Non Profit Organization
Bulk Rate U. S. Postage
PAID
Permit No. 122 - Eugene, OR

ADI NEWS

Volume 3, Number 2 | Association for Direct Instruction, P.O. Box 10252, Eugene, Oregon 97440 | Winter, 1983-84

1983 Excellence in Education Winners Announced by ADI

At the Annual Membership meeting held in August during the Eugene ADI Conference, the ADI Board presented awards for contributions to excellence in education to the following persons:

Tina Rosen

Tina Rosen won the award for excellence in the category of administration and supervision. Tina received her Ph.D. from the Utah State University working with Alan Hofmeister. Tina worked with Alan on the development of several basic skill tutorial programs. She is currently working as an educational specialist for Olympia School District in the State of Washington. Her responsibilities include teacher supervision, training, and program implementation.

Tina was one of the first people on the west coast to become involved with Direct Instruction. She attended her first workshops before the materials were even published by SRA. Before the materials were commercially available, she used Engelmann's *Preventing Failure in the Primary Grades* as a guide for good instruction. She feels that the strength of DI lies in the fact that it teaches students to become problem solvers. She says, "Zig and the other people involved in designing Direct Instruction materials have made things easier for the students and for the teachers. It has provided a model that learning can happen. It can be done!"

Zig Engelmann says of Tina, "She is one of the best teachers and best trainers around. She is patient, but holds a very hard criterion of excellence for the teachers she works with. She is highly respected and has an impeccable reputation as an excellent educator."

Karen Garner

Karen Garner won the award for excellence in teaching at the elementary level. Karen began her teaching career in Anchorage, Alaska as a first grade teacher. She first received training in DI in 1971 and began using DI materials in 1972.

In Palo Alto, CA, Karen taught in a team teaching situation where she was responsible for the lowest performing students. She set up an exemplary DI implementation. She is perhaps best recognized for the work she did in training teacher aides and parents to teach the programs. She was also responsible for writing grants and other administrative activities.

After leaving Palo Alto, Karen set up a resource room program in Beaverton, Oregon, where she trained and supervised six aides. Karen's aides are some of the best trained and most skilled DI teachers around. Karen's program served many more children than most typical resource room settings.

Karen is currently taking time off from the classroom to be with her young daughter. A child could have no better fortune than to have Karen as a mother and a teacher.

Karen Garner

Continued on Page 2

Reading Instruction for Poverty-Level Preschoolers

– A Seven Year Progress Report –

By Paul Weisberg
Early Childhood Day Care Center
Department of Psychology
University of Alabama

Editor's Note. Because of the merit and length of this outstanding research study, I have deleted most of four pages of references. These may be obtained from Wes Becker, ADI.

Ever since it opened its doors to poverty-level preschoolers in 1970, a major and continual objective of the Early Childhood Day Care Center (ECDCC) has been to accelerate the academic achievements of its 24 children. Along with establishing language expression and learning concepts necessary for school success, the heart of its academic-based curriculum has been the teaching of reading. For the ECDCC staff, the issue was never a matter of whether to teach reading to educationally at-risk preschoolers. The issue was: according to what level of reading proficiency?

Background

When we began we knew how terribly ill-equipped entering first graders from poverty homes were in skills related to reading. This led us to champion the teaching of this tool subject in our preschool setting. However, despite these strong convictions, our early efforts were not directed at generalizeable word attack or decoding strategies. That responsibility, we originally thought, was the public school's. Instead of teaching the requisite skills for decoding words, we engaged in modeling and encouraging "reading-like" behaviors: going to the book area, holding a book rightside-up, turning the pages properly, looking at pictures and discussing them, listening to stories and learning about a plot, and so on (Palomares & Ball, 1975). We soon discovered that reading did not magically evolve from these "pre-reading" activities. Reading also did not materialize when these activities were supplemented with successful instruction in learning the names of alphabet letters (Kincaid & Weisberg, 1978); we now recognize that this skill is not necessary for decoding words (Carnine & Silbert, 1979; Samuels, 1972).

Paul Weisberg

We subsequently adopted a whole-word, meaning-emphasis approach which incorporated many basal reader methods. A sight recognition vocabulary of from 40 to 60 words was possible, but only for the highest performers. It was accomplished through the initial selection of highly dissimilar words made predictable in isolation and in sentences through redundant syntactical, semantic, and picture prompts. However, caught without these reliable prompts, *guessing often became the children's major word-attack strategy*. The situation worsened when we programmed increasingly similar words, especially in the case of the "little" words, such as *in-on, no-not, run-ran, as-ask*, and so forth. Major problems also developed once non-content words and words not easily pictured were presented, namely, *the, there, this, what, when, is, was*, and *any*. Even when illustrations were available, the "picture readers," who were usually the lowest performers, had trouble guessing the right word. When reading simple sentences, they readily substituted *boat* for *ship, cat* for *kitten, water* for *wet*, and so on. We were advised to accept these and other forms of inexact reading

Continued on Page 16

Columbia Direct Instruction Association Formed

A regional Direct Instruction association has been formed in eastern Washington, northern Idoho and western Montana. The "Columbia Direct Instruction Association" (CDIA) was formed to provide local support for educators, parents, and others using the Direct Instruction technology created at the University of Oregon.

While there is no formal affiliation with the Association for Direct Instruction, and none is planned, it is hoped that an informal relationship with common purposes and goals will strengthen both organizations by providing mutual support. To that end, members of CDIA are also encouraged to join ADI; and, members of ADI living or working in the region from the Columbia River area in eastern Washington through northern Idaho and into western Montana are encouraged to contact CDIA for local programming. The contact person is:

Dr. Stephen W. Ragan
Lewis-Clark State College
Lewiston, Idaho 83501
(208) 746-2341, Ext. 260

On the agenda for the coming year (1983-84) are bi-monthly evening meetings (the dates are published in the CDIA newsletter); a series of Saturday morning workshops on various DI programs and concepts; a conference to be held in both Coeur d'Alene and Lewiston, Idaho March 2 & 3, 1984 on the topic of "Technology and Education" (see advertisement in this issue of *DI News*); the publication of a local newsletter intended as a local supplement to *DI News*; and the formation of multiple local support committees in the region. CDIA is interested in contact with anyone who would like to receive our newsletter, join our organization, or start a local committee affiliated with CDIA.

Dear Editor:

Please note the following correction to Figure 1, page 4 in the Fall, 1983 issue article titled "A Test of the Automaticity and Psycholinguistic Models" by Carnine and Williams. The two groups in Figure 1 were mislabeled. The labels should be reversed.

Thank you,
Doug Carnine

Advertising Policies and Rates

The **Direct Instruction News** will publish advertisements for materials (programs, books), training (conferences, workshops), and services (consultation, evaluation) related to direct instruction. All proceeds from the sale of advertising space will be used to help pay publication costs incurred by the News. Ad sizes and corresponding costs are as follows:

Full page: $200
Half-page: $125
Quarter-page: $75

The **Direct Instruction News** is published Fall, Winter, Spring and Summer, and is distributed by mail to members of the Association for Direct Instruction. Readers are invited to submit articles for publication relating to DI. Send contributions to: The Association for Direct Instruction, P.O. Box 10252, Eugene, Oregon 97440.

Editors . . . . . Wes Becker
. . . . . Stan Paine
Associate Editors for Research . . . . . Ed Kameenui
. . . . . Russell Gersten
. . . . . Craig Darch

Departments
Teacher-to-Teacher . . . . . Jane M. Dougall
Administrator's Briefing . . . . . Linda Carnine
Dear Ziggy . . . . . Ziggy Engelmann
Analyses of Curricula . . . . . Linda Meyer
. . . . . Douglas Carnine
Art Director . . . . . Susan Jerde
Layout . . . . . Wes Becker
. . . . . Springfield News
Photography . . . . . Arden Munkres
Typesetting . . . . . Pan Typsetters
. . . . . Springfield News
Printing . . . . . Springfield News

Excellence Awards (Cont. from Page 1)

Nancy Woolfsen

Nancy won the award for excellence in teaching at the secondary level. She currently teaches in a resource room at Madison Middle School in Eugene, Oregon. Her career in education began as a teacher's aide in the Portland area. She became recognized as an excellent DI teacher while going through the Handicapped Learner certification program at the University of Oregon. While in that program she developed a reputation as a person eager to learn new methods for reaching hard-to-teach children. She consistently tried to improve her skills and expand her knowledge and abilities to implement quality instruction.

Nancy now serves as a master teacher for the placement of practicum students. This allows University students an opportunity to teach and learn in an excellent resource room program. Engelmann says, "Nancy is an excellent teacher, a very hard worker, and someone who puts in whatever time it takes to get the job done."

Alex Maggs

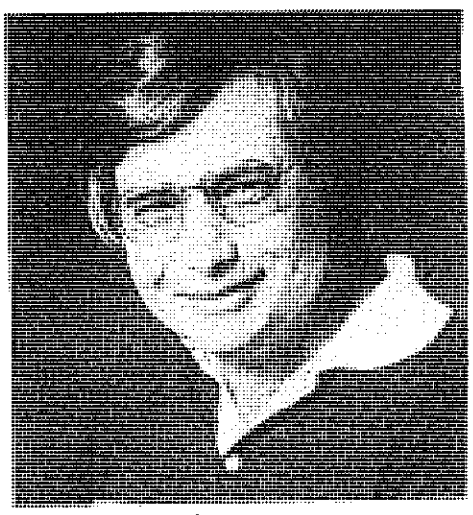
Alex Maggs won the award for excellence in the category of research and college training. Alex has conducted a research program and taught about Direct Instruction at Macquarie University near Sydney, Australia, since receiving his doctorate in 1974. He first learned about Direct Instruction from the book by Becker, Engelmann, and Thomas (*Teaching—a course in applied psychology* SRA, 1971) and through the Distar programs.

His Doctoral thesis was an experimental study using Distar with moderately and severely retarded children.

After finishing his degree, he directed the Special Education Research Centre at Macquarie. At the same time, he incorporated teaching about DI theory and methods into all courses he taught, including Instructional Technology. He was funded by the Australian government to study applications of the programs to different special education groups. He worked with many master's and doctoral students on DI studies with all kinds of populations from severely retarded to physically handicapped to culturally deprived to normal. He has published more than 30 experimental evaluations in Australian and international journals. He served as the Australian representative on the editorial board of the journal *Analysis and Intervention in Developmental Disabilities*.

In 1978 he founded the Australian Association for Direct Instruction, with the aid of his wife Robyn, Joe Moore, and others. Since 1978, this association has held three week-long workshops modelled after the Eugene Conference. Their Association has about 100 members (and they receive our newsletters).

Besides his contributions to research and teaching about DI, Alex has applied DI strategies to teach retarded and normal children to program computers using Basic.



Alex Maggs

Finally, Alex Maggs has in the past two years, been working for UNESCO to aid the development of Special Education programs in seven African countries, (e.g., Kenya, Tanzania, Malawi, Zimbabwe, Swaziland, Maritius, and Botswana). On his last visit to Zimbabwe (formerly Rhodesia) he helped to set up four model programs (2 rural and 2 city) for special and normal children using Distar as their basis.

Alex has truly made important and significant contributions to excellence in Education.

Australian Behaviour Modification Association

7th Annual Conference May 14-18, 1984

The Conference will provide a multidisciplinary forum for the exchange of information on new developments in research, techniques, and theory within the behavioural approach to clinical, educational, and community problems.

KEYNOTE SPEAKERS: Alan Hofmeister, K. Daniel O'Leary, Susan O'Leary

CALL FOR PAPERS: Send to Dr. Jay Birnbrauer,
Psychology Section, Murdoch University, Murdoch 6150
Deadline for abstracts Feb. 15, 1984.

INFORMATION: Ken Rawlings,
257 Adelaide Terrace, 1st Floor, Perth 6000

Sequencing Examples in Discrimination Learning

By W.A.T. White
Scott Martinson
Russell Gersten
Philip Bourbeau

To function in normalized settings, individuals with moderate to severe mental handicaps must be able to make countless discriminations. For instance, when severely handicapped adults learn to use a hammer, they must discriminate whether or not the nail is perpendicular to the surface. Or, when students who are labelled developmentally disabled learn to sort socks, they must discriminate whether two socks match.

Because naive (i.e., difficult-to-teach) learners often fail to pick up naturally on their own some discriminations that are essential for independent functioning, it becomes the responsibility of the teacher to teach these discriminations. Engelmann and Carnine (1982) have furnished specific guidelines on how to efficiently teach discriminations in their recent book, *Theory of Instruction*. Carnine and colleagues have conducted numerous studies that support the efficacy of these guidelines.

When teachers introduce a basic language discrimination (e.g., "to the left of"), they can present positive examples (e.g., "it is to the left of the table") and negative examples (e.g., "it is *not* to the left of the table"). According to the research of Carnine and others, students learn a discrimination more easily when: (1) the teacher presents both positive and negative examples; (2) the teacher initially presents the discrimination in a narrow situation, and then gradually introduces the discrimination in more complex situations; (3) there is great variety among the positive examples; (4) the words with which the teacher presents each example are consistent across examples. Other Carnine studies indicate that discrimination learning is facilitated when, in the teacher's presentation of sequenced examples, positive and negative examples that are *extremely similar* to one another appear consecutively. This "minimal difference" between the negative and positive examples shows exactly where the "boundary line" is in making the discrimination—in deciding whether an example is positive or negative.

In *Theory of Instruction*, Engelmann and Carnine have collated the principles mentioned in the previous paragraph into what they proffer as exemplary sequences for initially teaching basic language discriminations. The present study is a first step in investigating whether the Engelmann and Carnine sequences effectively teach discriminations. The study is also interesting in that the subjects were handicapped adults, whereas most of Carnine and associates' research was conducted with nonhandicapped school children.

Although Engelmann and Carnine's guidelines for designing discrimination sequences allow for some flexibility, many of their sequences are similar to the one depicted in Figure 1, which was used in the present study to initially teach the concept *parallel*. The sequence begins with five examples for which the teacher provides the answer ("These are/are not parallel"). The teacher tests the students on the rest of the examples in the sequence ("Are these parallel?") and provides feedback to students as to the correctness of their answers. The sequence consistently adheres to a narrow situation of line segments of constant length against a constant background. *Theory of Instruction* provides the complete theoretical basis for discrimination sequences such as Figure 1.

(The sequence in Figure 1 differs from a sequence that Engelmann and Carnine might suggest in two respects. The investigators realized that the subjects in the present study might incorrectly learn a misrule: that *parallel* means lines not touching, and that *not parallel* means lines touching. Subjects guided by such a misrule might still score as high as 75% correct on a posttest. Thus, although in a typical sequence intersecting line segments would be used, the investigators decided against using them. The investigators hoped to prevent any subject guided by a misrule from scoring well on a posttest.

The second difference relates to variety among positive examples. Note that all positive (parallel) examples in Figure 1 represent the same angle, even though *Theory of Instruction* espouses variety. The investigators surmised that, due to the severe handicapping condition of the subjects, only one angle for parallel should be taught during the first lesson. A second angle for parallel was taught during the second lesson, while the third lesson expanded to all angles. For less naive learners, this "one-subset-of-parallel-at-a-time" strategy is detrimental.)

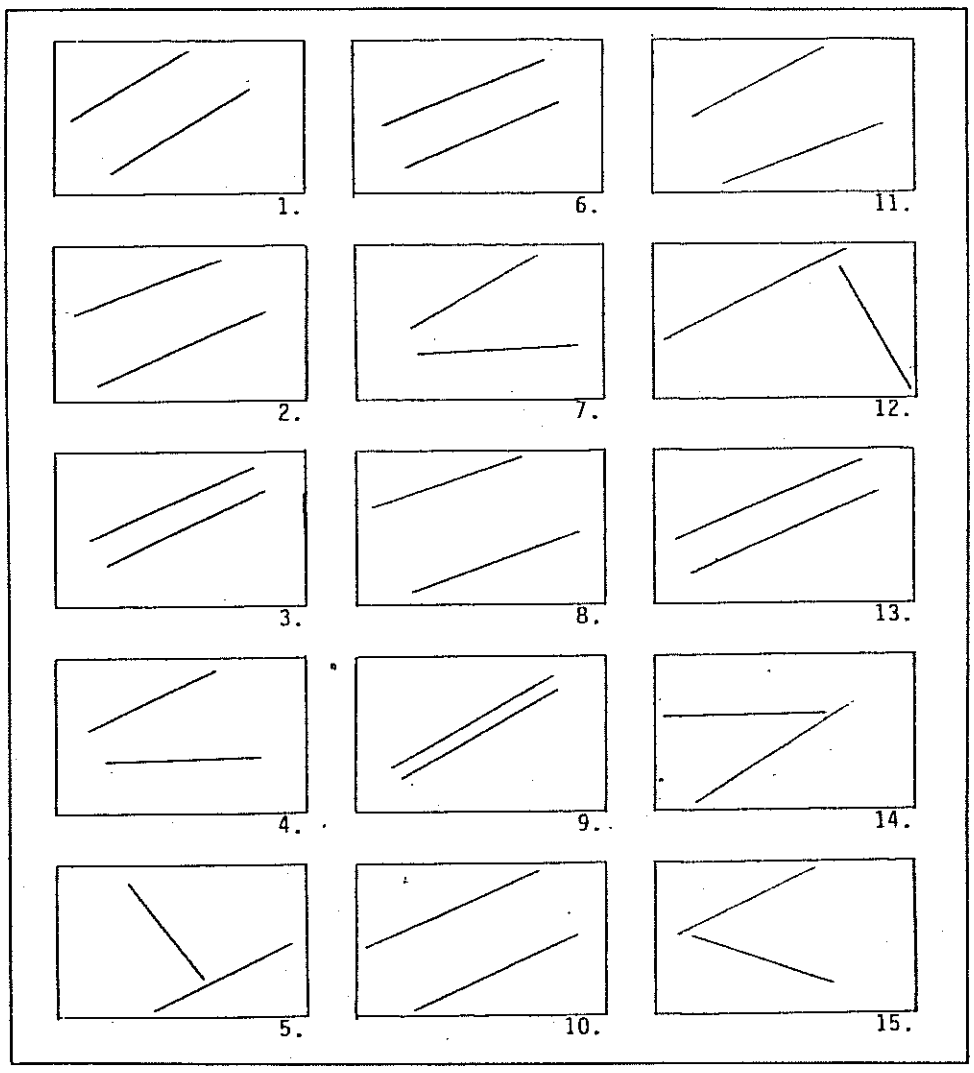


Figure 1: Discrimination sequence for teaching a subset of parallel/not parallel.

