or how to find it for purchase (presuming that the reader is new to the game).

Evaluation of software is addressed throughout the book and in an additional chapter. The rationale for evaluation is presented and several checklists are illustrated. These lists have been reduced in size to fit on the page and are rather hard to read. They all have so much information jammed onto the sheet that I have a tendency to skip over most of them. The names and addresses of eight collections of evaluations are included in this chapter, along with some reduced in size copies of sample evaluations. Bright suggests that teachers might wish to develop their own evaluation form, a suggestion that would not seem to helpful to a novice.

The question of whether to teach programming in the elementary grades is presented as a problem solving area. FORTRAN, COBAL, PASCAL, ADA, and C are listed as languages, LOGO and BASIC are slightly covered, but the presentation is more likely to cause confusion than any real understanding of their management or purpose.

The chapter on computer literacy gives a description of the needs for and uses of computers. This would be a good chapter to recommend to someone who knows nothing about the use of computers in the schools and wants a quick overview. Two examples of computer literacy scope and sequence are included, but suffer from poor quality printing.

This text presents a easy to read synopsis of things to think about when introducing a computer system to an elementary school. It could be a valuable addition to the staff library, either as an introductory text, or as a guide for planning workshops to the staff. It does not have a very complete documentation of the programs it mentions and really doesn't give much specific help. It does not address the problems associated with breakdowns, classroom management, student sabotage or software glitches. For these types of problems, Sam Miller's book, *Selecting and Implementing Educational Software,* fills the bill nicely.

As Miller's title states, his book focuses on the selection of appropriate software and gives suggestions for management of the computer environment. It is very well-organized with careful, although somewhat simple, explanations, a wide variety of examples, and really good documentation. It even had a sent of readings and a set of projects and questions at the end of each chapter.

The chapter covering Educational Software and utilities is lean and would appeal to the more experi-

enced computer teacher. It summarizes briefly design and uses of drill and practice, tutorial, simulation-oriented CAI and instructional games.

The chapter on "Tool Software" has a careful explanation of the functions found in word processing programs with hints for desirable features in such programs. The data base section tells the more important points to consider when selecting such a program. A nice touch is the inclusion of the tools for creative arts, e.g., "Songwriter" and several creative graphics programs. Teacher utilities are also covered in this chapter, as is a very brief description of the languages PASCAL, LOGO and BASIC.

The real meat of this book is the "how to" in selecting software. Excellent suggestions for sources of information, evaluating the sources as well as the software, and sources of software are given. The illustrations are easy to read and give a sense of the actual display on the screen.

The chapter about software evaluation and the chapter on organizing and using the software once you have it, ca and probably should be used by any teacher or committee responsible for purchasing educational software. The suggestions are reasonable, practical and, if followed, might avert some of the frustration and confusion that seems to be part of any new program.

I found that these two books supplemented each other quite well, the Bright text as an very nice introduction for the novice computer teacher, and the Miller text as a practical handbook for actually setting up and running a classroom program. ◆

Leveled Behavior Management Systems: Development and Operation

George Sugai, Ph.D.
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Many special educators arrange their instructional environments so learning occurs along a continuum of restrictiveness. At one end of the continuum, expectations approximate those of the less-restrictive (often "mainstream") setting and students are afforded greater opportunities for independence and self-management. The school discipline plan is used to manage inappropriate behaviors. At the other end, students are expected to comply with specific teacher-directed demands and must function under more restricted conditions. Independent student functioning is limited and inappropriate behaviors are managed through specific and individualized plans. When educational programming for academic and/or social behaviors is characterized by a continuum that is marked by clearly stipulated steps or phases, a LEVELED BEHAVIOR MANAGEMENT SYSTEM has been established (Bauer & Shea, 1988; Bauer, Shea, & Keppler, 1986; Kerr & Nelson, 1983; Mastropieri, Jenne, & Scruggs, 1988).

This paper describes specific guidelines for developing and operating a leveled behavior management system. Four major aspects are discussed: (a) prerequisites for effective classroom management, (b) characteristics of a leveled system, (c) basic operating procedures, and (d) a classroom illustration. Although programs for students with severe learning and behavior disorders are emphasized, most aspects of this discussion can be applied across grade levels (i.e., preschool, elementary, secondary, post-secondary), type of learning problems (i.e., academic, social behavior), and classroom configuration (e.g., resource, self-contained, special school).

Prerequisites for Effective Behavior Management

This system is not intended to replace sound instruction, schoolwide discipline plans, or individualized education plans. Leveled behavior management systems are most effective where sound teaching practices are in place. Effective teachers have a number of qualities and skills (e.g., brisk pace, clear instructions, smooth transitions, positively reinforcing) that enable them to maximize student learning and minimize behavior management problems. Readers should refer to Bickel and Bickel (1986) and others (Brophy & Good, 1986; Colvin & Sugai, in press; Rosenshine, 1987; Rosenshine & Stevens, 1986; Wolery, Bailey, & Sugai, 1988) for a review of effective teaching practices.

Characteristics of a Leveled Behavior Management System

Leveled behavior management systems have a number of common characteristics. They include the following:

1. *Dynamic continuum of clearly identified steps or levels that highlight movement toward less-restrictive conditions.* Although each step may consist of a number of sub-levels, there usually are no more than four or five major steps in the continuum. This continuum tends to be highly teacher-directed at one end and more student-directed at the other.
2. *An observable and specific set of desired behaviors or*

competencies. Clearly defined behaviors define the student's place within a leveled behavior management system and function as behavioral targets for advancement toward less-restrictive conditions.

3. *Specific set of observable rules and consequences for undesirable behaviors.* At one end of the continuum, rules and consequences approximate those of the mainstream (i.e., less specific and more intermittently enforced). At the more restrictive end of the continuum, contingencies are more overt, less like the mainstream environment, and more frequent and immediate.
4. *Measurable criteria for placement and movement through the level system.* Based on the kind and frequency of behaviors displayed, level systems have specific criteria that establish forward movement for appropriate behavior and backward movement for inappropriate behavior. To allow for more student individualization, new students may be placed at the level that best matches their current level of individual functioning.
5. *Equal emphasis placed on academic and social skills.* A leveled behavior management system provides a structure for both academic and social behaviors.
6. *Procedures for continuous assessment and evaluation of student performance.* Student behaviors are measured continuously, and decisions about placement and movement along the leveled continuum are based on regular evaluations of student performance.

Basic Operating Procedures of a Leveled Behavior Management System

The most important aspect of operating a leveled behavior management system is adequate planning. Steps include the following:

1. *Identify the number of levels required to delineate the behavior management continuum.* In general, a relatively small number of levels should be developed (i.e., three to five). The actual number will depend on the (a) type of program (e.g., resource room, special school), (b) kind, severity, and range of academic and social behavior problems, (c) age/grade range of the students, and (d) physical resources and space.
2. *Identify the characteristics that distinguish one level from another.* Each level should be defined so students can describe their position on the continuum and understand to what level they are working. Characteristics of higher levels should be increasingly more desirable or "reinforcing" to the student.
3. *Define behavioral expectations and transition criteria for each level.* Students should know what is required of them to remain in good standing at a given level and what kind and degree of behavior is required to progress to the next less-restrictive level.
4. *Define positive and negative consequences for each level.* Clear positive outcomes or rewards should be stipulated for desirable behaviors at each level. Similarly, negative consequences should be specified for behaviors that are rule infractions.
5. *Develop a data-monitoring system.* Data-monitoring procedures and instruments should be simple and direct so information and progress can be communicated to parents, students, and others.
6. *Establish general operating procedures.* Regardless of the specific nature of these procedures, they should be preplanned, taughtsystematically to students, and consistently applied.

A simple checklist is provided in Figure 1 to assist teachers in the development and implementation of leveled behavior management systems. Questions are divided into three major categories: (a) Levels, (b) Behaviors, and (c) Implementation.

Figure 1. Checklist for developing and implementing a leveled management program.

LEVELS	
Yes ? No	Are individual levels distinct and measurable?
Yes ? No	Do the levels form a continuum that moves students toward approximations of the expectations and requirements of the natural learning environment?
Yes ? No	Do privileges and reinforcer schedules at the highest levels approximate the natural environment?
Yes ? No	Have procedures for smooth transitions between levels been established?
Yes ? No	Have clear and objective rules, including criteria, for movement between levels (i.e., forward and backward) been developed?
Yes ? No	Is movement between levels based on learner performance?
BEHAVIORS	
Yes ? No	Do behavioral expectations focus on the requirements of the less-restrictive environment?
Yes ? No	Are behavioral expectations specific and observable?
Yes ? No	Have observable and specific rules and consequences been established for undesirable behaviors?
Yes ? No	Have observable and specific rules and consequences been established for desirable behaviors?
Yes ? No	Has equal emphasis been placed on academic and social behaviors?
Yes ? No	Do behavioral expectations reflect increased student independence and less teacher-directed behavior as the student moves to higher levels?
IMPLEMENTATION	
Yes ? No	Are the needs of the individual student addressed?
Yes ? No	Has a student behavior monitoring procedure been developed?
Yes ? No	Have all participants (i.e., students, teachers, parents, administrators, etc.) been informed about the leveled behavior management system?

Yes ? No	Have all students been oriented and taught how the program functions?
Yes ? No	Has a specific plan of implementation been established (i.e., before actual initiation)?
Yes ? No	Have a procedure and schedule for student goal setting and evaluation (individual and/or group) been established?
Yes ? No	Is the overall management plan evaluated on a regular basis?

Level Components

Each level within a leveled behavior management program should include the following components: (a) name of the level, (b) general description, (c) expectations and transition criteria, (d) consequences and privileges, and (e) level transition rules. See Figure 2 for an illustration of the required level components.

Figure 2. Illustration of General Level Components

Level II Name: BRONZE STAR

General Description:
The BRONZE STAR level falls between White and Gold Star. It provides more opportunities for students to experience greater independence and responsibility. Although academic and behavioral demands are increased, classroom and school privileges also are increased. More opportunities for peer socialization are available. No more than 50% of day is spent in the regular classroom.

Expectations & Transition Criteria:
1. Model five classroom rule-following behaviors.
2. Display five classroom rule-following behaviors with no more than 3 demerits.
3. Have Performance Monitoring Sheet available at morning and afternoon performance evaluation meetings.
4. Participate in performance evaluation meeting appropriately with no more than 3 demerits.
5. Follow teacher directives the first time within 5 seconds (90% of opportunities).
6. Meet daily individualized goals.
7. Take, complete (50%), and return homework assignments.
8. Take timeout on first request (75%); second request (100%).

Consequences & Privileges:
1. Full participation in all in-class activities, but not in out-of-class privileges.
2. Free time in room alone or with others.
3. Breaks permitted with permission and hall pass.
4. Special contracts if teacher developed.
5. Daily snack with second helpings on either drinks or crackers; no specials.

Transition Rules:
MOVE BACK a level if 3 consecutive days with five or fewer expectations or if one major timeout or three minor timeouts earned in 1 day.

MOVE UP next level when all expectations satisfied concurrently.

Concluding Comments

Leveled behavior management systems can be powerful tools for structuring the school experiences of students with learning and social behavior problems. They provide a dynamic and flexible means of managing and monitoring individual student performance and moving the student toward less-restrictive environments. Successful operation is contingent upon careful planning and consistent implementation.

For a leveled management system to be successful, a number of guidelines should be followed. First and foremost, the structural and operating procedures of the program should be preplanned. If weaknesses, oversights, or discrepancies exist, students will find them and the integrity of the program will be lessened. Second, behaviors, criteria, rules, and consequences should be defined in observable and measurable terms to prevent unnecessary disputes. Third, a continuum of expectations and competencies that move toward an approximation of the natural environment, or next least-restrictive setting, should be developed. Fourth, students should be taught systematically and directly how the level system operates and how the various expectations, rules, and consequences are defined. To avoid such failure, students should be carefully oriented to the system. Fifth, student performance should be monitored closely and continuously. Finally, in addition to students, all key players (i.e., parents, teaching assistants, building administrators, and other teachers) should be instructed about the nature and operating characteristics of the leveled behavior management system. ◆

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Extending Critical Skills with Low Performers—*Between-Class Generalization*

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This project was funded by the U.S. Office of Special Education to allow us to investigate the problems of teaching complex skill clusters to learners with severe handicaps. It is our belief that many skill deficits of our students remain because our extant instructional models are inadequate, not because our students cannot learn. As we attempt to teach complex community referenced skills to learners with more severe handicaps, we need more powerful instructional models. A major purpose of this project is to develop a conceptual approach to generalization that more fully analyzes the multiple interactions that occur within and between skill clusters in order to develop an instructional technology that will allow learners to more spontaneously and independently interact with their world.

Traditional Model of Generalization

All models of instruction for learners with severe handicaps address the problem of generalization in one way or another. Many curriculum models deal with the problem of generalization in a *post hoc* manner. That is, after instruction of the skill has taken place in one setting or with one set of materials, the student's performance across other related settings and materials is assessed and instruction is then added so that competent performance is extended to all areas of functioning that are critical for the individual. For example, for a young adult, if instruction is implemented to teach an appropriate social greeting to coworkers at a job site by the learner's job coach, this skill might subsequently be extended to the supervisor, bus drivers, and group home workers until all of the people whom the student routinely encounters are included. The defining characteristic of more traditional instruction is that instruction to extend performance occurs *after* the skill is initially taught. Performance is extended by teaching the student to respond to each new condition (i.e., new people, settings, times, or materials) until all critically important situations have been included.

This traditional model of instruction has some powerful benefits. First, it ensures that through direct instruction, the student can respond across all critical situations, materials, and people. In addition, it is frequently found that as performance is extended from the initial instruction of a skill, that each subsequent training of the skill under new conditions is more and more rapid. Sometimes students spontaneously respond correctly to new, untaught situations. This would represent a "true" form of generalization, as the response to the novel item, person, place, or time was never directly taught or reinforced. The model is limited, though, by several factors. First, because generalization was considered after the fact, a thorough survey of critical situations to which the student ought to respond is frequently missing. Thus, there may be critical "holes" in the skill that was taught. Second, the model is dependent on teaching each new situation individually— it does not necessarily teach the student to generalize in the absence of training.

The introduction of Direct Instruction (e.g., Becker, Engelmann & Thomas, 1975; Engelmann & Carnine, 1982) and General-Case Programming (e.g., Horner, McDonnell, & Bellamy, 1986; Albin & Horner, 1988) offered a major breakthrough in creating generalized learning outcomes for students with severe handicaps. Following the principles of General-Case Programming, the instructor first identifies a class of events, objects, or people to which the student ought to be able to respond correctly once training has occurred. Examples of classes of stimuli might be all colors and types of rotary dial telephones, all same-aged peers whom a student knows, or the range of colors and sizes of industrial fasteners that are used for assembling a Sears swing-set. After a class is identified the student is taught with one item from a class. As training progresses, generalization probes are periodically conducted across the other members of the class (that are still untrained) to identify if generalization has occurred. If generalization has not occurred, once the first example has been taught, additional examples are trained until generalization to the entire class occurs. Most research conducted with learners with severe handicaps indicates that students generalize to broader classes after training with three to five examples of a class. An important contribution of General-Case Programming has been the specification of guidelines as to the order of examples trained. Training should begin with the most typical or representative member of a class. Subsequent training should be extended to examples that are closer to the boundaries of nonexamples, that is, examples that are least representative of the class. By so doing, the student is exposed initially to the most typical examples and then subsequently to the most unlikely examples so that the student learns the entire range of critical examples from a class. Finally, General-Case Programming in-

troduces the idea that training with non-examples is as critical to independent living as is training with critical examples. For example, in teaching students to safely cross streets, a freeway might be used as a non-example of the class "streets that you can cross".

In the development of the conceptual model for the Generalization Research Project we have used Direct Instruction and General-Case Programming as fundamental components of our model. However, in the analysis of many independent living skills we have been struck by that fact that many larger repertoires are composed not of single classes of events, items, or people, but multiple, interrelated classes. Thus, to fully teach a large repertoire, multiple classes need to be analyzed and taught. The purpose of the Generalization Research Project is to develop a research and curriculum model that deals with the interrelationships of multiple classes. Although this analysis is somewhat more complex, the potential advantage of this approach is twofold. First, a more thorough analysis will potentially lead to greater degrees of independent living, as a more thorough analysis of skill repertoires is completed. Second, the model offers the potential of greater overall levels of generalization as generalization occurs both within individual classes, and across interrelated classes.

A Model of Generalization

Our model of generalization adds the concept of *Between-Class* generalization to the traditional model of generalization. As reviewed above, most analyses of generalization look at responding *within* classes of objects, events, or persons. For example, using a within-class model, a student may be taught to appropriately play with toy cars by training the student to play either serially or concurrently with a broad class of toy cars until generalization occurs within the entire class. General-Case programming offers a well validated model to structure this training. However, if a broader repertoire of *play responses* is desired (e.g., playing with toy airplanes, boats, spaceships, and Teenage Mutant Ninja Turtles), training must be expanded to include multiple classes of toys. If the goal of instruction is to teach the broader repertoire, the traditional model of instruction and generalization offers little guidance.

Between-class generalization describes the generalization that occurs across or between interrelated classes of stimuli. For example, once a student has been trained a generalized play response in the presence of a class of toy cars, between-class generalization occurs if the student emits a play response in the presence of novel classes of toys (e.g., planes, boats, or spaceships) (Haring, 1985).

In teaching broader critical skills repertoires, the first step in the analysis is to identify all of the possible interrelated classes and skill clusters that comprise the repertoire. For example, one area that we have analyzed using this model is teaching students to identify age-appropriate items and activities that relate to their appearance in integrated settings. We identified multiple classes of age-appropriate items (e.g., shirts, pants, hairstyles, shoes, accessories, and sweaters) and then trained students to determine which items from each class are appropriate or inappropriate. Sufficient exemplar training was conducted within each class. For example, we first taught a student to be able to identify a class of age-appropriate pants, that is, pants that share positive stimulus components (e.g., narrow cuffs, zippers) and exclude negative stimulus components (e.g., the presence of cartoon graphics or bell bottoms). After the student learns to make generalized selections from the first class of pants, a second class (e.g., sweaters) was taught. When a student was taught to select a class of age-appropriate sweaters, the prior training with pants facilitated learning the similar (interrelated) task of judging age-appropriate items from other classes. In this case, if a student has learned that cartoon graphics are age-inappropriate on pants it is relatively easy to apply this discrimination to the interrelated class of sweaters.