Method

Overview. Subjects who received three discrimination sequences arranged according to Engelmann/Carnine guidelines to teach *parallel* were compared to subjects who received three comparison sequences. Over the course of the three sequences (one sequence per day for three consecutive days), subjects who received the arranged sequences (i.e., the arranged sequence group) and subjects who received the comparison sequences (i.e., the Random Sequence group) were exposed to the exact same examples. Only the order of example presentation differed between the two groups. The order of examples in the comparison sequences was randomly determined.

Subjects. Subjects were volunteers from workshops for adult clients who were labelled mentally retarded. The 50 adults who agreed to participate were paid at their regular hourly work rates. Subjects were matched in pairs according to their scores on a pretest that assessed ability to learn vocational tasks from instructional input and feedback. Within each pair, one subject was randomly assigned to the Arranged Sequence group. The other subject was assigned to the Random Sequence group. Due to attrition, and to extra or "odd" clients being randomly assigned to the Random Sequence group at two workshops, sample size for the two groups was not equal.

Instruction. All training and testing was conducted individually. Each subject received three days of training. Every subject in the Arranged Sequence group received one 15-example sequence every training day that approximated the model discrimination sequences as set forth by Engelmann and Carnine's *Theory of Instruction*. The first day's sequence consisted of three inch, thick purple line segments. The positive examples showed segments parallel in a horizontal position. The second day's sequence, which is illustrated in Figure 1, consisted of five inch, thin black segments. The positive examples showed segments at a 27 degree angle. The third day's sequence was also carefully arranged, but contained examples varying in angle, length, thickness, and color.

All 45 training examples over three days for the Arranged Sequence group were randomly shuffled. The first 15 cards became the day one training sequence for the Random Sequence group; the second 15 cards became the day two sequence, the last 15 became the day three sequence. Other than order of cards, training for both groups was identical.

Testing. As in training, all test examples were represented on 5 × 8 inch unlined index cards. For every test example, the subject was asked, "Are these parallel?"

Ten cards were randomly selected from the 45 training cards, with the stipulation that five positive and five negative examples be selected. These cards represented the posttest, which was administered immediately after the third day of training and one week after training. Also, ten transfer test examples were created that differed from the training examples in color of card or line segment, in length or thickness of line segment, or in type of line segment (one card had pencils affixed to it; another, square rods). Five positive and five negative examples were included in this test. The transfer test was administered at the same two times as the posttest.

Results

Group results on the tests are shown in Table 1. Because each test was 10 items long, it is easy to convert each mean into precentage correct. For instance, on the maintenance transfer test the 25 Random Sequence group members averaged 5.72 items correct, or 57.2%. According to statistical tests, the Arranged Sequence group significantly outperformed the Random Sequence group on both tests that were given immediately after training; $F(1,48)=4.23$, $p=.05$ for the posttest, $F(1,48)=4.14$, $p=.05$ for the transfer test. Although the Arranged Sequence group averaged a score of over 10% higher than the Random Sequence group on the maintenance posttest, and over 6% higher on the the maintenance transfer test, neither edge was significant statistically. However, the differences between the two groups on the two maintenance measures represent effect sizes (i.e., differences in pooled standard deviation units) of .58 and .39. Any difference greater than .33 is usually considered educationally meaningful.

Discussion

The present study affirms that the order in which instructional examples are sequenced does make a difference, and that there is validity to the *Theory of Instruction* guidelines for designing

Continued on Page 5

An Observation System

To Improve Teacher Performance[1]

By Ellen Adler
Educational Service District
Lane County, OR

During the past few years, classroom research has become increasingly focused on studies of effective teaching practices—a delineation of those practices that increase student learning rate (Stallings, 1980; Carnine, 1981; Zoref, 1981). Research with mildly handicapped and other low-performing groups has shown that effective teaching can be characterized as taking place in groups which are academically focused with high student success rate (Stallings, 1980; Stevens & Rosenshine, 1981). Consistent monitoring of student progress and high levels of academically-oriented interactions between teachers and students are also signs of an effective classroom (Brophy & Evertson, 1976; Rosenshine & Berliner, 1978).

A clear picture of effective teaching procedures is emerging from the literature. These findings are welcomed by supervisory personnel. The data from these studies can assist supervisors in providing objective feedback to teachers on their performance.

Program supervisors fulfill a unique role in the educational evaluation process. Merely by monitoring teacher performance, supervisors can effect change in the methods of classroom instruction (Haring, 1979). Supervisory tasks can result not only in information and recommendations, but actual program change. It is very important that classroom supervision be based on objective, measurable classroom data (Piper & Elgart, 1979). Objective data can be tracked over time and easily communicated to the recipient.

At the present time, objective supervision is the exception rather than the rule. Although there are a large number of classroom observation techniques in the research literature, few are readily available to supervisors. Competency is more often measured by rating scales and management by objective procedures. These are subjective procedures. Objective measurement systems are often viewed as cumbersome, intrusive, and time consuming. Easy-to-use objective supervisory instruments that can be used often, allow for within-program comparisons, and provide teachers with specific feedback are needed. The purpose of this study was to field test one such instrument and to assess the effectiveness of publicly posted comparative feedback. Also of interest are teacher ratings of the validity of the *Classroom Overview Data* scale.

Method

Participants and Settings

Three teachers of severly handicapped students and their aides (2 each) participated in the study. All were employed by the Lane Education Service District, Eugene, Oregon, and taught self-contained special education classes. All of the classes were located in public schools.

Observations were conducted within the teacher's self-contained classroom. All students attending these TMR (trainable mentally retarded) classes met State of Oregon eligibility criteria, and attended a full class day in a school appropriate to their age level and closest to their home address. The program supervisor was also the experimenter in the study which was conducted between April and June, 1982. Two of the study teachers had taught in the program for at least two years, one was a first-year teacher, and all were committed to returning to the program for the following year.

Measurement

Data were collected on the *Classroom Overview Data Code* (Adler, 1982). The procedure examines teaching in an entire classroom for a 30-minute period. Students and staff are tracked across both in-class and out-of-class activities. The code measures total class behaviors and does not track individual interactions between teachers and students.

The *Classroom Overview Code* examines three groupings of activities: Staff Deployment, Student Behavior, and Task Variables. There are 20 classroom *Categories* in all. For example, under Staff Deployment are Out of Room, Waits, Structured Teaching, Organizing, etc. Under Student Behavior are Number Observed, Task Response, Inappropriate Action, Transition, etc. Under Task Variables are Age Appropriate, Functional, Data Based, etc. The tallies from the *Category* boxes are compiled into *Composite* scores. Composites are calculated as a percentage by combining the totals from the *Category* data and dividing that figure by the total number of 30-second observation units.

The *Classroom Overview Code* uses sequential point sampling within a larger interval. Target behaviors in each of the three code areas are observed within a 30-second interval, which begins during the middle of a scheduled class session, includes one transition period, and ends during the next class session. [For further detail, see Adler (1982) or write to the author.]

The observer uses an auditory timing device to signal scoring intervals. Upon hearing the thirty-second signal (beep), the observer follows a standardized scanning procedure. The observational scan follows a consistent left-to-right and within this direction a near-to-far from the observer. This scanning procedure remains constant for all observations. In order to maintain a proper spacing of time between the observation of single staff/students, an inaudible second count was employed. Observation of one person and the marking of the corresponding tally take approximately one full second. Any box in the Staff Deployment or Student Behavior areas may contain more than one tally. Both the Staff Deployment and Student Behavior areas follow this scanning and tallying procedure.

The Task Variable area is not scanned across the classroom within a 30-second interval. Although the consistent observational scan is maintained, one student is observed for the full 30-second interval. As each student is observed, the task content is rated according to specified criteria.

General Procudure

Each class was observed 5 times in each week. Observations occurred for 30 minutes during a scheduled morning time, which remained constant throughout the study. Days that did not meet the experimental conditions (field trips, more than two staff absences) were non-data days. Data were given to the experimenter by the observers on a daily basis. The experimenter computed and charted the percentage data. These data were posted in each classroom and were updated daily by exchanging an updated graph for the previous day's graph.

Experimental Design

Observation times were randomly selected from class periods that had the majority of staff and students within the room and were designated by the teacher as skill development periods. Two back-to-back class periods were required for one experimental observation period.

A multiple baseline design across three classrooms (Hersen & Barlow, 1976) was used (see Figure 2). Feedback procedures were sequentially introduced to the three classrooms. The purpose of the study was to compare a No Feedback Condition (Baseline) to a Feedback Condition which involved posting of comparative data on staff instruction time.

A composite score from the *Classroom Observation Code*, Staff Instruction-Related Time, served as the *dependent measure*. Percent Staff Instruction-Related time involved the number of 30-second intervals of Structured Teaching, plus Out of Room Instruction, plus Monitoring, plus Appropriate Other divided by the number of 30-second observation units.

Interobserver Agreement

Observer reliability was as the percent agreement by interval. An agreement was defined as the same number of tallies in the same cell within each interval. Any deviation in number of tallies between observers was defined as a disagreement. The calculation employed was:

$$\frac{\text{(No. of Agreements)} \times 100}{\text{(No. of Agreements + Disagreements)}}$$

During Baseline the percentage agreement score was 84 percent. In the Feedback Condition interobserver agreement was 91 percent.

Phases of the Intervention

Baseline

During baseline no feedback was given to the teachers of staff. Teachers were aware that a study was being conducted that involved coding of behaviors in the classroom. But they did not know the context of the code or the purpose of the study. At this time teachers were asked not to talk to the other teachers about the observations that were taking place in their classrooms.

Feedback Condition

Public posting of comparative data on staff instruction time comprised the Feedback Condition. The intervention involved the classroom supervisor sharing graphed data that compared the classroom's data on Staff Instruction-Related Time to other classrooms and to a standard performance level established by the supervisor on the basis of pilot data (see Figure 1). The graph was posted on a bulletin board within the classroom.

The feedback intervention was administered daily to classroom staff simultaneously. If a staff member could not be present, the teacher relayed the feedback information to that staff member. If the teacher was absent, a classroom aide was designated as the person responsible to communicate the feedback to the teacher. The feedback intervention was carefully scripted and contained the following information: initial feedback on their comparative score, subsequent comparative feedback, and a format for teacher questions.

Results

Results are discussed in terms of: (1) the effect of the public posting of Staff Instructional-Related Time; (2) the stability of the data across time; and (3) the social validity of the survey.

The percent occurrence of Staff Instruction-Related Time for all classrooms is presented in Figure 2. The data indicate baseline patterns for the three classrooms of high variability around a stable trend line. Classroom A averaged 37 percent over 17 days within a range of 3-67 percent; Classroom B averaged 46 percent over 20 days within a range of 2-67 percent; Classroom C averaged 50 percent over 25 days within a range of 29-73 percent.

The intervention of public posting of staff instructional time was introduced following the traditional multiple baseline format. An immediate and abrupt increase in Instruction-Related Time is noticeable across classrooms, along with a decrease in variability. Classroom A averaged 99 percent over 17 days within a range of 70-100 percent; Classroom B averaged 85 percent over 11 days with range of 76-98 percent; Classroom C averaged 88 percent over 7 days with a range of 62-92 percent. There was no overlap of baseline and feedback condition data.

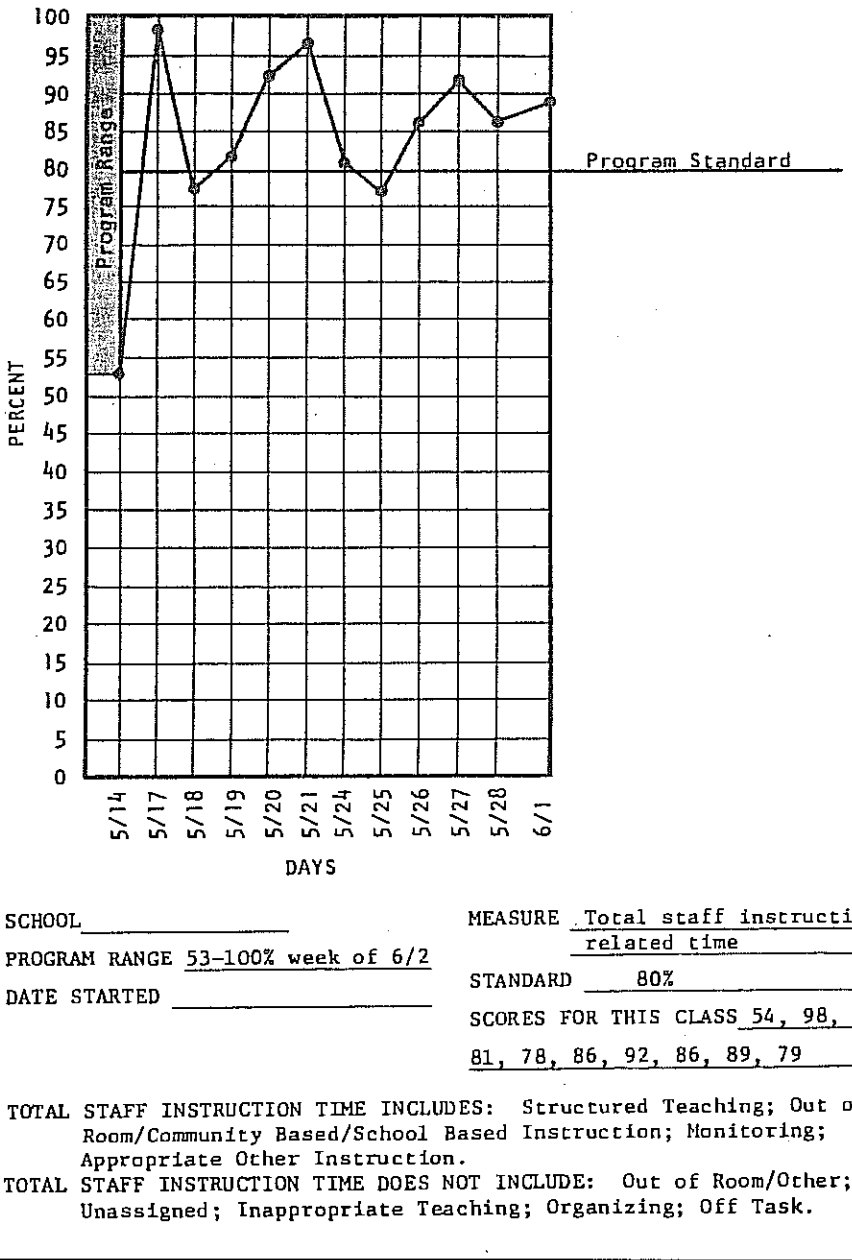
After the study was completed, the teachers filled out a code rating form (1—low to 5—high) on importance of the categories/composites to monitoring program effectiveness. It was given to them at the last staff meeting of the year with instructions for completion. They were also asked for comments on the observation and feedback procedure. This comment sheet was attached to the rating form and completed at the same time.

Results of this social validity inquiry indicated that the teachers approved of the classroom overview code, and were willing to set program-wide goals based on observation. These responses showed that teachers were aware of good teaching/classroom management practices and were willing to work toward operationalizing them. In addition, target teachers were keenly aware of observers and altered their performance

Continued on Page 5

[1] The author wishes to express her appreciation to Martin Sheehan and Tom Bellamy for their assistance in the preparation of this paper.

Observation System (Continued from Page 4)



SCHOOL _____

PROGRAM RANGE 53–100% week of 6/2

DATE STARTED _____

MEASURE Total staff instructional related time

STANDARD 80%

SCORES FOR THIS CLASS 54, 98, 77, 81, 78, 86, 92, 86, 89, 79

TOTAL STAFF INSTRUCTION TIME INCLUDES: Structured Teaching; Out of Room/Community Based/School Based Instruction; Monitoring; Appropriate Other Instruction.

TOTAL STAFF INSTRUCTION TIME DOES NOT INCLUDE: Out of Room/Other; Unassigned; Inappropriate Teaching; Organizing; Off Task.

Figure 1: Chart posted in classroom on staff instructional related time.

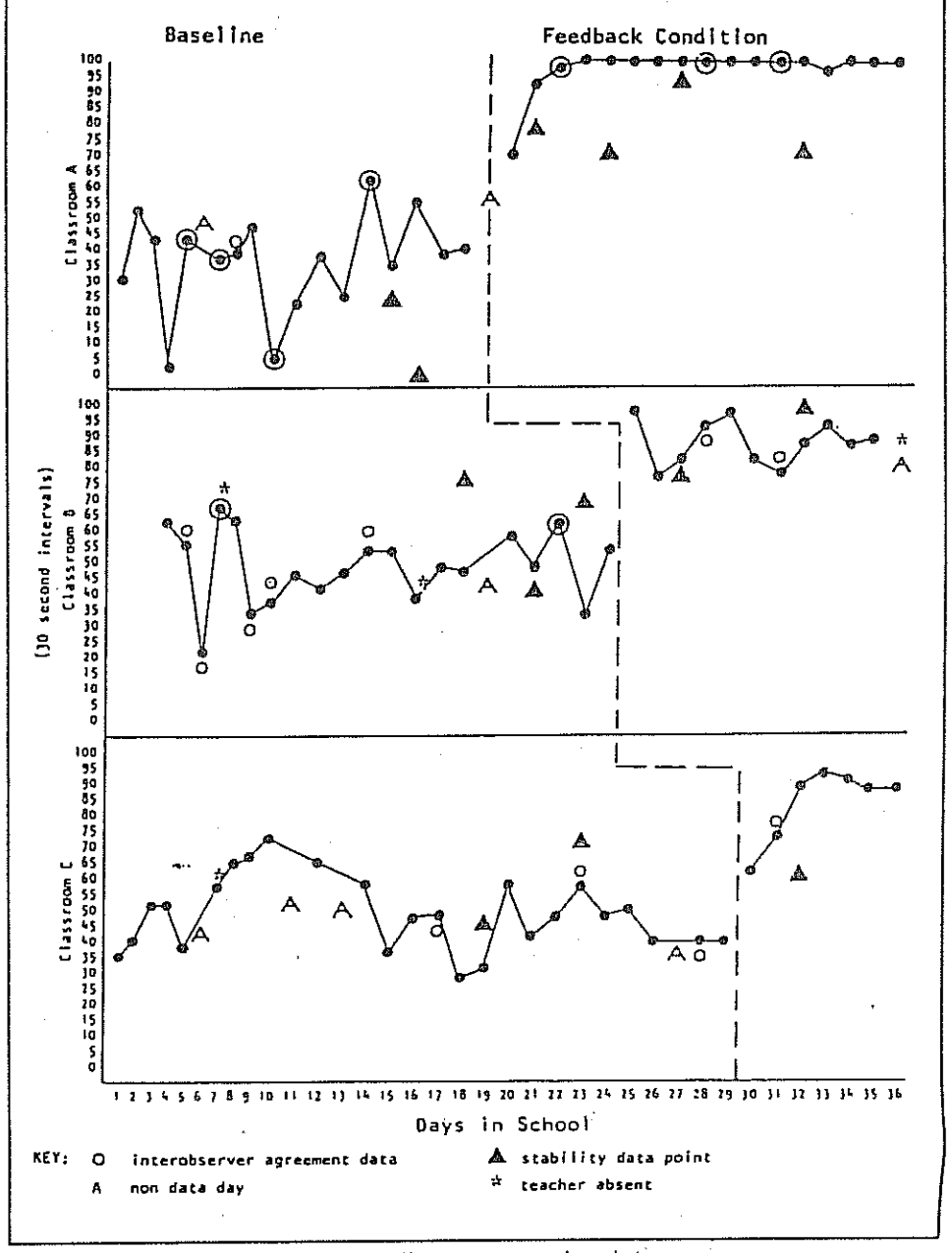


Figure 2: Percent occurrence of staff instruction-related time.

during observation times. The three teachers generally approved of the public posting of classroom data. It should be noted that one teacher found it patronizing. Use of a private feedback system, or a bar graph analysis may assist in avoiding the negative connotation connected with public posting. The importance of the immediacy of the feedback should be stressed.

In conclusion, the study demonstrated that definitions of effective instruction could be built into the framework of a reliable observation code for teachers of severley handicapped students. Providing information on comparative classroom performance data based on the code proved to be an effective method for improving staff behavior. Compilation of data throughout the school year could also offer a supervisor the performance data necessary for staff evaluation.

References

Adler, Ellen. The effect of public posting of comparative classroom performance data on staff instructional related time. Thesis submitted in partial fulfillment of requirements for the Ph.D., College of Education, University of Oregon, 1982.

Brophy, J.E., & Evertson, C.M. *Learning from teaching: A developmental perspective.* Boston: Allyn & Bacon, 1976.

Carnine, D.W. High and low implementation of direct instruction teaching techniques. *Education and Treatment of Children*, 1981, *4* (1), 42-51.

Haring, N.G. Foreward. In T.J. Piper & D.B. Elgart (Eds.), *Teacher supervision through behavioral objectives — An operationally described system.* Baltimore: Paul H. Brookes, 1979.

Piper, T.J., & Elgart, D.B. *Teacher supervision through behavioral objectives: An operationally described system.* Baltimore: Paul H. Brookes, 1979.

Rosenshine, B., & Berliner, D.C. Academic engaged time. *British Journal of Teacher Education*, 1978, *4*, 3-16.

Stallings, J. Allocated academic learning time revisited, or beyond time on task. *Educational Researcher*, 1980, *9*, 11-16.

Stevens, R., & Rosenshine, B. Advances in research on teaching. *Exceptional Education Quarterly*, 1981, *2*, 1-9.

Zoref, L.S. *A prototype for how to evaluate implementation of a structured educational program.* Unpublished doctoral dissertation, University of Oregon, 1981.

Sequencing (Continued from Page 3)

discrimination sequences. However, the variables investigated in the present study relate only to initial learning of a basic language discrimination. When these same guidelines are used in other situations, such as when the learner is being taught later on to apply the discrimination in a generalized manner to a variety of settings, they might hamper progress, and alternative guidelines might have to be used.

The utilization of principles or guidelines is still very much an art. It is like a variety of different coaching techniques in an athletic situation. The good coach uses effective techniques on the proper occasions. A poor coach might try the same techniques, but at inopportune moments. The discrimination sequences that Engelmann and Carnine suggest for initial learning seem to be effective techniques for just that—initial learning. On other occasions, different guidelines, from *Theory of Instruction* and other guides, should be considered.

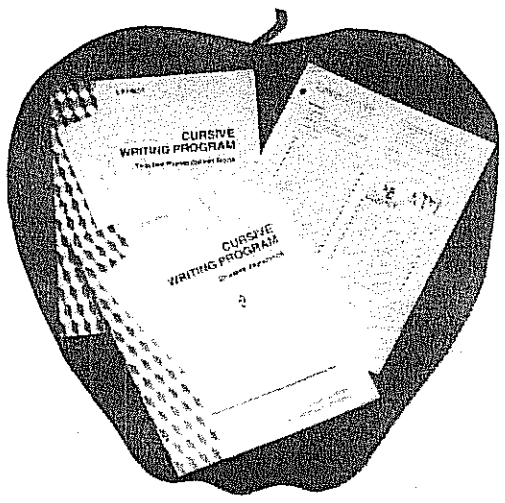
When teaching technique constantly fits learning need, it seems that learning can be accelerated. In this study, after only 15 minutes of training (five minutes per day, maximum), the Arranged Sequence group was appreciably ahead of the comparison group. If the Arranged Sequence group continued to receive instruction carefully designed to meet their learning needs, while the other group continued with less emphasis on careful instructional design, the gap between the two groups would be expected to widen considerably.

Table 1

Descriptive Statistics for Dependent Measures

	Measures taken immediately after training			Measures taken one week after training (maintenance)		
	N	Mean	SD	N	Mean	SD
Posttest on trained examples:						
Arranged Sequence Group	24	8.00	1.91	22	7.32	2.10
Random Sequence Group	26	6.77	2.29	26	7.11	1.80
Transfer test on untrained examples:						
Arranged Sequence Group	24	6.88	1.87	22	6.36	1.76
Random Sequence Group	26	5.80	1.83	25	5.72	1.54

APPLES FOR TEACHER



Cursive Writing Program

AUTHORS Samuel Miller, Siegfried Engelmann

RANGE Third and fourth grade students or older students poor in cursive skills.

DESCRIPTION The ***Cursive Writing Program*** is a 140 lesson direct instruction program that teaches how to form the various letters, create words, write sentences, and write faster and more accurately. Special features include a simplified orthography, emphasis on high-letter combinations, and design features such as the slant arrow to insure correct paper placement. Exercises require only 15–20 minutes of daily work.

ADMINISTRATION The program is suitable for individuals, small groups, or an entire class.

COMPONENTS **Teacher Presentation Book** includes • Detailed specifications for each lesson • Complete information and reproducible material for placement testing • Information on how to supplement the program • **Student Workbook** includes • Practice papers for each lesson • Point Summary Chart

440j	***Cursive Writing Program*** Teacher Presentation Book	15.95
441j	***Cursive Writing Program*** Student Workbook (1 ea.)	4.25
442j	***Cursive Writing Program*** Student Workbook (pkg. of 5)	21.25

I Love Library Books

AUTHORS Janice Jensen, Siegfried Engelmann

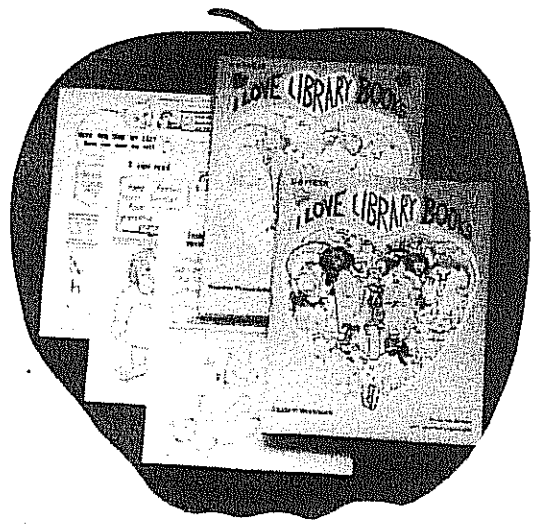
RANGE Students with first grade reading skills.

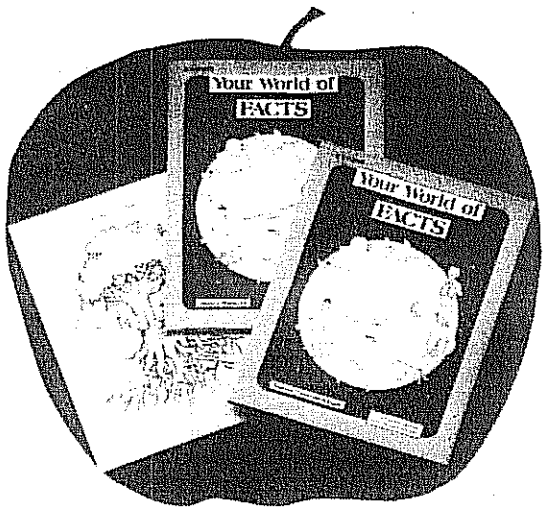
DESCRIPTION ***I Love Library Books*** provides details for introducing 37 popular children's books as an integral component of a first grade reading program. A computer analysis has keyed each book's vocabulary with the words presented in 8 major basal reading programs so that the selected books will match the child's skills and ensure a successful reading experience. Children using this program usually start reading library books by February.

ADMINISTRATION Either the librarian or teacher may administer this program.

COMPONENTS **Teacher Presentation Book** includes • Complete lesson plans for introducing 37 books • Computer analysis chart matching each book with a specific page and text of 8 basal reading programs • Procedures for record-keeping and assessment • Creative, time-efficient reinforcement activities • **Student Workbook** includes • Introductory sheets for each book • Student record sheet • Supplementary worksheets

444j	***I Love Library Books*** Teacher Presentation Book	15.95
445j	***I Love Library Books*** Student Workbook (1 ea.)	4.25
446j	***I Love Library Books*** Student Workbook (pkg. of 5)	21.25





Your World of Facts

AUTHORS Siegfried Engelmann, Karen Davis, Gary Davis

RANGE Third through fifth grade students, and remedial learners who read on at least the beginning third grade level.

DESCRIPTION ***Your World of Facts*** is designed to supplement science and social studies programs, preteaching key facts and relationships. The series was written in response to the problem that students are often so concerned with the vocabulary of science and social studies texts that they fail to understand the concepts. Simple charts and pictures present each set of facts, and a game format provides impetus and practice. The 40 lessons require 45–50 minutes each, but only 15 minutes of teacher-directed time.

COMPONENTS **Teacher Presentation Book** contains guide information and instructions for each lesson • **Student Workbooks** are nonconsumable and contain 25 topics, including the solar system, the respiratory system, continents, oceans, and the internal combustion engine • Reproducible scoresheet • Reproducible certificate

448j	***Your World of Facts*** Teacher Presentation Book	24.95
449j	***Your World of Facts*** Student Workbook (1 ea.)	4.25
450j	***Your World of Facts*** Student Workbook (pkg. of 5)	21.25

Speed Spelling

AUTHOR Judy Proff-Witt

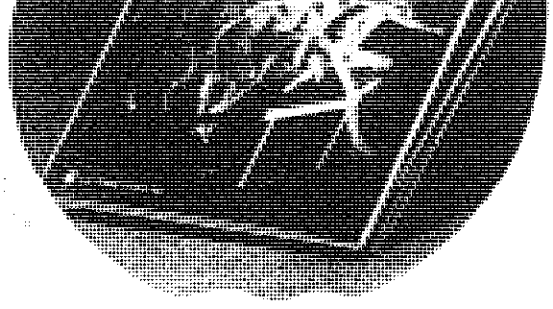
RANGE Learning disabled and retarded children who have not mastered grade school spelling skills.

DESCRIPTION ***Speed Spelling*** is an individualized, phonic program designed to increase spelling speed and accuracy following a systematic development of sound-to-letter correspondence. A placement test determines each student's level. Each of the 93 lessons teaches word reading, word writing, and sentence writing, and contains instructional objectives and detailed directions.

ADMINISTRATION Teachers, students, aides, or other paraprofessionals may act as tutors.

COMPONENTS **Manual** includes • Placement test • Cycling tests • 93 lessons with complete instructions • Adaptation procedures for classroom settings • **Student Book** includes a record of performance and is the only consumable part of the program • **Word List Packet** contains large-letter words and is reproducible

252j	***Speed Spelling Kit,*** manual, 20 Student Books, plus Word List Packet	72.95
253j	***Speed Spelling Student Books*** (pkg. of 20)	9.95



Send for our free catalog.

C.C. PUBLICATIONS, INC.

P.O. Box 23699, Tigard, Oregon 97223-0108

TO ORDER, WRITE OR CALL
TOLL-FREE
1-800-547-4800
(Oregon residents call 1-692-6880)

DI Approaches to Teaching Spelling

By Maria Collins
University of Oregon

Editor's Note. This is the second of a two-part series on teaching spelling. The first article (DI News, fall, 1983) by Maria focused on general research findings on effective procedures for teaching spelling. The present article focuses on DI approaches to spelling.

This article describes two DI programs for teaching spelling—*Spelling Mastery* (Dixon & Engelmann, 1980) and *Corrective Spelling Through Morphographs* (Dixon & Engelmann, 1979). These programs will be examined in relation to the research on spelling practices and effective spelling instruction (Collins, 1983). Each program will be briefly described, and then both programs will be discussed for the teacher presentation skills and instructional design characteristics.

Spelling Mastery

Spelling Mastery contains five levels (A through E) for grades 2 to 6. This program incorporates specific skills, rules, strategies to "teach spelling skills to long-term mastery" (Dixon, Engelmann & Olen, 1981). The authors have designed the levels to teach spelling words as efficiently and effectively as possible. Level A includes 60 lessons, B, C and D 140 lessons and level E 100 lessons. The program is designed to be used daily, each lesson taking about 20 minutes. Each level reviews the skills taught in the previous level in the first 20 lessons.

Although the program is designed for grades 2 through 6, the materials can be used with mildly handicapped students, other low-performers, and students for whom English is a second language. Students should be started in Level A only after they have had one year's reading instruction in a systematic phonics-based program. They will be better prepared to learn the spelling system of sound-to-symbol translation. Other starting points can be determined by performance on the placement test which comes with the program.

The program is based on three distinct teaching strategies: *phonemic*, for words with predictable sound to symbol correspondences (examples: *man, hit, stand, beam*); *morphemic*, for words made up of base words and affixes (examples: *unreturnable, disjoined, worried*); and the *whole word*, for words which cannot be taught by the other two approaches (for example, irregular words such as *quiet, was*, and *enough*). The phonemic approach is stressed in levels A and B, and the morphemic in C, D and E. The whole word approach is included throughout the levels, but emphasized more regularly in the lower levels.