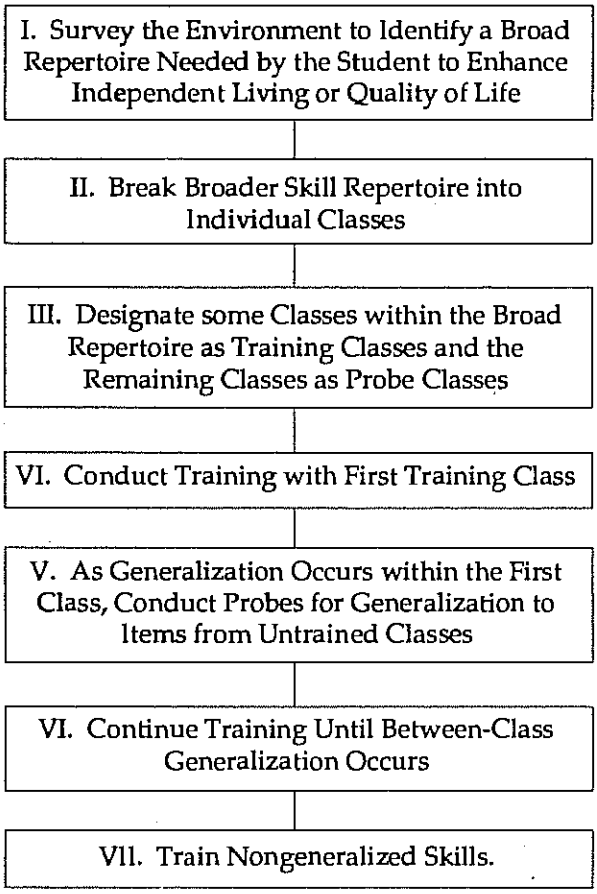
The primary purpose of the Generalization Research Project has been to conduct a series of studies that document the ability of learners with severe disabilities to show this type of complex generalization. As a result of these demonstrations, we have developed an approach to generating curricula based on this analysis of between-class generalization.

The Between-Class Model of Generalization

Figure 1 shows a flow chart for the process that we have validated for conducting between-class generalization training. Each step of within the flow chart will be described so that curriculum developers can apply this model of generalization to other skill repertoires needed by specific students.

STEP 1: Survey the environment. The first step in the Between-Class Generalization Model is to survey the environment to identify broad interrelated response clusters that comprise a skill repertoire. We have used this model of research to develop instructional programs for the following repertoires: toy play, age-appropriate clothing selection, cooking meals and snack foods, making purchases in community settings, social language use during game playing on micro computers, and solving problems at vocational sites.

Figure 1. Between-class Generalizations Model



STEP 2: Break the broad repertoire into classes. Once a repertoire has been selected for intervention, the next step in the Between-Class Generalization Model is to break the repertoire into interrelated classes. In many cases the division of a repertoire into individual classes is a simple process that can be done by the identification of natural categories of objects from the repertoire. For example, in analyzing the repertoire that comprises appropriate toy play, toys were broken into natural classes of toys such as boats, cars, airplanes, spaceships, animals, human figures, and construction vehicles. Each class of toys was to be played with using different movement patterns. For instance, human figures were made to move from side to side on two feet (as if walking) while animals were made to move from side to side on four feet. Generally, the most preferred approach to the creation of classes is to use the natural categories of objects needed within the broader skill repertoire. This method of classification can be referred to as *Natural Concept Classification.*

In other cases, the initial selection of events or items to be trained within the repertoire do not define themselves into obvious classes. For example, within an analysis of cooking skills (Haring, Breen, Laitinen, Bednersh, & Weiner, 1989), 32 recipes were identified that would be needed for independent living in apartment settings. Recipes included making hamburgers, milkshakes, salads, sandwiches, and fried eggs. The initial survey of recipes left us a bit bewildered as to how to classify the recipes into classes. However, upon closer inspection we realized that several classes of recipes could be formed not by the identification of traditional food groups (e.g., meats, vegetables, or fruits) or by types of dishes (e,g., main dishes, side dishes, or desserts) but by the classes of appliances needed to prepare the meals or food items. Thus, what initially appeared as 32 separate recipes with some overlap by group, or function within the meal was separable into 8 classes: Toaster, Oven, Stove Top, Sandwiches, Hot Pot, Fry Pan, Salad, and Blender. Each class contained 4 recipes. Subsequently, when training was being conducted we could expect generalization both within classes (for example if you can make a tuna sandwich, it will facilitate learning to make a deviled ham sandwich) as well as between classes (e.g., if you learn to slice cheese to make a toasted cheese sandwich, it will be easier to learn to slice tomatoes to make tacos). This method of creating classes might be referred to as *Functional Classification.* That is, the members of the class are grouped by common operations needed to produce or operate each member of the class (Becker, et al, 1975).

STEP 3: Designate training and probe classes. The third step is to divide the classes identified from Step 2 into two groups: Training Classes and Probe Classes. To accomplish this, each task from each class is first task analyzed. The process of task analysis breaks each skill to be included within the repertoire into a series of steps needed to perform that task. In conducting a task analysis for use in this model, it is preferable to conduct the analysis in the most general terms in the form of a *generic task analysis.* A generic task analysis consists of the overall outcomes to be obtained for each step of the analysis. In contrast, a *specific task analysis* is composed of a detailed listing of the exact responses that are needed to do a task. A generic task analysis contains far fewer steps than a specific task analysis and stresses the outcome or operation to be performed rather than the exact response topography needed. Examples of the two types of task analyses are given in Table 1 to illustrate the differences between a generic and a specific task analysis.

Table 1. Examples of Generic and Specific Task Analyses of Hand Washing

Generic Task Analysis	Specific Task Analysis
1. Enter bathroom	1. Walk to bathroom
	2. Push open door marked Women
2. Stand in front of sink	3. Walk to sink
3. Turn on water	4. Place hand on faucet
	5. Twist faucet to right 1/2 turn
4. Put hands in water	6. Put hands in water
5. Put soap on hands	7. Place right hand on lever of soap dispenser
	8. Place left hand under dispenser
	9. Pump lever with right hand 4 times
6. Rub hands under water	10. Place hands under water
	11. Rub hands together
7. Turn water off	12. Place right hand on faucet
	13. Turn faucet off to the left.
8. Dry hands	14. Walk to paper towel dispenser
	15. Place right hand on lever
	16. Pump lever 5 times
	17. Tear off paper towel
	18. Dry hands

Once each task has been task analyzed, the resulting response chains are compared both within and across tasks. To conduct the comparison, the curriculum developer looks for the same generic steps as they appear across the separate task analyses. The chains targeted for training should have the greatest degree of overlap in terms of response requirements with the probe chains.

Figure 2 shows the overlapping steps from the generic task analyses from the 32 recipes targeted for our study of cooking skills. The analysis indicates that there were 17 steps from the 32 recipes that were shared to one degree or another across the recipes. The task for the curriculum developer is to choose a subsample of tasks for training that contain an optimal, or maximal degree of overlap to tasks that are not as yet being taught. From the example shown in Figure 2, the solid (dark) boxes that appear under the first recipes from the Toaster, Oven, Stove Top, and Sandwich Classes indicate that these were the four recipes selected for the initial training of this complex cooking repertoire. A blank area in Figure 2 indicates that the response was not needed in a given task analysis. Thus, the response, "get items from cupboard" was included on all task analyses. The response, "Slice Hard" (e.g., objects such as hard cheese) was included in only 8 task analyses. It was critical to select at least one task analysis that included slicing hard objects as a training task as it was a relatively rare response.

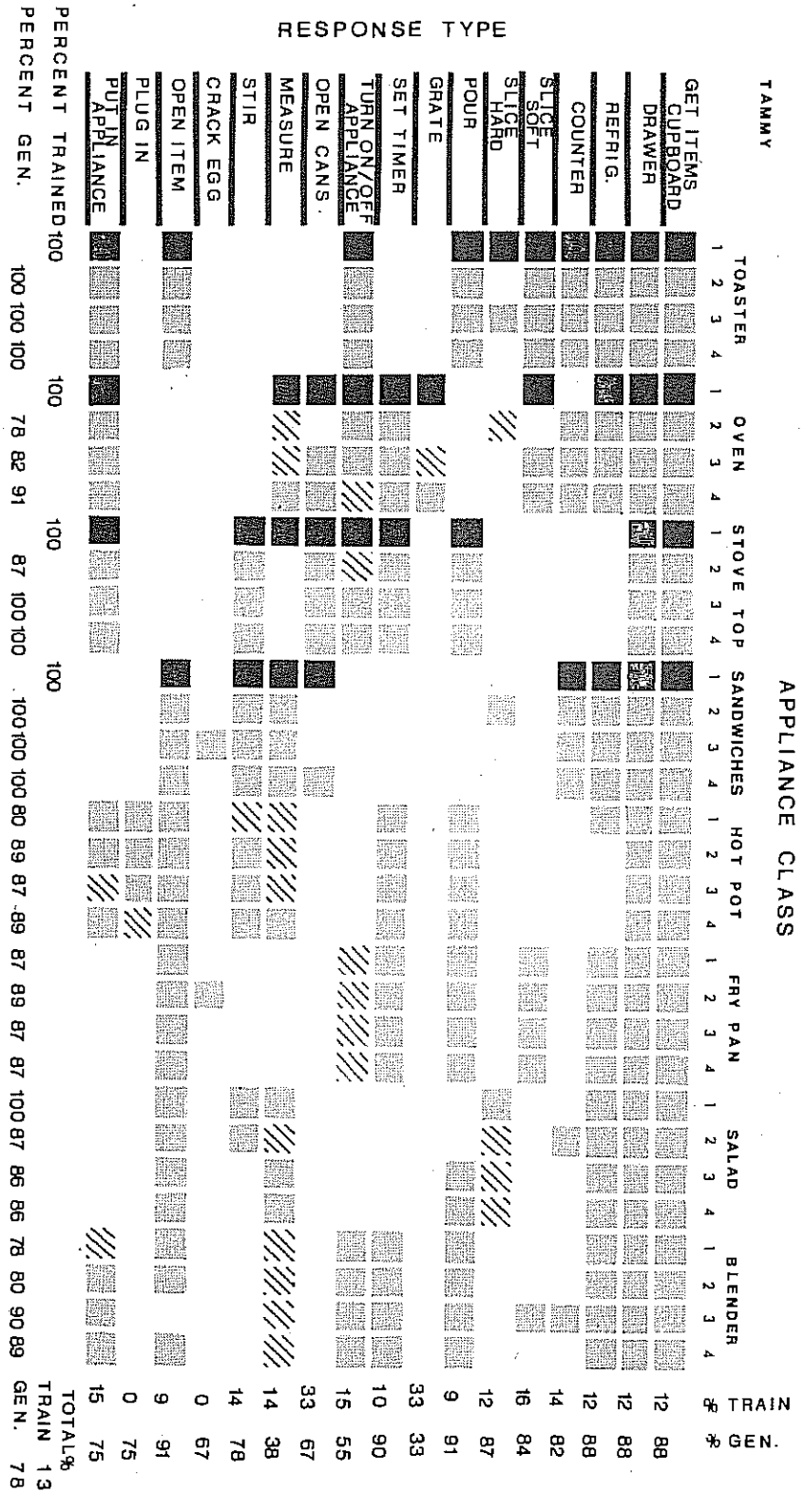
The ultimate decision as to which items to train and which to probe, must be made on several factors. For example, we have found it helpful to include items that are maximally rewarding for the student within the first item(s) trained. In addition, it is not always beneficial to make the training selections "easier" items. Indeed, generalization is frequently promoted if more difficult chains are selected for training, and probes are conducted on easier chains (Horner, Albin, & Day, 1986).

STEP 4: Conduct training within the first class. Once the classes have been divided into training and probe classes, training is begun. There are two general strategies that can be used to structure the training: Concurrent Training and Serial Training. Both strategies are effective; however, our validation studies indicate a slight advantage in generalization when the concurrent strategy is employed. Using serial training, one task from one class is targeted at a time for instruction. When the student meets the criterion for acquisition for that chain, the next task is trained from the same class. Once all of the items from a class are acquired (either from direct instruction or through generalization) the first chain from the second class is trained. As before, training continues one chain at a time within the second class until all chains are trained or generalized. Training then continues through the remaining classes.

In concurrent training, four tasks are targeted (each from four different classes) for instruction concurrently. Thus, within the cooking study we typically provided one instructional session per day within which the student completed one recipe. Thus, on Monday through Thursday the student received instruction on a different recipe each day. We reserved Friday for conducting probe trials to untrained recipes from within or between classes. As stated above, there is a slight increase in the overall level of generalization when concurrent training is provided.

STEP 5: Conduct generalization probes to untrained tasks. The fifth step of the model is to conduct gener-

Figure 2. An analysis of interrelated responses across 32 recipes organized into eight appliance classes. The grid shows the four response sequences that were trained initially (black squares), responses that generalized across chains (shaded squares), and nongeneralized respones (squares with diagonal lines).



alization probes to untrained tasks. To conduct a generalization probe, the environment should be arranged in a manner that simulates performance of the task under natural, unsupervised conditions. The position of the instructor/data collector should be as unobtrusive as possible. The student is given a standard cue to begin the sequence and the observer records the presence or absence of responses from the task analysis for that activity. If the student makes an error there are two possible strategies. One strategy is to terminate the session after a substantial error occurs (that is, an error that would make continuation impossible). Another strategy that can be used is to quickly and unobtrusively "fix" the situation to allow the student the opportunity to continue the chain, but at the same time, not prompting or teaching the behavior. For example, in teaching shopping, if a student fails to find an item to purchase during a probe, the observer might hand the student the appropriate item (without teaching him where it was located) to allow the remainder of the chain (e.g. finding the cash register and paying) to proceed.

Probes are never directly reinforced. That is, feedback is never given to the student for responses within the chain and the student is never rewarded at the end of the chain with unnatural reinforcers, including praise. The purpose of the probe is to determine if the student can perform the skill under natural conditions. Thus, if a task is completed during a probe, such as, the successful purchase of a snack food, a student can be allowed to consume that food, but only during a natural snack time, not as a specific reward for the purchase.

The purpose of the probe is to determine which responses in the task are generalized—the purpose is not to teach the task. It is important to conduct probes in order to assess the emergence of the repertoire. As a rule of thumb, we suggest conducting generalization probes one session per week across all instructional programs. Generalization probes are critical to this instructional model because it is only through performance during probes that the emergence of the repertoire can be seen and that the true functionality of the repertoire can be assessed under natural conditions.

STEP 6: Between-class generalization occurs. As a result of training multiple examples from several different classes of tasks, between-class generalization will begin to emerge to classes that have never undergone instruction. From the prior studies that we have conducted concerning the teaching of larger repertoires, we know that within-class generalization typically precedes between-class generalization. That is, generalization is observed first within those classes that have received training. After training has proceeded through several classes, generalization is typically seen to classes where no instruction has taken place. The degree of between-class generalization that can be expected is strongly related to the nature of the repertoire and the classes needed within the repertoire. For example, in the cooking study described earlier (see Figure 2) four task sequences were taught (one sequence from each of four classes). The dark boxes indicate generic skills that were trained. As Figure 2 indicates, the training of 4 task analyses represents teaching 13% of the generic skills. Four additional classes never received whole chain training. The light grey boxes indicate skills from those sequences that were generalized as a result of training within the first four task analyses. Thus, there was an overlap of generic skills from these 4 task analyses to the remaining 28 task analyses. The advantage of this system can be seen in Figure 2 by examining the level of generalization observed. That is, 78% of the skills generalized, on the basis of having trained 13% of the skills. After training 13% of the skills, the student was able to take the individual skills trained within a small sample of recipes and recombine them in such a way that he could successfully cook a broader sample of recipes. Only an additional 9% the skills required training in order for the broad repertoire of cooking 32 recipes to be functional.

STEP 7: Train remaining nongeneralized skills. As the analysis above indicated, there is nearly always a sub-set of "residual" skills that require follow-up training. In the data from Figure 2, this subset was made up of 9% of the total, or 7 skills. The first step in conducting the training of nongeneralized skills is to identify those that are shared across multiple task analyses. Once these skills are identified, the teacher trains each skill in isolation, that is, not within the natural sequence, to criterion. The sequence in which the skill is contained is then probed. The next nongeneralized skill is then trained independently to criterion and so on. A good example from Figure 2 is slicing hard objects. Although this was trained from one task analysis, the skill only generalized to three other sequences and could not be performed on four sequences. The strategy we used then was to conduct massed practice training for slicing hard objects. To do this, hard items were identified which require slicing. The student was taught to slice these items until the student was able to successfully slice a variety of hard objects. The recipes which showed errors in hard slicing were then probed.

Summary

The instruction of complex repertoires of interrelated skills is an important area for current research and practice for learners with severe disabilities. The purpose of the Generalization Research Project is to provide both general and specific guidelines in designing curricula and instructional programming that can capitalize on this technology. The conceptual model of the project is an outgrowth of Direct Instruction and General-Case Programming in that the instructional principles outlined from these approaches are used to analyze the stimulus control of generalized responding within classes of stimuli and responses. The procedures outlined in General-Case programming are extended to analyze the potential interrelationships across classes. An advantage of designing instruction around larger repertoires of interrelated classes of responding is the "multiplier" effect that occurs as responding is extended both within classes and between classes. Given the learning deficits of most students with severe handicaps, such a technology is crucially needed to promote maximum degrees of independent living in typical community settings. ◆

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Teaching Syllogistic Reasoning Skills Using Computers—*Effects of Adding Logic Diagrams*

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In spite of an abundance of discussion about thinking skills in the literature, comparatively little research has been done on interventions for teaching thinking. Most of the available research on thinking skills interventions targeted global programs (Segal, Chipman, & Glaser, 1985).

Studies of global programs usually fail to distinguish teacher variables from program variables (Bransford, Arbitman-Smith, Stein, and Vye, 1985; Savell, Twohig, & Rachford, 1986). They also fail to identify critical skills in a global program. Sternberg (1985) points out that studies of global programs do not indicate what kinds of changes are needed in order to make training in thinking skills more effective. He advocates a component-by-component investigation into thinking skills. There is considerable controversy over what components are critical to intelligent behavior. At one extreme, Perkins (1985) believes that no non-context-bound strategies are worthy of instruction. On the other extreme, Guilford (1977) identified 150 components of intelligence for instruction. The present study targeted one of the two components identified by Aristotle—syllogistic reasoning.

Similar to the component-by-component investigation of thinking skills advocated by Sternberg (1985), Dansereau (1985) advocates a "strategy science" to determine the relative contribution of each "facet" of an instructional strategy. One important facet of strategy instruction is the level of processing required (Craik & Lockhart, 1972). In summarizing the research on comprehension strategies, Anderson and Armbruster (1984) found that a "deeper level" of processing, when it is compatible with the criterion demands of the task, results in better learning. "Depth"

of processing refers to the extent to which the student is involved in constructing or producing a response, such as reorganizing content in notes, underlining, summarizing, outlining (Anderson & Armbruster, 1984).

The literature on syllogistic reasoning has been primarily descriptive in nature. This research has found some problem types are consistently more difficult than others (Begg & Denny, 1969; Woodworth & Sells, 1935). In the problem-form dimension, evaluating given conclusions for evidence (critiquing) is more difficult than forming conclusions for evidence. In the validity dimension, invalid syllogisms are more difficult than valid ones. In the part-whole dimension, syllogisms with a *some* statement (particular statements) in them are more difficult than syllogisms with only *all* or *no* statements (universal statements).