Corrective Spelling Through Morphographs

The *Corrective Spelling Through Morphographs* program is designed to be used with students in grades 4 on, who have mastered the phonemic approach, but need more instruction on the morphemic level. The program, like the C and D levels of the *Spelling Mastery Series*, incorporates rules and teaching principles to ensure that students will learn to spell words accurately and rapidly. Because this program is intended to be a "corrective" spelling program, students learn in 140 lessons what the *Spelling Mastery* presents in 280 lessons (levels C and D). Lessons require 20-30 minutes daily.

Program Design

Placement Procedures. Many spelling programs use placement procedures which often result in teaching words that students already know (Manolakes, 1975). This problem occurs because programs place students in broadly defined *grade-level* materials, rather than focusing on specific skill deficits. DI spelling programs place students in an appropriate instructional level, based on their performance on a program-related placement test. Specific errors indicate that students need a particular level because they do not know how to spell the words in that sequence. In this manner, the teacher does not spend time teaching words students already know.

Wordlist and sentence formats. Research indicates that teachers should present words in a list form, rather than in meaningful context (Fitzsimmons & Loomer, 1977). Emphasizing the "meaning" of a word, rather than its spelling, distracts from the goal of teaching students to spell accurately. DI spelling programs introduce words in two ways. The most commonly utilized method is wordlists, in which words with the same letter combination or vowel are presented in a short list together. The words are presented with a brief statement (or rule) by the teacher about the sound or sound combination. For example, in level B, teaching students how to spell the /v/ sound at the end of short words is introduced by the teacher in these words: "The sound /vv/ at the end of words is usually spelled with the letters v-e." Next, the teacher tests the students on this rule by asking: "What sound is at the end of *have*?" Students respond "/vv/." "How do you spell that sound?" Students say "v-e." and then the teacher directs the students to spell *have*. This procedure is repeated with the words *five, gave, live*, and *give*.

The second word-introduction method in the Spelling Mastery series involves a sentence strategy, which focuses on words that have the same spellings, but different sounds. For example, one sentence introduced in the student material is "I thought he was through" (level B, lesson 106). Students are deliberately introduced to the difficult words "thought" and "through" so that they can see the spelling similarity. The authors do not present these sentences so that students grasp the meanings of the words, but to facilitate students' spelling these "hard words." The authors then include "editing sentences" as a strategy for students to review previously-taught words throughout the series.

The words taught in both the *Corrective Spelling Through Morphographs* and *Spelling Mastery* programs were chosen on the basis of their high frequency and their usefulness in applying the spelling rule principles. Although "unrefreshing" is not a common or high frequency word, the word is included in the morphemic presentation so that students use the conceptual framework they've been taught to determine the number of morphographs". Groff (1982) has recommended a similar approach based on her research.

Although word meanings are not stressed, students are taught the meanings of several "key" morphemes. The program incorporates these morpheme meanings in the levels C, D, and E to show that morphemes have meaning. By learning the meanings of selected morphemes (for example: *pre* means "before," *re* means "again," *ing* means "when you do something") students learn that a word like *returning* means "when you turn again" or *preview* means "to view before (others do)."

The program teaches students the meanings of many homonyms so that students can discriminate these in writing (and in dictated tests). Students learn to spell one homonym, such as "right" when the teacher states, "Here's a sentence: The answer is right. Here's how you spell that *right*: r-i-g-h-t." The teacher then tests the students, "Everybody, spell the word *right* that refers to being correct." Students practice spelling this word in various contexts before being introduced to its homonym, write. This strategy for introducing homonyms is followed throughout both *Spelling Mastery* and *Corrective Spelling Through Morphographs*.

Rule introduction. Both *Spelling Mastery* and the *Corrective Spelling* teach the three rules recommended by Miller and Graham (1979) as being most useful.

1. Doubling the final consonant on a CVC word before adding an ending. Example: *sad + en = sadden*
2. Dropping the final *e* on a CVCe word before adding an ending. Example: *hide + ing = hiding*
3. Change the *y* to *i* before adding an ending. Example: *worry + er = worrier*

These rules are taught progressively over the program so that students learn and *apply* the rules to mastery. For example, the doubling rule is presented and the teacher writes on the board: *double c when CVC + V* and says "When a short word ends CVC and the next morphograph begins with a vowel letter, you must double this consonant" (points to the final *C*). The students learn to state the rule orally, and then practice applying the rule. For example, students answer teacher-directed questions about *sad + er* (rule applies), then *sad + ly* (rule doesn't), then *sad + est* (rule applies). They learn that the word *water* does not follow the rule, because it is not a short CVC word (words with 3 or 4 letters).

After several days of teacher-directed instruction with the above procedures, the programs introduce the students to actual words on a worksheet, in which students must apply the rule. For example, on the following words students must write "c" or "v" above the last three letters in the first word (morphograph) and then write "v" or "c" above the first letter of the second morphograph. These visual prompts aid the students in determining whether the rule applies or does not apply.

double when CVC + V

1. stop + ed = _____
2. farm + er = _____
3. sad + ness = _____
4. swim + ing = _____

After using this strategy for several days, students use the same system, but the rule is not included in their worksheet. Later, the teacher dictates the morphographs and students write them on lines in their workbook. Eventually, the teacher dictates the complete word with no morphemic breakdown, and students must apply the rule for this terminal skill. These same sequencing strategies apply to the other rules as well.

Other sequencing principles. The programs are carefully designed according to the principles described by Engelmann and Carnine (1982). Preskills for a strategy are taught before students learn the strategy. For example, before students actually apply the CVC rule, they receive teacher instruction about the difference between a vowel (v) and a consonant (c) and practice writing *c* or *v* above letters before they write these above letters in words. Before students spell words like *man* or *rob*, they practice identifying the sounds in the words. Although this strategy is not a direct spelling skill, it is a preskill designed to ensure that students can determine all the sounds in regularly-spelled words, and to prevent reversals (example: spelling *mats* as *mast*).

Words that have been previously introduced are cumulatively reviewed throughout the programs. For example, although the words *give, live*, and *have* are introduced in lesson 1 in level B, these words are periodically reviewed throughout the program, either in teacher dictation form or in review exercises in the student workbook. Cumulative review is particularly important for low-performing students (Neef, Iwata, and Page, 1977; Gettinger, Bryant, and Fayne, 1982). A host of other design principles are also embedded in the programs.

Teacher-guided worksheets. In his review of the literature on what makes teaching "effective", Rosenshine (1983) recommends that teachers carefully direct the class through the first seatwork problems before students complete workbook exercises independently. DI spelling programs incorporate this guided-practice strategy in all workbook activities. Only after students have received adequate practice on specific skills, do they work an exercise independently.

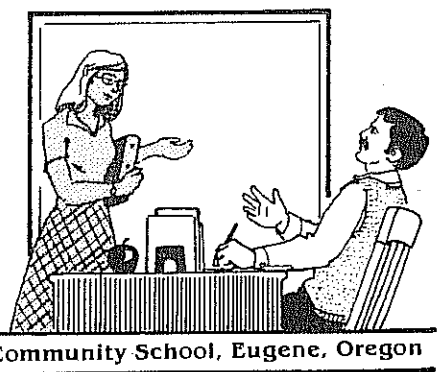
Teacher Presentation Variables

Both programs prescribe specific behaviors to be used by the teacher during spelling instruction.

Scripted lessons. Both spelling programs emphasize direct teacher presentation of essential spelling skills. A specific script for the teacher to follow is provided. The teacher spends most of the spelling period directing students' spelling practice, a recommendation Hillerich (1982) has made after his analysis of teacher's instructional spell-

Continued on Page 15

Teacher to Teacher



by Jane M. Dougall — Whiteaker Community School, Eugene, Oregon

Theory into Practice –

A "Regular" Mainstream Classroom

Sue Brent
Portland, Oregon

Imagine, if you will, a classroom of 30 children bustling around at the beginning of the school day, correcting errors on take-homes and other seat work, hanging up coats and playing games. Now check that desk in the front of the room—the one with a teacher aide sitting next to it and the brailler sitting on top. That desk belongs to a child who is non-sighted and emotionally handicapped. His name is Sean. If you look on the right side of the room, you will notice a rather large, drafting-table-like desk with a typewriter sitting on it. That desk belongs to Raini, a student who has cerebral palsy. She usually types the answers to her take-homes with a mouth-stick. Just behind her, at the end of the row, sits a third handicapped learner. Her desk is shorter than the others. Naomi has arthrogryposis. You can't see her? Look down on the floor. She usually sits there if she's not in her wheelchair. I doubt if she's correcting errors—she's gifted. It's not that she doesn't make mistakes, but it's my guess she's drawing; she loves to draw. She's not there? I guess she went outside for a little early morning recess with some of the other children. Don't worry. She'll be back when the bell rings. The last person I want to draw your attention to is right up in front, seated next to Sean. Nancy is also emotionally handicapped. That's why I have her sit up in the front. I find I remember to praise more often that way, and she stays on task longer. Nancy also has vision problems, another reason she must sit up front. She has hydrocephaly.

That's a quick overview of our room. The other 26 students? Oh, they don't have problems—not physical ones anyway. They have their moments, of course; there are a few behavior management cases. But these other students are generally non-handicapped—unless you consider the other three over by the window playing cards. They're identified as academically gifted, and they have a whole different set of problems that require attention. I will not go into that in this article, but I want you to know that they are in Direct Instruction reading and math programs, just like everyone else in the class. We simply move a little more quickly with them than with the other children, and we provide more enrichment activities. What grade level is this class, you ask? They're second and third graders. Is this mainstream situation hard to handle? Yes, at times, but I don't do it alone. I have an aide who works full-time with Raini, as well as one who works full-time with Sean. I usually have volunteers and practicum students from the University, too. I would not have taken on this assignment without adequate help. I also work with a half-time DI teacher, itinerant teachers and various consultants. This classroom is an experiment of sorts. Previously I just had Raini in my class. Due to last year's success with her, I received three other handicapped learners this year.

In this article I will illustrate how I integrated the handicapped students into my DISTAR reading and math groups, how I used DI to teach other subjects, and what rules and organizational systems helped keep the classroom running smoothly.

Mainstream Reading and Math

There is relatively little difficulty in mainstreaming handicapped children into a classroom which already uses DI reading or math programs—compared to one which is less structured. In fact, it is a lot easier because chances are that the handicapped students have been using a structured approach in their self-contained special education classrooms. The way to prevent many of the potential problems is to plan ahead and use lots of praise. Planning takes time, but it pays off. Praise keeps children with extreme emotional handicaps and other learning disabilities on-task so that the rest of the class does not become frustrated with the learning situation.

Sean

Sharon, an aide with the skill of an experienced teacher, arrived in mid-October to work with Sean. Sharon was very skilled in DI techniques and had worked with Sean for two years before coming into my classroom. When Sean arrived, my lowest DISTAR Reading II group was already on lesson 99. (The students at our school began their DISTAR training in kindergarten.) Sean was reading below that level, and he had been working throughout the summer with Sharon in both behavioral and reading programs. Sean was confused enough trying to learn mobility in a new classroom and school, so we didn't see any benfit in sending him to a different class to read in a group at his level. We had hoped eventually to "catch him up" to the level of the lowest group and to integrate him into it. We had the Teacher's Presentation Manuals prepared with clear brailled words under the written words, knowing Sean could sit next to the presentor and read the brailled words as the other students followed the cue and read visually. The DISTAR readers had all been brailled, too, so reading with the group would also have worked. But as he moved ahead, so did we, and the dream of having Sean reading with his peers never happened.

Mathematics was more of a success. We brailled the teacher presentation book, and Sean followed along in it while I presented the chalkboard work to the students. We also had Sean's take-homes brailled, because the take-home is often the major portion of a DISTAR math lesson. We did not use the same layout as the printed take-home. Skills needed to be more ordered for Sean. We also eliminated some of the extra review because it was enough of a task for Sean to complete the lesson portion of the take-home. After group, Sean would take his work to his seat and complete it with his brailler. Sharon would give him oral review on the portions we had cut, either at the time or later in the day.

Normally during a DISTAR presentation, low performers sit right in front of the teacher for eye contact. With Sean we found it worked best to have him sit on the end closest to his desk. We did this for two reasons. First, time telling, measuring, or counting money were skills that Sean worked on individually with Sharon at a later time during the day. I often changed the presentation order of the lesson so that skills Sean learned with Sharon were taught to the others after he left the group. Secondly, because of certain behavioral programs, Sharon would sometimes need to pull Sean out of group for inappropriate behavior. Having Sean sit on the end of the row seemed the least distracting for the other students. I used touch instead of eye contact to keep him on task.

Raini

Raini was probably the next most difficult student to plan for. To get her to the group, someone had to transport her, attach her portable tray to the chair, and bring mouth-sticks for writing and turning pages. A mouth-stick is a cigar-type mouthpiece stuck onto either end of a pencil. The eraser is exposed for turning pages; lead is exposed for writing. The mouthpiece was also used with other adaptations. Remembering to come to group on time was Raini's responsibility. Another student brought her to group. The whole process was only a problem if someone forgot their responsibility and the group had to wait.

The only accomodation we made for Raini was to let her skip some of the review questions at the end of the DISTAR Reading III take-homes. Either her aide or I would ask her to give the responses orally when we checked her written answers.

Math was similar to reading instruction—little needed to be done to accommodate Raini's individual differences. If we were doing count-bys, she would use the hands of the student sitting next to her, as she could not hold her hands still enough. Raini usually wrote the answers on her take-home during and after group.

Naomi

There was really nothing special I did to plan for Naomi in our groups, either. As I've said before, she is gifted and we didn't need any special equipment to accomodate her needs in group. If something did need to be adapted, Naomi often came up with the suggestion and the solution.

For both reading and math, Naomi would "walk" on her knees up to our benches for group. I would lift her up, and because of her sitting position, it was usuallly easier for her to sit in the middle. To write answers on take-homes, all the children used lap boards, which worked fine for Naomi too. Noami's handicap required that she write in an adapted manner. She had little muscle development in her arms, so sitting cross-legged, she would use her foot to guide the pencil in her hand. She had beautiful handwriting, and she worked very hard at it. It did take her a little longer to finish her take-homes, but Naomi insisted on finishing all the work. Sometimes she was a little late going out for recess, but that was her choice. She was definitely an inspiration to the other children in the group, because she would always strive for excellence.

Nancy

Nancy was at or slightly below grade level in both reading and math. However, keeping her on-task during group and after, while she was working independently on her take-homes, was a task in itself. Few things worked as a reinforcer for Nancy. Stickers and praise helped during group time. After group was the most difficult time for her to work. There were so many things going on that distracted her. Because of her severe emotional problems, Nancy was eventually phased into an ED classroom. She wasn't a mainstream failure, there were just too many distractions in a classroom of 30 children for it to be a beneficial placement for her.

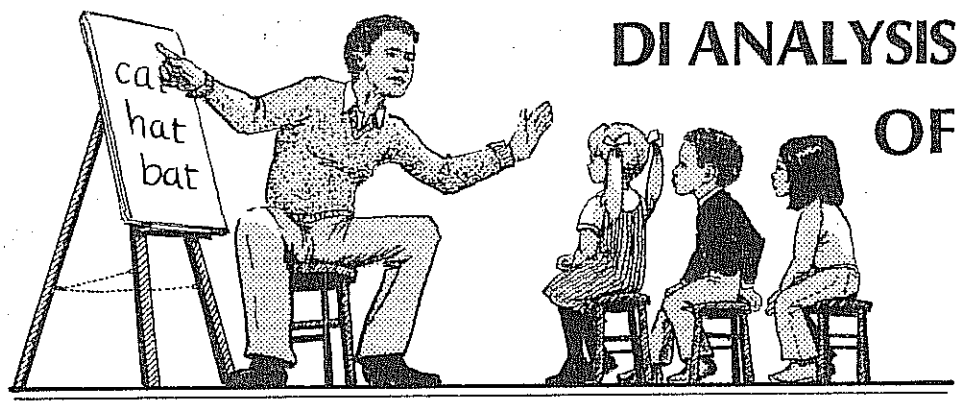
Social Studies, Scienced, Creative Arts and Free-time

Free-time activities, which we engaged in after reading and math, were always rewarding situations. Handicapped and non-handicapped played together without coaxing. We played math and reading games which reinforced skills that had been taught. The occupational therapist with whom we worked and our consultant for the blind very creatively adapted many different games. We used brailled cards, and games which did not require vision. Raini could move checkers with the eraser end of her mouth-stick, and she had an adaptation which was like a clothespin that she could use to hold cards. Often students would read stories to each other or just draw and color.

In the afternoon, after we had a story (a time for other handicapped students who didn't fit into our instructional programs to visit), it was time for other subjects.