There is little research on instructional interventions for teaching syllogistic reasoning to children. Only three intervention studies could be found in the area of syllogistic reasoning (DeLeeuw, 1983; Collins, Carnine, & Gersten, 1987; Collins & Carnine, 1988). Coincidentally, all three studies were similar to the present study in that they: (a) compared interventions without having a no-treatment control, (b) tested just one facet of the strategy, and (c) delivered instruction via computer. An overall effective instructional strategy for teaching syllogistic reasoning was not provided by these studies. In the DeLeeuw study (1983) the performance of both treatment groups was no better than chance. In both the Collins et al. studies (1987, 1988), the post scores were better than chance, but were attained on measures suspect of a background knowledge confound.

The present research investigated: (a) a facet of the depth-of-processing variable—the importance of having students diagram their thinking process when learning a strategy for syllogistic reasoning, (b) the overall effectiveness of the instruction in teaching syllogistic reasoning, (c) the interaction of the complexity of the reasoning task with instructional effectiveness, and (d) the contribution of instruction in a specific thinking skill—a strategy for syllogistic reasoning—to overall thinking by measuring transfer effects.

Students

Prior to instruction, 31 high school learning-disabled students were assessed for mastery of basic reading skills necessary for the computer program. For assignment to treatment, students were paired based on total achievement scale scores from the California Achievement Test (CAT) and then randomly assigned to the diagram-drawing response (DR) treatment or to the treatment with only a key punch as a response (CAI). There was no significant difference between the final treatment groups on the CAT scale score means; 520 (SD = 49) for the DR group and 514 (SD = 52) for the CAI group, $t(23) = .25$. The mean corresponded to a sixth-grade equivalent. The percentile score equivalents ranged from 3 to 39.

Out of the original 31 students, 25 completed the posttest (see Table 1 for descriptive information) and 24 completed the maintenance test (given two weeks after the last day of instruction). Subject attrition resulted from a variety of sources: two subjects were arrested for armed robbery and incarcerated; one subject was suspended for inappropriate behavior and subsequently dropped out of school; one subject's father died suddenly and after extended absence needed the time for help in other academic areas; two subjects in the CAI treatment quit in frustration at no longer being able to meet the criterion for proceeding through the program An additional student was not available for the maintenance test: he dropped out of school and could no longer be found, not even by his parents.

Table 1. Number of Subjects Completing the Posttest by Sex, Grade in School, and Experimental Treatment

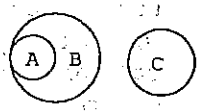
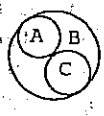
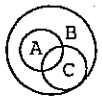
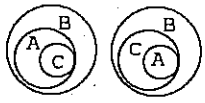
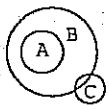
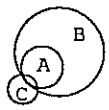
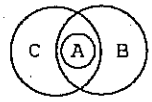
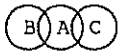
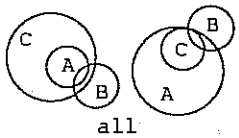
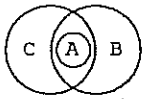
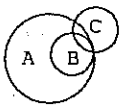
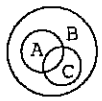
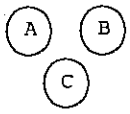
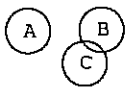
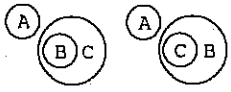
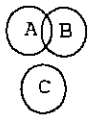
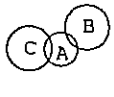
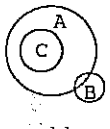
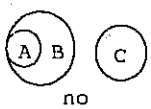
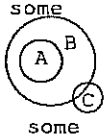
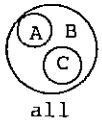
	Grade in School							
	9		10		11		12	
Treatment	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
DR	5	1	2	0	0	3	1	1
CAI	2	0	3	1	2	1	1	2

Note. Included in these data is one tenth-grade boy in the CAI treatment, who did not complete the maintenance test.

Materials

A strategy was developed for use in the present study, which involved a set of rules for drawing Euler-type diagrams of the relationships between classes. Because the strategy required only one diagram for both of these determinations (up to 14 can be required using the standard Euler strategy), and because the steps for drawing the diagram were rule-based and an attempt was made to fully specify these rules in the instruction, this strategy would best be called algo-

Figure 1. The 10 Possible Forms for Syllogisms

Basic forms of evidence	valid	invalid		
1. All A are B. All B are C.	 All A are C.	none		
2. All A are B. No B are C.	 No A are C.	none		
3. All A are B. All C are B.	none	 no	 some	 all
4. All A are B. Some B are C. (Some C are B.)	none	 no	 some	 all
5. Some A are B. Some B are C. (Some A are C.)	none	 no	 some	 all
6. All A are B. All A are C.	 Some C are B.	 All A are C.	 All A are C.	
7. All A are B. All C are C. (Some C are A.)	 Some B are C.	 All A are C.		
8. No A are B. No A are C.	none	 no	 some	 all
9. Some A are B. No B are C.	Some A are not C.	 no	 some	 all
10. All A are B. No A are C.	Some B not are C.	 no	 some	 all

rithmic. The fact that the performance of the algorithm group was near perfect in drawing diagrams in the DeLeeuw study indicates that an algorithm can be effective. The particulars of the present algorithm were based on *Theory of Instruction* (Engelmann & Carnine, 1982), a direct instruction approach. Judy, Alexander, Kulikowich, and Willson (1988) found that direct instruction in an analogy strategy was more effective than an inquiry approach for both gifted and nongifted sixth-grade students on both posttests and transfer measures.

Figure 1 illustrates the ten possible forms of syllogisms with all the possible conclusions, valid and invalid. Of the ten forms in Figure 1, only the first eight were tested in the measures. Evidence forms 9 and 10 result in a valid "particular-negative" conclusion, which involves a level of complex logical thinking beyond the scope of this research. The diagrams subjects were taught to draw in the algorithmic variation of the Euler method are underlined in Figure 1.

The instructional computer program, common to both treatments, was developed around established principles of instructional design and was presented using the Direct Instruction Authoring Language (DIAL) (Carnine & Engelmann, 1987). The logic strategy was presented in small steps, each one practiced to a criterion of 80%. If the criterion was not met, extra practice was automatically provided in special remediation loops of additional explanations, practice in smaller steps, repeated trials, or extra questions. Explanations were pilot-tested twice and thoroughly reviewed for clarity in communicating rules and examples and included frequent checks for understanding.

Elaborated corrective feedback, matched to specific errors, or confirmation of correct answers was provided immediately after each student response. Feedback was also provided on accuracy levels for sets of questions. Specific positive feedback for high first-time success and notification when remediation loops were consequently being skipped were given.

The material differed in only one way. In the diagram-drawing (DR) treatment, subjects were presented with a question, after which subjects drew the required diagram on paper and pressed "enter." The computer then displayed diagrams in multiple choice format, against which the drawn diagram was compared and the matching diagram selected. The CAI program treatment, in contrast, simply presented the multiple choice diagram options immediately following each question.

The 64-lesson logic program was contained on 7 floppy disks. Each subject worked through the lessons at a computer using MS-DOS with a color monitor.

Procedures

From 1 to 10 subjects worked in the same classroom location and were monitored consistently. Subjects understood that, depending on the luck of the draw, some would just use the computer, others would use paper and pencil as well. To ensure the cooperation of subjects in both treatments and treatment fidelity, a verbal and token system was implemented to reinforce subjects for recording the time started and the time finished, for following the instructions of the respective treatments (e.g., drawing diagrams), for working hard (e.g., Joe hasn't looked away from his screen since he started), for reading carefully, and for getting things right the first time.

All monitors were instructed to provide assistance when subjects were discouraged, working slowly, or off-task by orally reading the screens to subjects. No extra explanations or assistance in choosing the correct response was allowed. If subjects were extremely frustrated, the monitors were allowed to recite explanations or rules, using the wording from the program. No unique teacher-mediated explanations were allowed. Monitors were also asked to distribute their assistance, and to move from subject-to-subject regularly as they closely observed the subjects working.

If subjects remained off-task after the monitor began reading the screen orally and reinforcing work efforts, monitors "signed the student out" on the student time data sheet and told the subject that he or she could sign in again when s/he was ready to work. This more extreme consequence was rarely required.

At the end of the program the posttest and transfer measures were administered over a two-day period. Exactly two weeks after the last day of instruction, a parallel-form posttest and one transfer measure (irrelevant premises) were administered.

Measures

A preskill measure was administered to assess subjects' competency in the lowest level of logical skills that were to be taught. Three groups of dependent measures assessed performance on: (a) simple transfer to new problems presented in a non-CAI context using the same format as used in instruction, (b) transfer to sets of new problems in new formats in which the learned logic strategy could only be applied with creative modification, and (c) transfer to sets of

thinking tasks in which the logic strategy would have no direct application (far transfer).

Preskill Measure

The pretest contained four items that sampled the class-reasoning tasks to be taught in the instruction (practiced forms), and four items that contained irrelevant premises (a creative transfer form). All eight basic syllogistic forms (types 1 through 8 from Figure 1) were represented in the eight-item test.

Mean scores on the pretest for the DR and CAI groups were at a chance level, 2.46 and 2.62, respectively. There were no significant differences between the two groups, $t(23) = .27$.

Simple Transfer

A 13-problem pencil-and-paper test (alpha reliability = .86) contained two problem formats that had been practiced in the instruction—8 problems involved forming a conclusion from each of the eight basic forms of evidence (types 1 through 8 from Figure 1), and 5 problems required subjects to critique given arguments. Arguments with incorrect conclusions required two responses (judging the conclusion incorrect and giving the correct conclusion) and correct conclusions required only one response (agreement).

For further analysis of student performance the measure was divided into subscales of easy and difficult problem types along three dimensions: the problem-form dimension, the validity dimension, and the part-whole dimension (see Table 2). The forming conclusions, valid, and universal subscales are easier; the critiquing, invalid, and particular subscales are more difficult. Internal consistency reliabilities were computed for each of the subscales using a group of 64 subjects (25 experimental and 39 non-experimental).

Table 2. Alpha Reliability and the Number of Responses for the Subscales of the Posttest

Dimension Subscale	Alpha	Number of Responses
Problem Form		
Forming Conclusions	.66	8
Critiquing (atmosphere)	.84	9
Validity		
Valid	.74	7
Invalid	.78	10
Part-whole		
Universal	.54	7
Particular	.83	10

An example problem from the forming conclusions subscale follows:

You know that All B's are K's.
All N's are K's.

What else do you know?

A. All N's are B's.
B. All B's are N's.
C. Some B's are N's.
D. No B's are N's.
E. No definite conclusion

The correct answer is E. This problem is also a member of the invalid subscale, because there is no valid conclusion, and a member of the universal subscale because all of the statements begin with the first word *all* (or *no*).

The following problem is an example of one of five problems in the critiquing subscale:

Here is George's evidence:
All Animals are Heterotrophic.
All Animals are Eukaryotic.
Here is George's conclusion:
All Heterotrophes are Eukaryotic.
Check George's conclusion.
Is George's conclusion correct?
If not, what is the correct conclusion?

George's conclusion is not correct. The correct conclusion is "some heterotrophes are eukaryotic." This problem is, therefore, also a member of the valid subscale, because there is a valid conclusion, and is a member of the particular subscale, because one of the statements, the conclusion, begins with the first word *some*.

A parallel-form posttest was also administered to both groups via computer at program completion. No diagrams were presented, just as no diagrams were present on the pencil-and-paper test.

Transfer Requiring Creative Modification of the Strategy

Measures of transfer requiring creative modification assessed student performance on sets of problems in three unpracticed formats in which the learned strategy could be applied in a modified form by: (a) using three relevant premises to form a conclusion (three-premise evidence, alpha = .82), (b) finding relevant evidence for a desired conclusion from a set of two relevant and six irrelevant premises (irrelevant premises, alpha = .65), and (c) forming conclusions from evidence embedded in a naturalistic context (audio tape, alpha = .48).

Syllogisms with three-premise evidence. Eight problems comprised the three-premise evidence

measure, four multiple-choice items and four free-response items. Evidence with three relevant premises involved making a subconclusion with two premises and then using the subconclusion and the third premise to form a final conclusion. Subjects had no practice in forming subconclusions in order to reach a desired conclusion.

In the following example of a free response item, the three possible conclusions are: (a) all poison oak are anacardiaceae, (b) all rhus are "cashews," and (c) all poison oak are "cashews":

All rhus are anacardiaceae.

All poison oak are rhus.

All anacardiaceae are members of the cashew family.

What conclusions can you make? Write them:

Care was taken that the conclusions that could be made about the familiar classes would be contrary to common knowledge (e.g., all poison oak are "cashews," and all apple plants are "roses").

Irrelevant premises. The following factually-loaded science passage containing both familiar and obscure classes was selected from a college biology text (Arms & Camp, 1982, p. 315).

All members of the plant kingdom are eukaryotes and have cell walls that contain cellulose. Most contain chlorophyll and carry on photosynthesis inside chloroplasts, although a few species have lost their chlorophyll and obtain all of their nutrients by absorption. The plant kingdom includes the multicellular algae as well as all the familiar multicellular land plants—the mosses, ferns, grasses, shrubs, and trees.

In a pilot study, it was found that finding subject-predicate relationships in unfamiliar material was very difficult. To teach this skill would require extensive grammar instruction not directly related to reasoning skills. So instead, to preclude interference by lack of this skill, the above science passage was not presented to the student; rather it was rewritten in the form of a fact list of simple sentences to include the information needed to make eight conclusions in the eight basic forms (types 1 to 8 in Figure 1). The following is the example fact list:

No plants are animals.

All plants are eukaryotes.

Plants also contain cellulose.

Most plants contain chlorophyll and can carry on photosynthesis.

Multicellular algae is a plant.

All mosses, ferns, grasses, and trees are plants.

All aves are eukaryotes.

No monera are plants.

An example problem follows:

What else MUST be true?

A. All grasses are eukaryotes.

B. All eukaryotes are grasses.

C. Some eukaryotes are grasses.

D. No eukaryotes are grasses.

E. No definite conclusion.

A parallel-form measure was constructed using the animal kingdom in place of the plant kingdom. The same sentence structure was maintained with the same placement and balance of obscure to familiar classes. An additional analagous passage from the content domain of law was also designed.

Audiotape measure of every day problems. A set of five naturalistic dialogues, each with two corresponding questions, were developed and recorded on audiotape. The following is the text of one of the recorded dialogues:

A: I can't find the books I borrowed from Paula. I've looked all over. I have to give them back to her tomorrow.

B: I'll help you look.

A: Oh, thanks. They're all science fiction books. Paula is a

real science fiction fan.

B: Here's a box of books. Here's a math book and a bunch of music books. That's about it.

These two questions were asked regarding the above dialogue.

1. Do any of the books in the box belong to Paula?
   a. Yes b. No c. Maybe
2. Do all of the books in the box belong to Paula?
   a. Yes b. No c. Maybe

The correct answer for both questions above is "b. No." Finding subject-predicate relationships in familiar material was not so difficult, so the naturalistic form was maintained on this ten-item measure.

Far Transfer

Two measures of far transfer were developed. One was derived from the nonverbal classification portion of the logic subtest of the California Test of Mental Maturity (CTMM) and required subjects to select an item from an array of four pictured items which best fit with a class of three pictured items. The other was from the New Jersey Test of Reasoning (Shipman, 1983). Items were selected from the New Jersey Test which required subjects to determine assumptions or evaluate judgments. Because no reliability data were available on the nonverbal portion of the CTMM logic subtest, internal consistency reliability was calculated for the CTMM (alpha = .58), as well as for the items borrowed from the New Jersey Test (alpha = .39).

Results and Discussion

Simple Transfer

Do students who diagram their thinking process score higher on the test of simple transfer to pencil and paper than students who view diagrams of the process? Are the effects maintained over time?

A 2 x 2 analysis of variance was performed on the post and maintenance tests of simple transfer to pencil and paper.

There was a significant main effect for treatment ($p < .05$), indicating that students using a diagrammatic response performed better at both testing occasions (see Table 3). The effect for time of test approached significance ($p = .065$), indicating a non-significant drop for both groups. There was no interaction. All DR subjects (100%) drew diagrams and 69% of the CAI subjects drew diagrams. The CAI subjects gave "I don't know how" or "I can't" as the reason for not drawing diagrams.

Table 3. Means (*M*), Standard Deviations (*SD*), and Mean Percent Correct Scores (M%) on the Post and Maintenance Tests

		Posttest			Maintenance Test		
Response Form	*N*	*M*	*SD*	M%	*M*	*SD*	M%
DR	13	10.9	3.4	64	9.8	4.4	58
CAI	11	7.8	4.5	46	6.2	4.6	36

Performance did not deteriorate significantly over the two-week maintenance interval. The strategy used in this study seemed to be more easily remembered than the algorithm used in the DeLeeuw study (1983), where performance deteriorated to pretest levels within two days.

Students who diagrammed significantly outperformed students who viewed diagrams. This finding corroborates the finding of Barron and Stone (1974) that having students construct diagrams of vocabulary relationships between words contributes to learning. The task in the Barron and Stone study was similar to this one—it required subjects to diagram relationships based on class inclusion (an *all* relationship) and class exclusion (a *no* relationship) in a heirarchical form.

In contrast, a study by Griffin (1987) required subjects to place the headings and subheadings of a history passage in a heirarchical diagram form. Besides the different type of content, an important reason for no effect from this instruction may have been that it actually did not require the deeper level of processing necessary to make a difference. When the headings and subheadings were already present, the task of placing them into a graphic form may have actually been quite superficial.

An important feature of effective student-constructed responses seems to be the extent to which students mentally reorganize the material and make decisions about how to place it in the diagram. Simply reorganizing the material by placing it in a new location may not cause very "deep" processing.

In regard to computer-assisted instruction, the combination of a pencil-and-paper response with the computer may be generally more powerful than a simple key-punch response. The tendency toward better on-task performance with a computer (MacArthur, Hughes, Melouf, & Harris, 1987) combined with the deeper level of processing that may be required by a free-response form or generally by a pencil-and-paper response may be significant.

Learning Time and Number of Questions

Do students who diagram their thinking process need (a) more instructional time to reach mastery, and (b) fewer trials to mastery, than subjects who simply view the diagrams?

A *t*-test was performed on the total amount of instructional time required by the two groups to complete the program. No significant difference between the DR treatment mean of 13 hours 10 minutes ($SD = 4.73$) and the CAI mean of 12 hours 40 minutes ($SD = 2.75$) was found, $t(24) = .23$. A *t*-test was then performed on the total number of questions each subject repeated in order to reach the mastery criteria in the program, 214 for the DR group ($SD = 51$) and 287 for the CAI group ($SD = 106$). There was a significant difference, $t(24) = 2.17$, $p = .035$.

While the DR group spent extra time drawing diagrams, the CAI group spent extra time responding to remediation items. The extra time seemed comparable. The fact that more students (9 vs. 2) in the DR treatment said they liked the instruction because they learned more, lends additional support to the conventional wisdom that extra time would be better spent on a deeper level of processing than on answering remedial questions.

The DR group attained a posttest mean score of 64% ($SD = 20\%$). This score was significantly better than chance ($p = .005$). Before instruction subjects performed at a level no better than chance: $M = 30\%$, $SD = 17\%$, $p = .2$.