Direct Instruction techniques could most easily be seen during a social studies or science lesson. In this type of whole group situation, non-handicapped were paired with handicapped to share books and follow along. The group response and individual questioning strategies used for reading were also employed for science and social studies. The students would work together on projects—mapping the school grounds, measuring plant growth, or experimenting. I left it up to the students to work out how to adapt a project so all would be involved. Often these subjects were not appropriate for Sean or Nancy, so I would schedule

Continued on Page 9



DI ANALYSIS OF NON-DI PROGRAMS

by Linda Meyer
University of Illinois

The Problem of Inconsiderate Text*

By Bonnie B. Armbruster
Center for the Study of Reading
University of Illinois

Editor's Note: This is the first of a two-part series. Part one will introduce the concepts of "inconsiderate text", "global coherence," and "local coherence." Part two will cover characteristics of text that affect the type of information learned, implications for practitioners, and conclusions.

* In its entirity, this paper will appear in *Comprehension Instruction, Perspectives and Suggestions*, Duffy, Roehler, and Mason, Editors, forthcoming by Longman. Portions of this paper were presented in 1982 at Research Foundations for a Literate America, a conference organized by the Center for the Study of Reading and sponsored by the Hegeier Institute, the Johnson Foundation, the Exxon Education Foundation, the University of Illinois Educational Fund, the Monsanto Fund, and the National Institute of Education.

The textbook is the cornerstone of American education. During a decade of classroom observations, John Goodlad (1976) discovered that "the textbook predominated throughout as the medium of instruction, except in kindergarten. With each advance in grade level, dependence on the textbook increased . . ." (p. 14). A study in Texas (EPIE, 1974) concluded that students spend 75 percent of their classroom time and 90 percent of their homework time using textbooks and related materials. Given the pervasive influence of textbooks, few people would argue with the following premises: (1) Textbooks should promote understanding and learning, and (2) textbooks should promote learning *important* information. From research on learning from written materials, or text, we know some of the characteristics of text that affect these learning outcomes.

The most important text characteristics for comprehension and learning is textual coherence. The more coherent the text, the more likely the reader will be able to construct a coherent cognitive model of the information in the text. Texts cohere both globally and locally (Armbruster and Anderson, 1981; Cirilo, 1981). Global coherence is achieved by text characteristics that facilitate the integration of high level, important ideas across the entire section, chapter, or book. Local coherence is achieved by several kinds of simple links or ties that connect ideas together within and between sentences. Text that lacks global or local coherence is "inconsiderate text."

Global Coherence

Global coherence is achieved by the overall structure of organization of the text. Generally, structure refers to the system or arrangement of ideas in a text and the nature of the relationships connecting the ideas. A few basic text structures appear to capture fundamental patterns of human thought. The most common structures are these:

1. Simple listing
2. Compare/contrast
3. Temporal sequence
4. Cause/effect
5. Problem/solution

Another approach to defining text structures has been to identify structures that are somewhat more specialized, that is, appropriate for particular content or text genres (e.g., narratives, newspaper articles, or expository text). A generic structure for *narrative* text has been defined by two so-called story grammars. Story grammars specify the relationship among the story elements (e.g., goals, actions, and outcomes) that underlie narrative accounts. Another specialized text structure is used to describe *systems*. A description of a system (such as the circulatory system of the human body or the exhaust system of an automobile) typically includes information on the function of the system in the larger entity of which it is a part, the components of the system and their individual functions, and the operation of the system. Specialized structures for content-area text are just beginning to be identified (Dansereau, in press; Lunzer, Davies, and Greene, 1980).

Research on Structure

Several findings are apparent from research on structure:

1. Memory for stories is superior when the content is organized according to a well-known story grammar (e.g., Mandler and Johnson, 1977). When the structure of a story is altered by displacing or deleting story parts, readers not only say the stories are less understandable but they also do not remember the stories as well (Thorndyke, 1977).
2. Changing the structure, while leaving the content the same, affected memory for text. That is, the same ideas could be remembered better when expressed in one type of structure than another. A study by Meyer, Brandt, and Bluth, 1978) found that Ninth graders who identified the structure of well-organized text and used this structure as the basis of their own recall of the content of the text could remember more from a passage than those who did not use the author's structure. In another study, ninth graders who were taught to identify and use the author's structure dramatically improved their memory for text (Bartlett, 1978).
3. Learning can be affected by how clearly the structure is indicated in the text. Information about structure can

Continued on Page 10

Mainstreaming (Continued from Page 8)

science or social studies when they worked with an aide or specialist on other skills.

I also used DI in language arts—both for skill lessons which were in the student text and for creative writing. During creative writing I used DI to tell the students not *what* to write, but rather *how* to write. Sean could write on his brailler and Raini on her typewriter. Sharon did need to do some pre-instruction with Sean before such sessions in writing to teach him skills he had not acquired previously.

Organizational Guidelines

There were pull-out programs for everyone, handicapped and non-handicapped alike, in all subjects—talented and gifted, Title I reading and math, music, P.E., spelling, adapted P.E., physical therapy, and occupational therapy. Therefore, I found it necessary to have one big chart with each child's schedule on it. Every child was responsible for remembering what to do and when to do it. Naomi was very independent because of her electric wheelchair. Raini had to find someone to push her to special activities and Sean had to ask for a guide.

I lived by the following set of rules:

1. *Plan.* In fact, overplan. Know what you're doing and what you're going to do next. Let the kids help plan whenever possible.

2. *Develop a set daily routine.* Children should get used to starting and ending activities at about the same time. There should be established routines for obtaining materials and initiating activities that the kids can do themselves.

3. *Let the children know what you expect them to be doing.* Go over your plans with them, explaining things clearly. Youngsters feel secure when they know what to do.

4. *Warn students early about any changes.* If you know reading will be interrupted by an assembly, a fire drill, or whatever, tell your kids in the morning. Also give a few minutes warning before the end of any activity.

5. *Be aware of what the children are doing at all times.* Arrange the physical layout of the room so you can observe children who aren't working directly with you. A good way to deep track is to get in the habit of calling out praise to students who are on-task. It helps keep everyone working or gets them back if they are off-task.

6. *Set rules with the children and review them occasionally.* Rules should grow as the youngsters' ability to handle independence grows. When children help make the rules, they are more likely to help keep them.

7. *When things aren't working, get the kids involved in correcting the situation.* Put some of the problem solving responsibility on the children and allow them to develop solutions.

8. *Set aside time in your day to listen to your students.* Be as good a listener as you expect them to be.

9. *Take into account the children's abilities and needs.* Don't ask kids to do things they aren't able to do. Allow students enough time to complete tasks. Be flexible.

10. *Take into account your own human needs and limits.* Many teachers think they're superhuman. This is not so. Consider what pressures you're under. After all, you're the one who knows best how many different activities you can supervise at once, and how much noise you can tolerate. Be honest with yourself as to how much overtime you can put in and still function the next day. Allow time to teach skills and topics you enjoy.

11. *Don't give up on any child.* There's a way to help every youngster. When you've run out of methods and ideas, ask for outside assistance and be persistent until that child is helped.

It's easy to read this list and say, "Oh, I do all those things!" We all *try* to do them, but many times I found myself and my classroom slipping. Consistency is the key word when integrating handicapped children into a regular classroom.

In conclusion, I would stress again the importance of classroom assistance. I had volunteer as well as paid aide help. The aides were well trained before they worked with the handicapped students. We had weekly meetings with the consultants and itinerant teachers. The aides, as well as assisting their handicapped charges, filled in the gaps, corrected take-homes and answered questions when I was not available. We were an instructional team.

Handicapped children should not be dumped into a classroom. Extensive planning must be done before their arrival to prepare everyone involved. We had many instructional sessions with the non-handicapped children to inform them of the needs and abilities of the children that would be in our school and classroom. Mainstreaming has a very real chance of working in structured classrooms, such as those that use direct instruction. It is a great deal of work, but it is richly rewarding for the staff which has the commitment to assist students in learning to help and appreciate each other and the skills to enable each student to experience success.

Inconsiderate Text

(Continued from Page 9)

be provided in two ways. One way is through "signaling." Meyer (1979) has defined signaling as information in the text that emphasizes certain ideas in the content or points out aspects of the structure. Types of signaling that authors use include: (1) explicit statements of the structure or organization; (2) previews or introductory statements, including titles; (3) summary statements; (4) pointer words and phrases such as "an important point is..."; and (5) textual cues such as underlining, italics, and boldface. Average students remember more from text that includes signaling devices (see Meyer, 1979).

4. Another means of providing information about structure is through the repeated, consistent use of a particular structure. For example, readers reading a series of stories will remember more of the ideas in later-presented stories if the later stories have the same structure as earlier-presented stories (Thorndyke, 1977). Presumably, the reader learns the structure in early presentations of text and comes to expect that ideas in later presentations will be organized in the same way.

This research indicates that text structure *does* have an important effect on learning. If readers know to use the author's structure as a tool in building a coherent model of the text, the following seems to be true: The better organized the text and the more apparent the structure to the reader, the higher the probability that the reader will learn from reading the text.

In addition to structure, another important contributor to global coherence is *content*. (Actually, content and structure are so related that content might be considered an aspect of structure, as is the content of a story in a story grammar.) One area of research indicates that learning and memory are improved when people are given information clarifying the significance of facts that might otherwise seem arbitrary (Bransford and Johnson, 1973).

The effect of significance-imparting information also holds for longer text. Drawing once again on the research with story grammars, we know that information about a character's goal and events that lead up to a goal has a significant effect on comprehension and memory for narratives (Kintsch and vanDijk, 1978). Presumably, knowledge of the goal and the events leading up to a goal helps readers understand the significance of a character's actions and the consequences of those actions, and thus aids the reader's effort to build a coherent model of a text. Branford (in press) has suggested that the reciprocal relationship between structure and function provides the reader with information relative to the significance of the context. In sum, the content an author chooses to include can influence the global coherence of the text. In particular, global coherence is greater when the author establishes a meaningful context for facts that are presented in the text.

Structure in Textbooks

Since structure is a characteristic of extensive prose, it cannot readily be illustrated using short text excerpts. As mentioned, however, authors use signaling devices to indicate the structure of text. Therefore, one index of the structure of the text is the author's use of signaling. One kind of signaling device used universally in textbooks is titles and subtitles. A glance at a table of contents or outline of chapter titles and subtitles can be very revealing. For example, compare these chapter outlines from two different American history textbooks.

Textbook 1
What Were the Problems of the New Government?
- A. The Basic Problem
- B. Economic Troubles
  1. An Empty Treasury
  2. Economic Depression
  3. The Money Problem
- C. Conflicts Among the States
- D. Unfriendly Foreign Countries
- E. Calling the Constitutional Convention

Textbook 2
Growing Cities, Growing Industries
- Early Cities
- More Cities Grow
- Industrial Growth and Immigration
  - Americans All
  - Labor Unions
  - Jane Addams
  - Americans Prosper
- Cities Today
- Industrial and Technical Progress
  - Progress Through Inventions
  - Technology

The chapter outline from Textbook 1 suggests a better, clearer structure than the chapter outline from Textbook 2. The Textbook 1 chapter outline has an overall structure of "simple-listing"; it is easy to predict that each subtopic will probably be cast in a "cause/effect" or "problem/solution" structure. On the other hand, it is difficult to determine logical structure for the topics from Textbook 2.

Another signaling device is the introduction to a unit or chapter. Some introductions give the reader a good overview of the content and structure of the ideas to follow.

Another form of signaling is topic sentences that alert the reader to the organization of upcoming text.

In sum, signaling devices provide some information about structure in textbooks. Titles and subtitles, introduction, and topic sentences can be particularly revealing about the relative degree of structure in the text.

Another aspect of global coherence is the content itself—the inclusion of information that clarifies the significance of facts. For example, in history textbooks, information about motivations and goals can clarify the significance of events.

Local Coherence

Local coherence functions like a "linguistic mortar to connect ideas in the text together" (Tierney and Mosenthal, 1980). Local coherence is achieved by means of several kinds of cohesive ties—linguistic forms that help carry meaning across phrase, clause, and sentence boundaries. Examples of common cohesive ties are *pronoun reference*, or the use of a pronoun to refer to a previously mentioned noun ("The doctor will be back shortly. He's with a patient now"); *substitution*, or replacement of a word or words for a previously mentioned noun phrase, verb phrase, or clause ("My pen is out of ink. I need a new *one*"); *conjunctions* or *connectives* ("I'd give you a hand, *but* I'm busy"). A rather large body of research has established the importance of cohesive ties in understanding and remembering text.

The main findings are these:

1. Repeated references that help to carry meaning across sentence boundaries can decrease reading time and increase recall of text as an integrated unit (de Villiers, 1974).
2. Children prefer to read, are able to read faster, and have better memory for sentences connected by explicit conjunctions, particularly causal connectives, than sentences in which the conjunction is left to be inferred (Katz and Brent, 1968). Thus, sentences with explicit conjunctions produced better comprehension and recall even though the added conjunction increased the grammatical complexity of the sentence.

   The explanation for the consistent finding that more cohesive text is read faster and remembered better goes something like the following: Readers try to find a coherent model or interpretation of the text. When an incohesive text makes this difficult, readers spend extra time and cognitive energy to remediate the incohesiveness. They reread the text to search for the link, or they search through their memories to retrieve the connection, or they make an inference about a possible relationship. With this extra effort, mature readers may be able to form a coherent interpretation of the text. Children have less chance for successfully reading such text. They are less likely to know that rereading text and searching memory are appropriate "fix-up" strategies (Armbruster, Echols, and Brown, 1982). Children are also less likely than adults to be able to infer connections when coherence breaks down, simply because they have less linguistic and world knowledge to draw upon. Thus, local coherence in the form of strong, explicit cohesive ties is particularly important in textbooks for children is the explicit statement of relationships among ideas, particularly causal relationships.
3. The order of presentation of events in a text should generally proceed from the first event to the final events, especially in textbooks for younger children.
4. Another index of local coherence is clarity of references. For example, the pronoun "they" should have only one possible referent.

This installment has reviewed research that establishes the importance of textual coherence—structure and cohesion—in texts. The more coherent the text itself, the more coherent the cognitive model the reader is likely to construct of that text. Textual coherence is particularly important for children, who may not have sufficient linguistic experience and background knowledge to infer the content and relationships absent in incoherent text. In the next issue, we will look at characteristics of text that affect students' ability to learn *important* information from the text.

References

Armbruster, B.B. & Anderson, T.H. *Content-area textbooks* Reading Ed. Rep. No. 23, Urbana: University of Illinois, Center for the Study of Reading, July 1981.

Armbruster, B.B., Echols, C., & Brown, A.L. The role of metacognition in reading to learn: A developmental perspective. *Volta Review*, 1982, *84* (5), 45-46.

Bartlett, B.J. *Top-level structure as an organizational strategy for recall of classroom text.* Unpublished doctoral dissertation, Arizona State University, 1978.

Bransford, J.D. Schema activation and schema acquisition: Comments on Richard C. Anderson's remarks. In R.C. Anderson, J. Osborn, & R.J. Tierney (Eds.), *Learning to read in American Schools: Basal readers and content texts.* Hillsdale, N.J.: Erlbaum, in press.

Bransford, J.R., & Johnson, M.K. Considerations of some problems of comprehension. In W. Chase (Ed.), *Visual information processing*, New York: Academic Press, 1973.

Cirilo, R.K. Referential coherence and text structure in story comprehension. *Journal of Verbal Learning and Verbal Behavior*, 1981, *20*, 358-367.

Dansereau, D.F. Learning strategy research. In J. Segal, S. Chipman, & R. Glaser (Eds.), *Thinking and learning skills: Relating instruction to basic research*, vol. 1, Hillsdale, N.J.: Erlbaum, in press.

de Villiers, P.A. Imagery and theme in recall of connected discourse. *Journal of Experimental Psychology*, 1974, *103*,263-268.

EPIE Institute: *Fits and misfits: What you should know about your child's learning materials.* Columbia, Md.: National Committee for Citizens in Education, 1974.

Goodlad, J.I. *Facing the future: Issues in education and schooling.* New York: McGraw-Hill, 1976.

Katz, E., & Brent, S. Understanding connections. *Journal of Verbal Learning and Verbal Behavior*, 1968, *I*, 501-509.

King, A.Y., Dennis, I., & Potter, F. *The United States and the other Americans.* New York: Macmillan, 1982.

Kintsch, W., & van Dijk, T. Toward a model of text comprehension and production. *Psychological Review*, 1978, *85*, 363-394.

Lunzer, E., Davies, F., & Greene, T. *Reading for learning in science.* Schools Council Project Report, Nottingham, England: University of Nottingham, School of Education, 1980.

Mandler, J.M., & Johnson, N.S. Remembrance of things parsed: Story structure and recall. *Cognitive Psychology*, 1977, *9*, 111-151.

Meyer, B.J. Organizational patterns in prose and their use in reading. In M.L. Kamil & A.J. Moe (Eds.), *Reading research: Studies and application.* Twenty-eighth Yearbook of the National Reading Conference, 1979, 109-117.

Meyer, B.J.F., Brandt, D.M., & Bluth, G.J. *Use of author's schema: Key to ninth graders' comprehension.* Paper presented at the meeting of the American Educational Research Association, Toronto, March 1978.