The pre-post gains were also evaluated by a t-test comparison. Posttest performance was significantly

Table 4. Descriptive Statistics and Results of Correlated t-tests Comparing DR Performance (*N* = 13) on More and Less Difficult Problem Types

Dimension Subscale	*M*	*SD*	*t*	*p*
Validity			.52	.61
Valid (easy)	67	23		
Invalid (hard)	62	26		
Whole-part			1.85	.08
Universal(easy)	74	21		
Particular (hard)	58	23		
Problem form			.84	.40
Forming Conclusions (easy)	61	26		

better than pretest performance, $t(24) = 4.5$, $p = .001$. The magnitude of the pre-post gain was nearly equal to two standard deviation units (1.8), representing a large magnitude of effect.

The learning-disabled subjects in this study were able to achieve better-than-chance scores and significant pre- to posttest gains on logical thinking problems that could not be solved using common background knowledge (Collins and Carnine 1988).

To determine whether typical error patterns in logical thinking, as established by descriptive research (Begg & Denny, 1969; Woodworth & Sells, 1935), were changed by the instruction, the variability in the DR group's performance across these problem types was examined.

The performance of the DR group (N = 13) on the more difficult subscale was compared to the less difficult subscale in each of the three dimensions (see Table 4). There were no significant differences in performance on more versus less difficult problem types in any of the three dimensions.

As a quasi-experimental gauge of the overall effectiveness of the instruction, the DR group's performance was compared with a group of college students from three education classes ($N = 25$), and with a high school sophomore honors class ($N = 15$) composed of a majority of students who had been classified as gifted. There were no significant differences among the three groups (see Table 5).

The group of learning-disabled subjects in this study was able to achieve at levels equivalent to high-achieving populations as a result of learning a specific strategy for logical thinking.

The more difficult problem types of invalid syllogisms, syllogisms with a particular premise or conclusion, and syllogisms requiring critiquing were greater discriminators of the treatment effect. Subjects required to diagram their thinking during instruction (DR) significantly outperformed the non-writing treatment (CAI) only on the more difficult logic tasks. No significant differences were found on the less difficult problem types, although the DR group outperformed the CAI group on these, too.

Transfer Effects

Do the students who diagram during instruction delivered via computer, transfer use of the learned strategy to pencil-and-paper problems better than students who view diagrams?

A *t*-test comparing the means of both treatment groups on the parallel-form computer version of the posttest was performed. There was no significant difference on the computer version. In contrast, there was a significant difference between treatments on the pencil-and-paper version of the posttest ($p = .04$). This finding supports Salomon and Perkins' (1987) contention that varied practice that samples widely the circumstances that are targets for the transfer results in better transfer.

Table 5. Means, Standard Deviations, Mean Percent Correct Scores, and Effect Size for Group on More and Less Difficult CR Subscales for DR, College, and Gifted Group Performance

		Problem Type					
		Easy		Difficult		Group Effect	
Dimension	Group	M%	*SD*	*M%*	*SD*	*F*[a]	*p*
Validity	DR	67	23	62	26	.20	.82
	College	61	21	60	32		
	Gifted	64	21	64	41		
Whole-part	DR	74	21	58	24	.11	.90
	College	77	23	48	29		
	Gifted	76	31	55	34		
Problem Form	DR	68	15	61	26	.185	.83
	College	62	26	59	30		
	Gifted	68	27	60	36		

[a] $df = 2,50$

Do students who diagram their thinking process, *creatively* modify the thinking strategy better than students who view diagrams?

A multivariate analyses of variance performed on this set of transfer measures resulted in a non-significant result. However, both samples scored significantly better than chance. Scores significantly better than chance indicate that both instructed groups were able to transfer to some extent, because pretest levels were at chance.

The extent to which a subject will *transfer application* of a skill to new problem types can only be evaluated if the subject learned the skill in the first place. To determine whether subjects transferred their use of the learned logic strategy to new problem types, subjects were regrouped into two samples, a sample who had learned the logic strategy and a sample who had not learned it.

Scores on the post and maintenance measures were averaged for each subject. A natural dichotomy was found in their scores. Subjects with an average score greater than 65% were placed in the proficient sample, subjects with an average score less than 35% were placed in the non-proficient sample. One subject, who scored in the midrange, was eliminated. The average score of the proficient sample was 74%. A chi-square indicated that significantly more proficient subjects (9) were from the DR treatment.

The proficient sample attained a significantly better than chance score on the *three-premise-evidence* measure ($p < .01$), and its mean was significantly higher than the mean of the non-proficient sample ($p < .01$). The proficient sample was able to modify the learned strategy into one that could be used with evidence with three relevant premises. All of the subjects in the proficient sample drew diagrams, compared to only 58% of the subjects in the non-proficient sample. Analysis of the diagrams indicated that subjects universally modified the learned three-class diagram-drawing strategy to draw a four-class diagram to solve the problem, rather than finding the solution in two steps.

Scores on the *audiotape measure* for both the proficient sample ($M = 71\%$) and the non-proficient sample ($M = 64\%$) were clearly the highest of all the creative transfer measures. Both scores were significantly better than chance ($p < .02$). However, there was no significant difference between the means of the proficient and non-proficient sample.

The three *irrelevant-premises* measures were parallel in form, but had varying results. The proficient sample did not score significantly better than chance on the first irrelevant-premises measure (the law measure), but did on the two later irrelevant-premises measures (the science posttest and maintenance test). Only 25% of the proficient sample drew diagrams for the first measure (law). *After having taken the three-premise* measure, 75% and 50% of them drew diagrams for the second and third measures, respectively. Virtually none of the non-proficient sample drew diagrams on these measures.

Diagrams drawn by proficient students on the second and third measures revealed that subjects used three different strategy modifications for dealing with the irrelevant premises problems. One subject used the most efficient strategy, which is to look at the classes in the conclusion, then find the relevant premises and diagram those to find the needed conclusion. The most common strategy was to draw one large diagram of all the premises and attempt to then find the relevant conclusions as needed.

There was no evidence that *far transfer* had occurred, because sample differences were, at most, simply maintained during instruction.

Conclusions

From analyses of the data from this experiment the following conclusions seem warranted:

1. Use of a required diagram-drawing response in instruction in a logical thinking strategy is more effective than no drawing, for improving the performance of learning-disabled subjects on more complex logical problems.

2. Requiring this written response involves no cost in instructional time, because the learning-disabled students require significantly fewer items to reach the mastery criteria specified within the program.

3. Teaching learning-disabled students a strategy for logical thinking can bring their logic performance to a level that is equivalent to high-achieving populations and can eliminate typical error patterns that have been observed in normal populations.

4. The effect of diagraming was more apparent with more difficult tasks.

5. For learning-disabled students instructed in a strategy for logical thinking, the strength of transfer is a function of problem similarity. Spontaneous transfer diminishes as the new problem types increase in dissimilarity to the instructed problem forms.

6. Teaching learning-disabled subjects a strategy for logical thinking can result in spontaneous transfer of the strategy to new problem types which require creative modification of the strategy.

7. The computer medium is particularly suited to a

"strategy science" approach to strategy reseach. Seemingly minor components of instructional design can be investigated with greater fidelity to treatment by reducing the influence of teacher-personality variables.

8. The computer can be used effectively to teach very complex skills. ◆

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Zig Engelmann • Paul Weisberg

Other Presenters:

Wes Becker, Randy Sprick, Bob Dixon, Ann Arbogast, Jane Carter, Larry Chamberlain, Maria Collins, Geoff Colvin, Gary Davis, Terry Dodds, David Evans, Suzanne Fitch, Ann Glang, Mary Gleason, Phyllis Haddox, Tracey Hall, Gary Johnson, Georgia Layton, Kathy Madigan, John Noell, Pepe Quintero, Jerry Silbert, Marilyn Sprick, Marcy Stein, Linda Youngmayr

Conference Registration Information

Where-When: *To be held August 7-11, 1989, at the Eugene Hilton Hotel and Conference Center, in downtown Eugene, Oregon.*

How to Pre-Register: *Please fill out the registration form. Enclose with check or Institutional purchase order for the proper fee. Send application to the Association for Direct Instruction. Pre-registration before July 7 guarantees space in preferred sessions. Any session with less than 20 participants may be cancelled. A confirmation receipt will be sent to all pre-registered participants.* THIS FORM COVERS CONFERENCE PRE-REGISTRATION ONLY. THIS DOES NOT CONSTITUTE PRE-REGISTRATION FOR COLLEGE CREDIT OR ROOM RESERVATION.

Fees and Discounts: *The conference registration fee is $160.00. Association members receive a 20% discount ($32.00 off). Groups of 5 to 9 participants receive a 10% discount. Groups of 10-19 receive a 20% discount. For groups of 20 or more, call for a quotation. Ask for Bryan Wickman at (503) 485-1293. The member and group discounts cannot be used together. Choose the discount that will benefit you the most. The fee does not include lodging or meals with the exception of the picnic, and coffee each morning. All training materials are included in the fee. New members are eligible for the 20% discount when membership application and appropriate fees accompany registration form.*

Lodging: *The special conference rate at the Eugene Hilton is $44.00 per day for a single. Doubles are $52.00 ($26.00 per person) plus tax. We will send you a reservation envelope for the Eugene Hilton.* DO NOT SEND ANY ROOM RESERVATION MONEY TO THE ASSOCIATION

College Credit: *An optional 1, 2 or 3 hours of college credit through the University of Oregon Summer Session are available at an additional cost of $32.00 per quarter unit. Persons interested in college credit should so indicate on the pre-registration form. We will send additional information on college credit along with your conference pre-registration confirmation.* DO NOT SEND ANY ROOM RESERVATION MONEY TO THE ASSOCIATION

Refunds and Cancellations: *A 100% refund will be issued if a written request is postmarked by July 21. After that an 80% refund will be given. A written request must be received in our office before any refunds will be made.*

Optional Events: *Monday there will be a picnic at Skinners Butte Park to get acquainted. A meal for you and 1 guest is included in the registration fee. Wednesday from 4:00 to 5:00 there will be a special conference presentation. Paul McKinney will address the conference and we will present the 1988 ADI Awards for Excellence in Education. Afterward, there will be an opportunity for conversation with trainers and other conference participants.*

Conference Registration Form

Please fill out the registration form completely and mail to ADI.
Make checks payable (U.S. funds only) to **Association for Direct Instruction**
Because space is limited, early registration is recommended. Use an address where you will receive your mail up until the conference.

Name (as you would like it to appear on your name tag)_____

Street _____

City _____ State _____ Zip _____

Phone_____

Agency Affiliation _____ Position _____

I would like to register for the following (list one "A", one "B", and either one "C" *or* one "D" **and** one "E" session):

"A" _____.

"B" _____.

either C "C" _____.

or D & E "D" _____

"E" _____

I am an Association for Direct Instruction member: Yes No
I will attend the picnic: Yes No
Have you attended the Eugene Conference previously?_____ What year(s)? _____
Please return this form with your check or District Purchase Order to:

Association for Direct Instruction, P.O. Box 10252, Eugene, Oregon 97440

For office use only: Date_____ Fee____ Check____ PO#_____ By:____

The Association for Direct Instruction and Science Research Associates announce

The Lake Tahoe Direct Instruction Conference
Language to Literature

August 21 – 23, 1989
North Tahoe Conference Center Lakefront
Kings Beach, Nevada

Special Keynote Speaker
Siegfried Engelmann

Trainers include
Carole Allen
Roni Edgmon
Linda Youngmayr
Kathy Madigan

Sessions include
Orientation to Direct Instruction
Effective Spelling
Corrective Reading, Decoding
Supervision and Monitoring of DI Programs
Teaching the Beginning Reader
Expressive Writing
A Literature Integration Model
Beginning Language
Bridging the Comprehension Gap through Content Area Reading
Literature in Reading 5 & 6

Cost: $90.00
(Includes Reception on Sunday and Lunch on Wednesday
For a complete brochure contact ADI

The Association for Direct Instruction and Science Research Associates announce

The Puget Sound Direct Instruction Institute

August 28 – 30, 1989
Sheraton Tacoma Hotel • Tacoma, Washington

A Sessions

Corrective Reading, Decoding—Gary Johnson
Language 1 & 2—Ann Glang
Reading Mastery 3-6—Marcy Stein
Expressiv Writing—Bob Dixon
Design of DI Programs—Bob Dixon
Direct Instruction for Low-Performers—Ann Arbogast

B Sessions

Direct Instruction Spelling—Bob Dixon
Supervision of DI Programs—Gary Johnson
Reading 1 & 2—Ann Glang
Corrective Reading, Comprehension—Carole Allen
Direct Instruction Math—Marcy Stein
Direct Instruction for Low-Performers—Ann Arbogast

Registration Information

Where-When: To be held August 28 – 30, 1989, at the Tacoma Sheraton Hotel, 1320 Broadway Plaza, Tacoma, Wa.

How to Pre-Register: Please fill out the pre-registration form. Enclose with check or Institutional purchase order for the proper fee. Send application to the Association for Direct Instruction. Pre-registration before August 1 guarantees space in preferred sessions. A confirmation will be sent to all pre-registrants. This form covers Institute pre-registration only. This does not constitute pre-registration for college credit or lodging.

Training Fees and Discounts: The fee for the 3-day Institute is $90.00. Association members receive a 20% discount ($18.00). Groups of 5 to 9 participants receive a 10% discount. Groups of 10-19 receive a 20% discount. For groups of 20 or more, call for a quotation. Ask for Bryan Wickman at (503) 485-1293. The member and group discounts cannot be used together. Choose the discount that will benefit you the most. The fee does not include lodging or meals, with the exception of the reception on Monday afternoon. All training materials are included in the fee.

Lodging: The Association has negotiated a special $65.00 single , $75.00 double room rate for the Institute with the Tacoma Sheraton Hotel. We encourage out-of-town participants to take advantage of the convenience of the free, secure parking, excellent location and quality service that the Sheraton will provide. Out-of-town pre-registrants will receive a reservation envelope along with their session confirmation. If you would like to make reservations by phone you may contact the Sheraton at (206) 572-3200. You need to tell them you are with the ADI Institute to receive the reduced rate. Early reservations are recommended.

College Credit: An optional 1 quarter credit is available through the University of Oregon for an additional fee of $32.00. Information will be sent to preregistrants.

There is still time to sign up for these Direct Instruction Conferences!

Houston, Texas • July 31—August 2
Texas DI Institute

Kalamazoo, Michigan • August 7—10
Kalamazoo Conference

Eugene, Oregon • August 7—11
15th Eugene DI Conference

Salt Lake City, Utah • August 14—18
Fourth Salt Lake City DI Institute

Lake Tahoe (Kings Beach), Nevada • August 21—23
Second Lake Tahoe Conference

Reading, Pennsylvania • August 21—23
The Second Eastern Pennsylvania Conference on DI

Los Angeles, California • June 29—30
Los Angeles DI Conference

Tacoma, Washington • August 28—30
Puget Sound DI Conference

Enrollment form for Houston, Puget Sound, and Lake Tahoe

Please print your name & agency affiliation as you would like it to appear on your name tag.

Name: _____

Agency: _____

Street Address: _____

City, State, Zip: _____

Phone: _____

I am an ADI Member: Yes No

___ I wish to attend the_____ Institute. I have enclosed $_____.

My "A" and "B" session choices are listed below.

"A" _____

"B" _____

For office use Conf Fee Check PO# By

Now, the remedial reading program that works, works harder

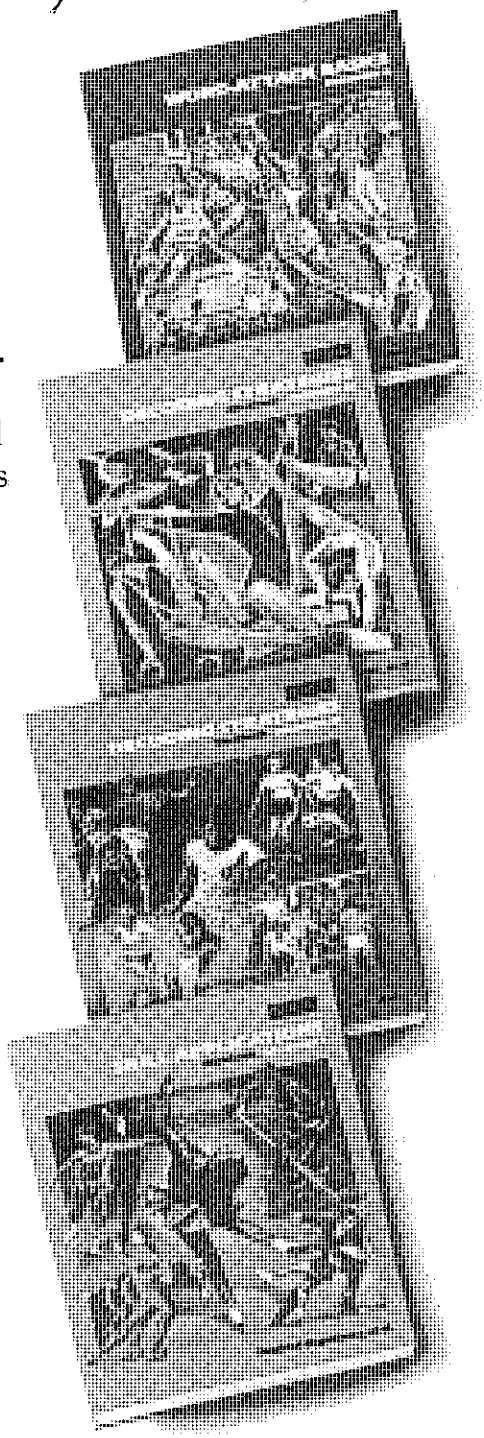
Introducing the newly revised version of SRA's Corrective Reading Decoding.

Corrective Reading Decoding—SRA's highly acclaimed remedial reading program that turns reading failures into successes—is now more effective than ever.

The newly revised 1988 edition contains features that you've asked for: new story reading procedures and workbooks enhance *comprehension; daily* timed readings to improve reading rates and decoding fluency; and printed *word lists in student books* eliminate the chore of writing long lists on the chalkboard.

Corrective Reading Decoding has proven that students who have not been able to learn to read with other programs, can master the skills and succeed. Key to this program's effectiveness is its direct instruction approach and built in management system. All lessons are scripted to provide carefully sequenced tasks and enough structure to assure that students experience a sense of accomplishment.

To find out more about how Corrective Reading Decoding can work hard for you, mail the coupon to: SRA, 155 N. Wacker Drive, Chicago, IL 60606; Attn: School Division Marketing Dept.



- ☐ Yes, I want to know more about the newly revised version of SRA's Corrective Reading Decoding. Please send me a brochure today.
- ☐ I'd like to know more about other SRA products, too. Please send me a 1988 School Catalog.
- ☐ Please have an SRA Representative contact me about SRA's newly revised version of Corrective Reading Decoding.

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Address_____

School_____

City, State, Zip_____

Telephone #_____ Good time to call_____

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Summer Conference information inside!

See Pages 41 - 48