Schwartz, S. & O'Connor, J.R. *Exploring our nation's history, Vol. I, The developing years.* New York: Globe Book, 1971.

Thorndyke, P.W. Cognitive structures in comprehension and memory of narrative discourse. *Cognitive Psychology*, 1977, *9*, 77-110.

Tierney, R.J., & Mosenthal, J. *Discourse comprehension and production: Analyzing text structure and cohesion.* Tech. Rep. No. 152. Urbana: University of Illinois, Center for the study of Reading, January 1980.

Evaluation of Computer Software

By Vicky Vachon & Douglas Carnine
University of Oregon

Editor's note. Beginning with the next issue of the DI News we will start a new column on **Software Evaluation**, *edited by Doug Carnine. The present article details procedures to be followed in such evaluations. This procedure should be a useful guideline to anyone interested in the evaluation of computer software.*

In recent years a new 'curriculum material', educational computer software, has been introduced to schools. Software sales are projected by market analysts to reach $500 million by 1985 (EPIE, 1981a), an amount approaching that spent on textbooks per year. This substantial investment, among other factors, points to the need for careful evaluation and selection of potential software purchases.

An analysis of most large courseware packages performed by the Educational Products Information Exchange (EPIE, 1981b) revealed the following findings:

1. Most programs are drill and practice for supplementary use in the classroom.
2. Most programs specify a target population that represents too wide of an audience.
3. Most objectives have to do with recall of previously learned facts rather than higher-order skills such as comprehension, application, analysis, synthesis, and evaluation.
4. Few pre-instructional strategies are used to orient the student to the content.
5. About 50% of the programs format the instructional text inadequately with sentence structure as a major problem.
6. The only program that attempts to teach concepts does not use any systematic method of presentation based on concept-teaching research.
7. Graphics are rarely embedded in the instructional content.
8. Although all programs include a teacher's guide, these do not provide specific lesson plans or activities designed to integrate the programs into the curriculum.
9. Most programs grant user control in only two areas: rate of display and exiting.
10. Although all programs use feedback for both correct and incorrect responses, most of the feedback does not remediate (only one program informs the user why the response is wrong).

While somewhat dated, these findings imply that there is an amazing amount of material that either does not make use of the unique interactive capabilities of the computer or does not meet even a minimum standard of instructional effectiveness, or both. Because distributors will not guarantee their products for instructional effectiveness, educators are forced to either depend on published software reviews or to evaluate potential purchases themselves.

There is a wide range of opinion concerning what constitutes an ideal courseware product. Because of this lack of consensus, the development of criteria and standards for evaluation is problematic.

"It can be argued that the only essential quality for any instructional material is the capability of bringing about learning, effectively and efficiently" (Robyler, 1981, p. 47). Criteria to predict the instructional effectiveness of CAI programs have been described in the form of guidelines (Jay, 1983; Gagne, Rojas & Wager, 1981), program attributes (Cohen, 1983), and 'areas of instructional concern' (Robyler, 1981). These 'criteria' have been derived through essentially two approaches.

The first proceeds from an analysis of instructional design principles. Although there are several instructional design models, most share the common purpose of identifying learning outcomes and matching activities to certain events or conditions required to achieve those outcomes. Gagne and Briggs (1979) list nine events of instruction as necessary components of complete instructional acts. These events include: gaining the learner's attention, informing the learner of the objectives, presenting stimulus materials, providing learner guidance, eliciting student performance, providing feedback on correctness, assessing performance, and enhancing retention and transfer. Guidelines derived through instructional design models consider these events as essential characteristics of effective CAI programs.

A second approach to establishing criteria is through extensive analyses of existing courseware. In comparing effective programs developed for mainframe computers (the Plato-based model and the Stanford/CCC model), Robyler (1981) notes that programs can vary dramatically and still be instructionally effective. From the extensive review of microcomputer courseware, Cohen (1983) lists essential CAI attributes in two categories: those generic to all instructional media and those necessary to courseware design.

Several checklists, encompassing both instructional design criteria and unique courseware characteristics, have been developed. These checklists place varying degrees of emphasis on program characteristics. All CAI checklists include criteria that focus on the appropriate use of graphics, sound, and color, while criteria addressing instructional design issues are often vague. Questions such as "Is the content presented clearly?" give little indication of features required in effective presentation of material.

The criteria that more precisely address instructional issues may appear to pose the "correct" questions (e.g., Is the program organized and presented in a sequential manner and in appropriate development steps?). The appearance of these questions on an evaluation form does not assure that an adequate analysis of the presentation will be undertaken. The program may be organized sequentially, but still be subject to misinterpretation. To be instructionally effective, the program must teach what it sets out to accomplish. To predict instructional effectiveness, evaluation must focus on whether the content is consistent with only one interpretation—the intended one. Presentations that are consistent with one interpretation present the learner with a "faultless communication" (Engelmann and Carnine, 1982, p. 3). These communications are designed through a logical analysis of the content presented. Underlying the concept of "faultless communications" are two assumptions about the learner: (1) that the learner has the capacity to learn any quality (feature or characteristic) exemplified through examples, and (2) that the learner can generalize to new examples on the basis of sameness. In other words, learning occurs on the basis of quality and sameness. Thus, "the primary analysis of cognitive learning must be an analysis of qualities of examples and of the communications that present these qualities to the learner" (Engelmann and Carnine, p. 5).

The criteria presented in the courseware evaluation form that follows are consistent with the assumption that learning occurs on the bases of quality and sameness of examples. A program's presentation of content is systematically evaluated according to design principles that focus on example selection, wording, example sequence, provision for generalization of learning, review, practice and feedback.

In addition to the courseware evaluation form, three other forms are included: a courseware screener, description form, and a summary form.

COURSEWARE SCREENER

The courseware screener, presented in Table 1, lists eight questions for previewing CAI programs. Evaluation is a lengthy process taking up to forty hours for a typical program (Peters, cited in Gleason, 1981). The screening process allows reviewers to quickly identify programs that merit a thorough evaluation.

The questions address essential (yet minimal) elements of effective CAI. Programs are rated as acceptable, marginal or unacceptable with regard to each question. The decision to proceed with a more thorough evaluation will, to a certain extent, depend upon the teacher's goals for instruction; however, in some instances, evaluation will end at this point (see Design Violation).

COURSEWARE DESCRIPTION

The Courseware Description form appears in Table 2. Items contained in this form cover basic factual information necessary for the use and evaluation of CAI programs.

Source information includes the program name, publisher, required equipment (hardware, software, and peripherals), package materials, and the unit price (if available).

Program information identifies the subject matter by both general and specific topics, the target audience, and the mode(s) of interaction (i.e., programs may include more than one form of instruction).

A description of the program should include an overall statement of the program's intent and general instructional strategies.

COURSEWARE EVALUATION

The Courseware Evaluation form is presented in Table 3. Criteria address content issues, instructional design, and technical (management) quality. Although some items are readily apparent and easy to judge, others will require a careful examination of the material. To assist reviewers in using this form, explanations and examples relating to instructional presentation are presented below.

Content

Content issues fall under the headings of accuracy, educational value and freedom of stereotypes.

Accuracy refers to the material being free from error. Error can result from factual misinformation, out-of-date material, inaccurate or unconventional labelling of graphs, maps, charts, or other illustrations, misspellings or grammatical structure.

Decisions regarding the educational value of a particular program will be highly subjective. Consideration may be given to the degree of "fit" between the program and school curricula, the applicability of the content to real-life situations and the overall goals of the individual teacher.

Programs should be free of stereotypic material. Certain groups should not be over-represented at the expense of others. Representations of groups should not imply generalizations of stereotypical behavior.

Continued on Page 12

Table 1

Courseware Screener

	Acceptable	Marginal	Unacceptable
1. Is the content accurate?			
2. Is the content of educational value?			
3. Are entry skills specified?			
4. Is the presentation of material clear and logical?			
5. Is the learning that is to occur generalizable?			
6. Is there feedback on all errors?			
7. Is review provided?			
8. Is the program motivational?			

Evaluating Software (Continued from Page 11)

Instructional Design

Criteria that address the design of CAI programs focus on objectives, individualization, presentation, feedback, review, motivation, and reinforcement.

1. Objectives
   a. Objectives specify what the learner should be able to do upon completing the program. Clearly-stated learning outcomes provide the basis for evaluating instructional effectiveness.
   b. Objectives may appear in the support materials or within the program. In the event that the program does not make objectives available to the learner, the teacher should inform students of program expectations.
   c. Program content should be consistent with objectives in that the students should learn what the program intends to teach. A trial run of one program should provide sufficient information concerning the extent to which content is consistent with objectives.
2. **Individualization**
   a. Most programs are developed to be used by a specific group of learners—the targeted audience. Students within the targeted audience presumably possess the knowledge, skills, and maturity to successfully interact with the program content. Further evaluation may reveal the specified audience as unnecessarily restrictive or, more commonly, as encompassing too wide of a range of learners. Programs that do not specify a targeted audience provide little basis for evaluating the effectiveness of the content.
   b. Entry skills are the program's specific instructional prerequisites. By listing entry skills, the program developer provides teachers with specific information regarding the level of difficulty of the content. This information allows teachers to assign the program to students who have mastered the prerequisite skills, to provide additional instruction for students who do not meet entry requirements, or to teach the lesson in a more traditional presentation mode.
   c. Pre-tests or placement tests may be available in the user-support materials or in the program. Initial testing should serve a specific purpose: to allow students who have mastered the content to test out of the program, to verify required entry skills, or to place students at an appropriate level within the program.
   d. For students who have mastered more than the prerequisite skills, but who could benefit from interacting with segments of the program, additional entry points should be provided. Program menus often list units that can be directly assessed.
   e. Options for exiting or returning to the program's menu should be available to the learner.
   f. Some programs may be structured in such a way to allow teachers to individualize instruction by modifying the content. Modifications can take the form of introducing equivalent practice items, selecting the number of tasks to be presented, or specifying the amount of time allowed for interaction.
   g. Most programs contain a system whereby student records are maintained by the computer. However, the extent to which these record-keeping systems vary is important to note. Systems range from simply scoring a student's performance in a drill and practice game to more complex management systems that store and mange records for complete curriculum units. Extensive record-keeping components specify student mastery of the materials and pinpoint levels at which individuals are performing within the program.

Continued on Page 13

Table 2 Courseware Description

Program Name: _____
Publisher: _____
_____
_____

Required Equipment:
Hardware _____
Software _____
Peripherals _____

Package Materials: _____

Unit Price: _____

Subject Area: _____
Topic _____

Target Audience: _____

Mode of Interaction: (check all that apply)
_____ Tutorial
_____ Drill and Practice/Gaming
_____ Simulation

Program Description: _____
_____
_____
_____

Table 3 Courseware Evaluation Form

Each item is rated using the following code:

E = Excellent
A = Acceptable
M = Marginal
U = Unacceptable
N.A. = Not Applicable

Rating

CONTENT

1. Is the content accurate? ____
2. Is the content of educational value? ____
3. Is the content free of stereotypic bias? ____

INSTRUCTIONAL DESIGN

1. Objectives
   a. Are objectives clearly stated? ____
   b. Are objectives defined to the learner? ____
   c. Is the program content consistent with objectives? ____
2. **Individualization**
   a. Is the target audience specified? ____
   b. Are entry skills specified? ____
   c. Is a pretest or placement test provided? ____
   d. Are a variety of entry points available? ____
   e. Are options for exiting or returning to menu available? ____
   f. Can the program be altered? ____
   g. Is there a method of record-keeping? ____
3. **Presentation**
   a. Do the activities optimally match the content? ____
   b. All Programs (Tutorials, Drill & Practice/Gaming, Simulation) ____
      ____ provides opportunity for frequent interaction
      ____ avoids restrictive response formats
   c. Tutorials ____
      ____ uses consistent wording
      ____ tests learner's ability to generalize
      ____ provides review
      (1) Concepts (Discriminations & Relationships)
         ____ uses examples & non-examples
         ____ demonstrates range of variation through examples
         (a) Discriminations (labelling tasks)
            ____ sequenced to demonstrate differences (minimally different non-examples)
            ____ uses continuous conversion when appropriate
         (b) Relationships (fact systems, science rules)
            ____ lists preskills as entry competencies
            ____ presents relationships explicitly (e.g., visual displays)
            ____ introduces new vocabulary systematically
      (2) Strategies
         ____ lists component skills as entry competencies
         ____ presents strategy as a series of steps
         ____ guides learner in responding to each step
         ____ integrates steps into sequence
         ____ provides *less* specific direction (hints, clues) as learner progresses
         ____ provides sufficient independent practice with range of appropriate tasks
   d. Drill and Practice/Gaming ____
      ____ provides varying levels of difficulty
         ____ problem type ____ rate ____ number of tasks
      ____ provides cumulative introduction
      ____ re-introduces missed tasks or equivalent tasks
      ____ provides tutorial instruction when appropriate
      ____ sequences tasks unpredictably
   e. Simulations ____
      ____ utilizes valid model
      ____ informs learner of inherent assumptions
      ____ informs learner of program variables
      ____ provides access to explanations
      ____ includes pre/post activities
4. **Feedback**
   a. Are all errors corrected? ____
   b. Does the correction fit the context in which the error occurred? ____
   c. Is feedback informative? ____
5. Review
   a. Is review provided for newly acquired skills? ____
   b. Does review incorporate previously-learned skills into more complex applications? ____
6. **Motivation**
   a. Is the level of difficulty challenging to the learner? ____
   b. Is the material presented at a good pace? ____
   c. Are readability levels appropriate to the target audience? ____
   d. Is user control granted to the learner where appropriate? ____
   e. Does the use of graphics/sound/color increase interest in program content? ____
7. **Reinforcement**
   a. Is reinforcement age-appropriate? ____
   b. Is reinforcement used appropriately? ____
   c. Is a variety of reinforcement used? ____

PROGRAM UTILITY

1. Are user-support materials included? ____
2. Is there a Teacher's Manual? ____
3. Is the program easy to operate? ____
4. Is the program reliable under normal use? ____
5. Can the program analyze a variety of responses? ____
6. Are information displays attractive? ____

Evaluating Software (Continued from Page 12)

3. Presentation

To provide the learner with clear, unambiguous communications, the organization of the presentation should optimally match the program's content. Because the structure of the content will vary according to the goals of instruction, criteria are listed under the major headings of tutorials, drill and practice/gaming and simulations. Additionally, two criteria, amount of interaction and unrestrictive response formats, are listed as essential attributes of all CAI programs.

Provisions for frequent student interaction with the content enables the learner to become an active participant in the program. It also provides opportunities for confirming the learner's understanding of the material as the program progresses to more complex concepts or content applications.

Response formats (i.e., the way in which students interact with the content) should be appropriate for the intended audience, but not unnecessarily restrictive. In evaluating the program's response formats, consideration should be given to the selected format (yes/no, multipe-choice, varied responses) eliciting maximum information regarding the student's understanding of the material. Could the interaction be improved by requiring the student to choose from a range of possible responses? Is the content specific enough for the program to analyze a variety of input and, thus, allow students to actually produce individual responses? Although response formats will, to a degree, be dependent upon the content and the capabilities of the targeted audience, they should be structured to provide unambiguous information about the learner's understanding of the material.

Response formats in drill and practice may require the learner to quickly recognize an answer and respond by pressing a key. These arcade-type responses may present very ambiguous information regarding the learner's performance as a result of extensive opportunities for chance responding being correct.

Tutorials

Tutorials present complete instructional units requiring little, if any, teacher supervision. The presentation of tutorial programs will vary according to the nature of the subject matter. However, as complete instructional units, all tutorials should include consistent wording, tests for generalization, and adequate provision for review.

To make the program as clear as possible, consistent wording (or wording that is as similar as possible) should be used. This allows the learner to focus on the relevant features of the presentation.

Teaching should culminate in a thorough test of the learner's understanding of the material through an ability to generalize to examples or problems not included in initial-teaching sequences. For those learners who have not mastered the content, provisions for review should be included.

Tutorial content teaches basic concepts (discriminations and relationships) and strategies (steps in problem-solving). *Concepts* are the pre-skills required for learning more complex strategies. Concept-teaching usually requires the use of examples and non-examples to demonstrate precisely those features relevant to the concept. Examples should be carefully selected to demonstrate the range of variation. By demonstrating the range of variation, the presentation provides a basis for the learner to generalize to examples not included in the initial-teaching sequence.

In programs that teach *discriminations* (labelling tasks), examples and non-examples should be sequenced to demonstrate both sameness and difference. To show sameness (the essential concept features), examples that are maximally-different are juxtaposed and treated in the same way (given the same label). The learner is given a clear demonstration that the changes from one example to another are *not* those relevant to the discrimination. To show the difference, non-examples that are highly similar (minimally-different) to the selected examples are presented and treated differently (given a different label). The juxtaposition of examples and highly-similar non-examples indicates that the observed difference is the controlling feature. Examples and non-examples can be demonstrated through either static or dynamic presentations.

In dynamic presentations, one example is *changed* into another. This procedure is called *continuous conversion*. Continuous conversion is appropriate for teaching many single-dimension concepts (i.e., those concepts wherein a change in a single feature creates examples and non-examples). In dynamic presentation the same irrelevant features appear in both examples and non-examples. Only the relevant feature is changed (see Engelmann & Carnine, 1982 for details). CAI programs are ideally suited for dynamic presentations because of the microcomputer's graphic capabilities.

Concept relationships demonstrate how basic concepts (labels) are logically or empirically related. Logical relationships are found in subject matter that teaches a system of responses appropriate to a wide range of examples. To make the relationship explicit, a series of examples can be used to demonstrate how each example correlates with a particular response. In teaching the relationships between words in a sentence and the subject of that sentence, a series of examples (sentences) would be presented with the correlated response (the subject of the sentence). By presenting examples that demonstrate the range of variation possible for 'subjects' the learner is provided with a basis for understanding what is the same across pairings of examples and responses.

Empirically-related concepts are those that happen together. Science rules, such as 'air travels to places of lower pressure,' typify empirical relationships.

Programs that are designed to teach relationships (e.g., rules, vocabulary, fact systems) should include an initial-teaching sequence to explicitly demonstrate the relationship. If new vocabulary is introduced, unfamiliar words should be systematically taught through examples, definitions or synonyms.

In teaching more complex relationships such as fact systems, visual displays can be used to demonstrate how various components are related in an overall structure. Visual displays are appropriate for any fact system that can be outlined or programmed (e.g., the circulatory system, the classification system for vertebrates, naval battles of WWII).

A *strategy* is a series of sequential steps used to solve a problem. Strategies are applicable to a wide range of academic tasks (e.g., solving mathematical problems, spelling regular words, using context clues to derive meaning).

The structure of a strategy indicates the most efficient presentation design. Once component skills are identified, initial teaching should demonstrate the sequence of steps required to solve the problem.

Component skills should be listed as entry competencies or pre-tested with additional instruction provided when appropriate. Strategies should be sufficiently specific to guide the learner unambiguously through each step. As the learner becomes more proficient in applying the strategy, component skills can be clustered and presented with less specific direction. Once the learner can independently apply the strategy, sufficient practice with a wide variety of problems should be provided to facilitate retention.

Access to review of component steps and additional practice opportunities should be provided.

Drill and Practice

Most educational software are drill and practice programs designed to supplement classroom instruction. Previously-learned skills are reinforced through interacting with drill and practice programs often designed as games.

In evaluating drill and practice programs, it is important to note the levels of difficulty available within the program, the provisions for cumulative introduction and review, the treatment of missed items, the provision for tutorial instruction and the sequence of tasks.

Levels of difficulty can include such variables as problem type, number of problems to be completed, complexity of the required strategy, and time allotted to problem-solving. To accommodate the maximum number of students within the program's specified range, the program should be sensitive to the individual student's accomplishments. Control of varying difficulty levels can be granted to the user, the teacher (via a special menu) or be determined by the program itself. In the latter case, the program should vary difficulty levels based on either the learner's performance with a predetermined number of problems or the number of missed items at a particular level.

Programs that present increasingly more complex problem types should provide adequate practice on newly-introduced types while maintaining review and practice for previously-learned material.

The program should also be sensitive to student errors and either re-introduce missed items or present equivalent items. An extension of this process is the program's ability to diagnose frequent errors and provide appropriate remediation. This process may result in introducing tutorial instruction when appropriate.

The sequencing of tasks within a drill and practice program should be unpredictable to the extent that the learner must actually attend to the question to answer it correctly.

Drill and practice programs hold great potential for classroom use. However, it is essential to determine if the program undergoing review is actually providing the learner with appropriate opportunities to practice skills. Programs may be highly rated based on the students' willingness to participate in drill and practice activities when in fact gaming aspects supersede and, in some cases, counteract the stated purpose of the program.

Simulations

Simulations allow the learner to interact with various aspects of social or physical reality within a computer application. Students who have mastered basic concepts and principles inherent to a particular simulation discover how the interaction of variables may result in varied outcomes. Successful interaction with the simulation requires the learner to formulate hypotheses regarding strategy interactions which are tested in simulated applications. The overall evaluation of simulation should focus on the validity of the model. Additionally, the program should inform the learner of both assumptions inherent in the simulation and variables that are part of the outcome. Hints and clues may be provided to assist the learner in discovering critical features of the program. Programs may also include both pre- and posttest activities to ensure that the learning that occurs is generalized to real-life applications.

4. Feedback
   a. The program should provide feedback to the learner immediately following an incorrect response. All errors should be corrected.
   b. The organization of the correction should also match the context in which the error was made. This requires the program to anticipate or predict the common errors that learners could make within a given task and provide remediation suitable to the context. For example, errors within a problem-solving strategy may be corrected through making relevant steps explicit to the learner.
   c. Feedback should be informative. Where possible, students should be told why the response was incorrect (e.g., "Spelling is incorrect" or "Spacing is not appropriate").
5. Review
   a. Skill-teaching programs should include review and practice items. Students require practice in using newly-acquired skills to reach mastery levels.
   b. In addition to reviewing new skills, the program should require students to practice previously-learned concepts in more complex applications. Cumulative review of new and previously-learned skills should be provided to facilitate retention.

Continued on Page 14

Evaluating Software

(Continued from Page 13)

6. Motivation
   a. The level of difficulty should be consistent with the expected ability level of the intended audience, however, the program should be sufficiently challenging to maintain the students' interest.
   b. Time between tasks should be minimal. Lengthy gaps may be distracting and encourage off-task behavior. Programs that require time to "search" for tasks should include messages (e.g., "searching," "be right back") to assure the learner that the program is still functioning. Programs may also include exercises that appear on screen for a pre-determined amount of time. These lessons can be very frutstrating to students who require extra "thinking" or response time. One way to counteract this problem, especially for drill and practice programs that stress rate or fluency, is for programs to include a pretest that establishes individual student rates. Time on screen is then adjusted either by the teacher or within the program itself.
   c. Readability levels are also a factor to consider in program evaluation. Reviewers may wish to apply a readability formula to a text-heavy program.
   d. User control is a feature included in most programs. Instructions to the learner appear in the form of "Press Space Bar (or Return Key) to Continue." This feature should remain consistent wherever it appears in the program. Skipping from the use of the space bar to the return key is often confusing and frustrating. User control should be granted to the learner for exiting the program, for changing within the program (returning to the menu for an alternate selection), for reviewing instructions in complex programs, for viewing scores (in game situations) and for choosing the number of problems to be worked (when appropriate).
   e. An exciting aspect of computer technology is the ability to use graphics, sound, and color within the programs. Although these features can, when used appropriately, enhance the lesson, a danger exists in their overuse. Sound within a program, especially when it cannot be turned off, can be very distracting within the classroom. Graphics can also be distracting in that students may attend to graphics while disregarding the accompanying text. The use of color to emphasize key words, advance organizers, clues, hints or prompts are often very effective in drawing the learner's attention to important material. Overuse of this feature, however, may actually counteract the original purpose.
7. Reinforcement
   a. Programs that include reinforcement for correct responses should use reinforcers that are appropriate to the age of the target audience.
   b. Reinforcement may also be overused. A program that reinforces every correct response may appear frustrating to students who just want to 'get on with it.' Sometimes just moving to the next question or exercise is adequate reinforcement for correct answers.
   c. Programs that include reinforcement should utilize a variety of reinforcers. Reinforcers may take the form of a game following successful completion of a unit, a variety of phrases or appropriate graphics.

Program Utility

Program utility criteria assess the accompanying materials (for students and teachers), program operation, and information displays.

1. Student materials should be provided and include activities directly related to the program content. These can be in the form of pre-instructional activities, follow-up activities, worksheets or testing materials.
2. Most programs include a Teacher's Manual. This manual should contain a description of the instructional strategies and sequences whthin the program, specific suggestions for relating the program content to existing curricula units, estimated time required for one student (or a small group) to interact with the material, resource information and explicit instructions for operating the program.
3. Operation of the program should require minimal computer knowledge of the intended user.
4. The program should consistently run under normal conditions.
5. The program should be capable of analyzing a variety of input (e.g., Y for yes). Programs that require the learner to produce variable responses should be capable of accepting a wide variety of input as correct.
6. Information displays should be attractive, uncluttered, and easy to read. The amount of text contained within each display should be controlled. Adequate size and spacing can enhance the clarity and appeal of both graphics and text.

Recap of Rating Procedures

Evaluation begins with previewing and using the courseware screener. Ratings are listed as acceptable, marginal, and unacceptable. The screening process quickly identifies those programs that meet minimal design standards, and those that do not. The latter group requires no further evaluation.

Programs that meet minimal standards are then thoroughly evaluated according to the criteria listed in the Courseware Evaluation Form. Rating categories are listed as excellent, acceptable, marginal, unacceptable, and not applicable. Criteria are listed under three major headings: content, instructional design, and program unitility. Instructional design criteria are further categorized into seven areas.

To use this form, the reviewer would first evaluate programs according to the specific criteria listed under categories and subcategories. For example, in evaluating the program's presentation of content, the reviewer must determine if the structure matches the content. The analysis of content begins with criteria listed under "All Programs." Evaluation continues with criteria listed according to program type (i.e., tutorial, drill and practice, simulation). Tutorial programs are classified according to type of content (i.e., concepts, strategies) and evaluated through more specific criteria. Upon completion of the relevant subsections, the reviewer would then rate the overall criteria (i.e., structure matches content).

Evaluation Summary Form

The Evaluation Summary Form appears in Tables 4 and 5. This form lists the program's title, major, categories, and subcategories for instructional design. Final ratings for each of the above are listed as excellent, acceptable, marginal, and unacceptable. This form

Continued on Page 15

Table 4

Evaluation Summary Form

Title: Story Machine

CONTENT	E	A	(M)	U
INSTRUCTIONAL DESIGN	E	(A)	M	U
1. Objectives	E	A	(M)	U
2. Individualization	E	A	(M)	U
3. Presentation	E	A	(M)	U
4. Feedback	E	(A)	M	U
5. Review	E	(A)	M	U
6. Motivation	E	(A)	M	U
7. Reinforcement	E	(A)	M	U
PROGRAM UTILITY	E	(A)	M	U

STRENGTHS: Sentences and stories are enacted through appealing graphics. Corrective feedback is given when student's stories become too complex for graphic displays.

WEAKNESSES: The program restricts expressive writing practice by imposing rules governing the number of 'characters', acceptable 'actions' within one story, and sentence construction.

RECOMMENDATIONS: Story Machine appears to have limited classroom use.

Table 5

Evaluation Summary Form

Title: Arcademic Skill Builders in Math

CONTENT	(E)	A	M	U
INSTRUCTIONAL DESIGN	E	(A)	M	U
1. Objectives	(E)	A	M	U
2. Individualization	(E)	A	M	U
3. Presentation	(E)	A	M	U
4. Feedback	E	A	(M)	U
5. Review	E	(A)	M	U
6. Motivation	(E)	A	M	U
7. Reinforcement	E	(A)	M	U
PROGRAM UTILITY	E	(A)	M	U

STRENGTHS: The programs in this package utilize a highly-motivating, arcade game format for drill and practice in basic facts. Support materials for both teachers and students are included. Teachers can alter the rate of presentation, the problem difficulty level and the interaction time.

WEAKNESSES: Errors in student performance can occur from a variety of sources. Program management includes decision-making based on student performance and is therefore difficult due to the amount of random error inherent to the design.

RECOMMENDATIONS: In making program decisions for individual students, teachers should be aware of extraneous sources of error.

Evaluating Software

(Continued from Page 14)

provides an overview of program evaluation. In addition, reviewers are encouraged to list the program's specific strengths and weaknesses and to make recommendations for use in classrooms.

A Courseware Description Form and Summary Form could be used to catalog program evaluation for future reference.

Design Violations

To illustrate the use of this courseware evaluation package, three programs have been reviewed and summarized.

Island Software's "Puss in Boot" is part of a "Young Folks Series" and is designed "to provide young children (preschool, kindergarten, and primary grades) with practice on positional concepts." Initial screening of this program reveals that content is inaccurate. The graphic representations of "on" and "over" are identical. Although these options are not presented together in the forced-choice format, the depiction of "over" is inaccurate.

In another frame, Puss is positioned beyond the toe of the boot. The options are "next to" and "in front of." The 'correct' answer is "next to"; however, the graphic also clearly shows Puss to be "in front of his boot."

Because of these gross inaccuracies in design, this program is clearly of limited, if any, educational value. Further evaluation is not necessary.

Spinnaker Software's 'Story Machine' (Table 4) is designed to provide children (ages 5-9) with practice in writing sentences, paragraphs, and stories. Students write sentences composed of words from a "dictionary" list. Each sentence is enacted on the upper part of the screen. Several rules for sentence construction are given in the user's guide. These include the number of actors that can appear in the story, space limitations for actions, and pronoun usage.

The combination of a limiting dictionary and rigid rules for sentence (story) construction results in restrictive formats for expressive writing.

DLM's Arcademic Skill Builders in Math (Table 5) is a package containing six programs, an exceptionally detailed Teacher's Manual, duplicable user materials, and a comprehensive record-keeping system. Programs are designed to provide drill in math facts whithin an arcade-type format. Four of these programs, Demolition Division, Meteor Multiplication, Alien Addition, and Minus Mission, require students to answer fact questions and "shoot" at advancing problems. Dragon Mix and Alligator Mix provide mixed practice in division/multiplication and addition/subtraction, respectively. In mixed practice games, students recognize an answer and respond by pressing the space bar at the appropriate time. Each program presents problems at nine speed levels and three difficulty levels (i.e., 0-3, 0-6, and 0-9). As students become more proficient, the speed at which problems are presented and the difficulty of the problems are increased. Correct responses are tallied as "Hits" while errors are recorded as "Misses." Scores are presented at the end of the timed interaction. These scores are then plotted on a semilogarhythmic chart from Lindsley's Precision Teaching Model. Program decisions are based on data collected from gaming sessions.

A major concern with these programs is the validity of decision-making based on program scores. Errors can occur from several sources: incorrect facts, response time, "aiming" the answer at the target, typographical errors, and, at very high speeds, the lapse time between entering the answer and having it appear on screen.

The programs provide minimal feedback to students except in tallying scores. Corrective feedback is not given, although missed facts do reappear.

The arcade-game format of the Arcademic programs provides a motivational atmosphere for drill and practice in math. However, because the reinforcing aspects of game participation are not contingent upon performance, program effectiveness is dependent upon direct teacher management.

Summary

To thoroughly analyze (and thus predict) the instructional effectiveness of a CAI program, evaluation efforts must focus on instructional design variables in great detail. These variables are particularly important for courseware because teachers can't make modifications the way they can for print material. Programs must present clear explanations, carefully selected and sequenced examples, corrective feedback, cumulative review, and evaluation to ensure that learning does occur.

The Courseware Evaluation Form presented in this article requires the reviewer to carefully analyze programs according to these variables (as well as others). Reviews performed according to these criteria will provide a strong basis for predicting the instructional effectiveness of programs with a wide range of learners within the targeted audience.

As educators become more sophisticated in selecting effective courseware, software developers will be required to produce programs that incorporate sound instructional design principles. However, until the demand for software evolves into a critical demand for effective programs, thorough evaluations and critical reviews will provide the basis or selecting well-designed programs from available CAI.

Selected References

Electronic Learning. Software Evaluation, 1982, 2(2), 47-48.

Engelmann, S., & Carnine, D. *Theory of Instruction: Principles and Applications*. New York: Irvington Publishers Inc. 1982.

EPIE Institute. *EPIEgram Materials*, 1981, 9(11,12), 1-6. (a)

EPIE Institute: *EPIE Report Materials: Microcomputer Courseware/Microprocessing Games*, 1981, 15(1,2). (b)

Hannsford, A., & Sloane, E. Microcomputers: Powerful Learning Tools with Proper Programming. *Teaching Exceptional Children*, 1981, 14(2), 54-57.

Hilgenfield, R. "Checking Out" Software. *The Computing Teacher*, 1981, 9(3), 24-27.

MicroSIFT. *Evaluator's guide for microcomputer-based instructional packages*. Eugene, OR: International Council for Computers in Education, 1982.

Minnesota Educational Computing Consortium. Computer Courseware Review Form, *AEDS Monitor*, 1982, 20(10,11,12), 24.

Robyler, M.D. Instructional Design Versus Authoring of Courseware: Some Critical Differences. *AEDS Journal*, 1981, 14(4), 173-181.

Winebriener, J. Evaluating educational software. A paper presented at EDCOM, October, 1982.

Spelling

(Continued from Page 7)

ing activities. Lessons are designed so that teachers provide regular feedback and incorporate rapid pacing. Students routinely spell words orally before they write them on dictated tests. In this manner, the teacher can frequently diagnose student problems and correct any errors students make to prevent these problems on written tests.

Correction/monitoring procedures. A unique feature of the DI spelling programs is that teachers are provided specific correction procedures whenever students make errors. These programs utilize the correction procedure determined to be most effective by researchers (Kuhn & Schroeder, 1971; Sheldon, Lashinger, Troike & Mercer, 1976). This procedure is as follows: teachers correct written spelling errors by orally spelling the word and writing it on the board while students match their spelling with the correct spelling. When students detect an error, they immediately draw a line through their misspelled word and rewrite the word correctly. For example, if a student spelled the word *help* as *hepl*, he would draw a line through *hepl* and rewrite *help* above the misspelled word.

The teacher also uses a correction procedure during oral instruction which includes "prompting" and "feedback" to facilitate students accurate spelling. Prompting with feedback strategies are especially important during the early-learning stages (Grant, McAvoy and Keenan, 1982). For example, if a student made a mistake orally spelling *quiet* as *queit*, the teacher would *model* the word for the students with a prompt (stressing the part that was missed with a stronger voice emphasis) "My turn to spell quiet, q-u-*i*-*e*-t", then *lead* the students through the spelling "spell quiet with me" (students spell with the teacher) , and then tests the students on the word ("Spell quiet." Students spell without teacher). The teacher would *praise* the students verbally for spelling quiet correctly and would include that word on more oral (and possibly written) tests during the lesson.

The programs also include specific provisions for the teacher to continuously monitor students spelling on a daily basis. All workbook activities are corrected by the teacher. While students complete the workbook activities, the teacher monitors by walking around the room or watching students to determine if any errors have been made. At the same time the teacher praises correct spelling, especially noting the words that were misspelled previously, but are now correctly written by one or more students in the group.

Conclusion

The DI spelling programs include many research-based recommendations and appear to correct the problems typically found in commercial spelling programs. Lessons are introduced in a carefully sequenced and well-programmed manner. Because the lessons are designed so that students learn words that they have previously not been able to spell, and because teachers continuously diagnose and correct student mistakes, the program ensures that students will spell words in an efficient and effective manner.

References

Collins, M. Teaching spelling: current practices and effective instruction. *Direct Instruction News*, 3(1), 1983.

Dixon, R., Engelmann, S. *Corrective Spelling Through Morphographs*. Chicogo: Science Research Association, 1979.

Dixon, R., & Engelmann, S. *Spelling mastery: A direct instruction series*. Chicago: Science Research Association, 1980.

Dixon, R., Engelmann, S., Olen, L. *Spelling Mastery: Series Guide*. Chicago: Science Research Association, 1981.

Engelmann, S., & Carnine, D. *Theory of instruction: Principles and applications*. New York: Irvington Publishers, Inc., 1982.

Fitzsimmons, R., & Loomer, B. *Spelling research and practice*. Iowa State Department of Public Instruction and University of Iowa, 1977.

Gettinger, M., Bryant, W., Fayne, J. Designing spelling instruction for learning-disabled children: an emphasis on unit size, distributed practice and training for transfer. *Journal for Special Education*, 16(4), 439-448, 1982.

Grant, L., McAvoy, R., Keenan, T. Prompting and feedback variables in concept programming. *Theory of Psychology*, 9(3), 173-177, 1982.

Graham, S., & Miller, L. Spelling research and practice: A unified approach. *Focus on Exceptional Children*, 1979, 12(2), 1-16.

Groff, P. Word frequency to spelling difficulty. *Elementary School Journal*, 1982 83(2), 124-130.

Hillerich, R. That's teaching spelling? *Educational Leadership*, 39(8), 1982 615-617.

Kuhn, J., & Schroeder, J. A multi-sensory approach to teaching spelling. *Elementary English*, 1971, *48*, 865-869.

Manolakes, G. Teaching of spelling: A pilot study. *Elementary English*, 1975, 52, 243-247.

Neef, N., Iwata, V., & Page, T. The effects of known-item interspersal on acquisition and retention of spelling and sight reading words. *Journal of Applied Behavior Analysis*, 1977, *10*, 738.

Rosenshine, B. Teaching functions of instructional programs. *The Elementary School Journal*, 1983, *83*, 335-351.

Sheldon, W., Lashinger, D., Troike, D., & Mercer, L. A summary of research studies relating language arts in elementary education: 1974. *Language Arts*, 1976, *53*, 85-110.

Tenth Annual DI Conference

The Eugene Direct Instruction Conference will be held during the week of August 6, 1984 at the Eugene Hilton. The cost for the five-day conference will still be only $100.00 per participant.

After an opening session, participants will be able to choose from many different session offerings. New sessions this year will include a session for administrators on monitoring of implementations, more sessions on computers and DI, and intensive training sessions on working with handicapped children. Perhaps the biggest change will be the offering of intensive practicum sessions as a preconference workshop. These will be detailed in the next issue of *DI News*. If you have ideas on other sessions you would like to see, send the information as soon as possible to Conference Committee care of ADI.

As in the past, the Conference days will be long and productive. Conference presentors will include Engelmann, Becker, Carnine, Sprick, Colvin, Haddox, Johnson, and many others. Three hours of graduate college credit can be earned through the University of Oregon for an additional registration fee.

Preschool Reading

Paul Weisberg

(Continued from Page 1)

as "miscue errors," something akin to a "psycholinguistic guessing game," which is what Goodman and Burke (1969) presumed naive readers naturally do as they attempt to figure out the words in a sentence.

Other kinds of confusions resulted when we taught number words (*two-three, five-four*), color words (*blue, black,* and *brown* were often interchangeable) and words for common classroom objects (*clock* for *chair, door* for *desk,* etc.). We discovered that the puzzlement and stagnation over learning to read evidenced by our preschoolers was not peculiar to this age group. Writing about elementary school children around the country, Flesch (1955) constantly reminded the public of the reading difficulties likely to be encountered when basal methods were used—difficulties which we recognized as already occurring with our preschoolers.

It became obvious that to establish substantial and continual improvement in reading, we would need to abandon our traditional methods and search for a program that focused the young reader's attention on the key elements of the printed word, i.e., its sounds, and provided a logically consistent, manageable way of decoding words. That opportunity presented itself when, in mid 1975, we observed a Distar Reading I program in a rural all-Black school. The teacher's training consisted of a weekend workshop. Her pacing was marginal and she spoke in a monotone, hardly ever challenging the children. We worried about all those signals, about the drill and teaching from scripted material. Yet, the children didn't seem to mind and, to our astonishment, they energetically and carefully sounded out each word. About the same time, we saw Engelmann's (1968) provocative movie where previously trained preschoolers, just starting first grade, were eagerly doing basic algebra problems and understanding mathematical concepts typically reserved for much older children. The impressive and promising achievement data from the Engelmann-Becker Direct Instruction Model in the Follow Through Project (Becker, Engelmann, & Thomas, 1975) also came to our attention. Noteworthy was the greater academic advantage for disadvantaged children started on DI in kindergarten. Their end-of-third grade reading levels on the Wide Range Achievement Test (WRAT) were from 0.7 to 1.0 grade points higher than first graders started in DI programs.

These events provided the impetus for the author to spend his sabbatical leave at the University of Oregon in 1976. Both he and his wife attended classes in DI programming and taught Distar Reading and Arithmetic to Title I children at a local school. Upon returning to Tuscaloosa in the summer of that year, DI programs were set up at the ECDCC.

Program Usage

During the first school year in which Distar was implemented (1976-77) priority went to the five year-olds who were taught from the Language I and Reading I programs. From 1977-1978, the Arithmetic I program was added to the curriculum of the five year-olds and the Language I and Reading I programs were started with the beginning four year-olds. By 1979-1980 and thereafter, all three programs were taught to beginning four and five year-old groups.

Children staying for one year typically finished all of Language I and Reading I and three-quarters of Arithmetic I. Those staying an additional year usually completed all Level II components of Language and Reading and at least half of Arithmetic II.

Three teachers each taught three groups daily, two in the morning (Reading and Language) and one in the afternoon (Arithmetic). Group size varied from five to eight children. As needed, a fourth group in language was held once in the morning for children lacking even rudimentary language skills and for late-entering children requiring catch-up work. It was usually taught by the part-time cook upon completion of that person's breakfast chores. All of the staff were trained in DI procedures by the author.

Children Served

The ECDCC offers year-round, full-time services to preschoolers living within a ten-mile radius of its location on the University of Alabama campus in Tuscaloosa. Funding is largely through yearly contractual arrangements with the state welfare agency under Title XX of the Social Security Act and the University of Alabama's Office of Sponsored Research. The Department of Psychology administers and sponsors the ECDCC.

Single-parent and extended family patterns predominated among the children served. Over 80 percent of the children are Black and 60 percent are male. The family demographics (see Sims & Weisberg, 1982) resemble those of low SES groups and are characteristic of families whose children have participated in previous preschool intervention projects (Engelmann, 1970; Schweinhart & Weikart, 1980).

When they begin, the preschoolers are unable to read, print words, spell, or do any mathematical computation. The Slosson IQ test (Slosson, 1981), the scores of which are taken as an indication of verbal competency, is individually given following a two-to-three week adaption period. The mean entry IQ over the past four years ($N=58$) has been 87, with only 19 percent of the IQ's exceeding 100.

Evaluation Design

Continuous Progress Tests (CPT) in Reading, (Becker, Carnine, & Davis, 1978), administered individually after every 10 to 20 instructional lessons, provided an estimate of how well the children were mastering the concepts and skills being taught. As such, the CPT represented a valuable criterion-referenced test, permitting not only periodic evaluation of the children's progress, but of the teacher's performance and the program's effectiveness as well. The results for a randomly selected group (N's varied between 16 and 20) of Distar Reading I children on the CPT are reported elsewhere (Weisberg & Sims, 1983). Briefly, their performance on major tasks was consistently high across all lessons; for sound identification items, correct answers averaged about 97 percent; for word identification, it was 92 percent for trained words and 85 percent for untrained words (nonsense and unfamiliar); for the oral reading of three-sentence stories, beginning at lesson 120 of Reading I, it was nearly 100 percent; and for answering simple comprehension questions, it was 94 percent.

Norm-referenced tests were also administered and the children's progress evaluated in two ways. First, norm-referenced comparisons were made in which the average of the ECDCC group's performance on standardized tests during the Spring of each program year were compared to normative data established by the test authors as reported in appropriate test manuals (Horst, Tallmadge, & Wood, 1975). Two sub-groupings of ECDCC children were formed: those about to enter first grade in the coming Fall (called 1st-starting) and those who were going to be between 5 and 5½ years of age (labeled kindergarten- or K-age children). Most 1st-starting children had the benefit of two program years of Distar, whereas K-age children had only one program year.

Second, norm-referenced tests were used to provide between-group (or treatment) comparisons during one program year in 1980, during which the test scores of the ECDCC children (Distar-trained) were contrasted with those from other preschool programs (non-Distar-trained) on various evaluative instruments that measured many common instructional objectives. The non-Distar-trained preschoolers came from a local Head Start program (in operation for eight years) and from a Child Development preschool (in operation for ten years). The latter was run by the Home Economics Division of the University of Alabama which, like the ECDCC, was a campus-based facility under state contract to furnish year-round, full-time day care services for poverty-level preschoolers. The local welfare agency assigned children to this preschool or to ours on a random basis.

Both the Head Start and Child Development programs essentially followed a Structured-Cognitive Model (Bissell, 1973; Weisberg, 1983) in which the professed aim was to develop general cognitive processes or abilities rather than knowledge of specific content, such as decoding words or solving arithmetic operations. At both programs, skills were taught through a unit-based curriculum, although the skills were of a rudimentary kind—counting, recognition and naming of shapes, colors, numerals, alphabet letters, and some words for common objects. Fuller program descriptions are given in Sims and Weisberg (1982). (In many respects, the goals and activities offered in these programs resembled those at the ECDCC before the adoption of Distar in 1976.)

A third comparison group contained children in the first several months of public school either in kindergarten or first grade (conforming to the K-age and 1st-starting distinction), but who had never been in a preschool program prior to public schooling. All children in this No-Preschool Group were eligible for the free-lunch program and were of the same low SES and lived in the same neighborhood as children in the other groups (see Sims and Weisberg, 1982). In neither the kindergarten nor the first grade classes were DI programs or DI teacher presentation procedures used.

The No-Preschool Groups provided an estimate of the level of academic proficiency of low SES children during the beginning part of their first school year. Although the test data, because of the time of collection, did not tell whether these skills were established in the schools or were developed prior to schooling, they did provide a reference point against which the proficiency levels of children from the three preschools could be compared. As it turned out, the reading performance of the Distar-trained Groups, especially the 1st-starting children, in the areas of decoding words and comprehension, were markedly superior to those of the No-Preschool Groups. Conversely, the absolute scores in reading of the Head Start and Child Development programs closely matched those of the No-Preschool Groups on all academic measures and there were no overall statistically significant group differences; for this reason, the scores for the Head Start, Child Development, and No-Preschool Groups were combined separately for the K-age and 1st-starting grouping and were classified as non-Distar-trained Groups.

WRAT and Related Findings

The Wide Range Achievement Test (WRAT) (Jastak & Jastak, 1978) was given every program year to the ECDCC children. In Figure 1 the mean percentile scores are plotted on quarter-standard-deviation-scale units. Averages were first computed using raw scores before converting to percentiles. At every program year, the percentile scores for Reading were substantially higher than the 50th percentile. The DI-trained 1st-starting Groups were consistently near or above the 98th percentile (two to three standard deviations above norm). The DI-trained K-age Groups were also advanced, averaging between the 77th and 98th percentile across program years.

Previous WRAT evaluations of DI preschools used grade equivalent (G.E.) scores to assess reading and other academic skills. Considering just those studies *containing 1st-entering children having two preschool years of DI Reading*, the obtained G.E.'s in WRAT Reading have always been higher than the normative value of 1.0 for beginning first graders. Bereiter (1968) reported a mean G.E. of 1.5 for the initial 13 graduates of the Bereiter-Engelmann (1966) preschool. Engelmann (1970) obtained a mean G.E. of 2.6 for 12 later graduates taught by an improved reading program that was phonics-based and focused greater attention on the lowest performers. Seven middle-class preschoolers taught for two years with the revised program obtained a mean G.E. of 3.4. Anderson (1982) reported a mean G.E. of 2.6 for 87 children trained with Distar Reading whose average entering IQ was close to 106.

Continued on Page 17

Preschool Reading (Continued from Page 16)

The G.E. in WRAT Reading for our 1st-starting ECDCC children with two program years ($N=31$) had been 3.8 (which simply means an extremely high WRAT score for this age group and does not imply the children can read and comprehend third grade books). Chief among the reasons for the higher G.E. is that our facility, being a full-day preschool (the others were half-day) allowed for longer engaged-time in reading, and that ours, also being a more recent preschool, had the advantage of using improved DI programming materials and teacher presentation procedures.

The reason that DI-trained preschoolers do so well on WRAT Reading can be understood by considering the subskills tested. Table 1 provides the WRAT subskill breakdown for the previously described 1980 between-group comparison of DI-trained vs. Non-DI-trained Groups (combined Head Start, Child Development, and No-Preschool Groups).

The four subskills can be divided into two broad categories. There are those which can be called *rudimentary entering-public school* skills because most children know or are able to do them by the time they enter first grade or, most certainly, will be taught them within the first several weeks of public school. These include the first three subskills in Table 1. Indeed, some may claim that these are not only rudimentary, but also functionally irrelevant for the teaching of effective word-attack strategies (Carnine & Silbert, 1979). The second category can be called *substantive entering-public school* skills, one of which consists of reading or decoding words, a relatively more difficult skill that only a small percentage of children can do before first grade (Durkin, 1966; Morrison, Harris & Auerbach, 1971), and one that is not normally mastered by many until well into first grade or, unfortunately, is never learned by an alarming number of children throughout their school years (Harman, 1970).

Clearly, it is not the rudimentary subskill category that distinguishes DI from Non-DI children, but rather the substantive subskill of decoding words. This contention is supported by parametric and nonparametric statistics, wherein no significant between-program differences (DI vs. Non-DI) were found for the first three subskills, either for the K-age or the 1st-starting age groupings, whereas the effects for Reading were significant ($p=.0001$) for each of the two age groupings. A significant between-age group (K-age vs. 1st-starting) effect was not found for the first two subskills, but the effects were reliable for Letter Naming ($p=.0001$) and for Reading ($p=.0001$) (Letter Naming is not taught until the second year of Distar; thus, the K-age children and those in the 1st-starting group with only one program year did not know many alphabet letters). The program × age grouping interaction was significant only for the Reading subtest ($p=.0001$).

The same pattern of WRAT subskill performance for the ECDCC groups in 1980 has been obtained for every evaluation year. Especially provocative was the decoding performance of the 1st-starting children with two program years. Of the first 50 WRAT words, a total of 21 words should have been familiar since they were explicitly taught in Distar Reading (12 words from Level 1 and 9 words from Level II). Nevertheless, the preschoolers were able to decode a large number of never-presented words, such as *size, weather, stalk, cliff, struck, glutton,* and *threshold*. The two-year DI-trained children had little trouble with other word lists: of the 220 Dolch sight words (Dolch, 1936), extending from preprimer to third grade, an average of 95 percent were correctly read, and of the 37 words used by Durkin (1966) to identify early readers, 99 percent were correctly read. These findings suggest that the excellent decoding skills imparted to public school children by the Distar Reading program (Becker, 1977; Becker & Gersten, 1982) can be similarly generated with preschoolers.

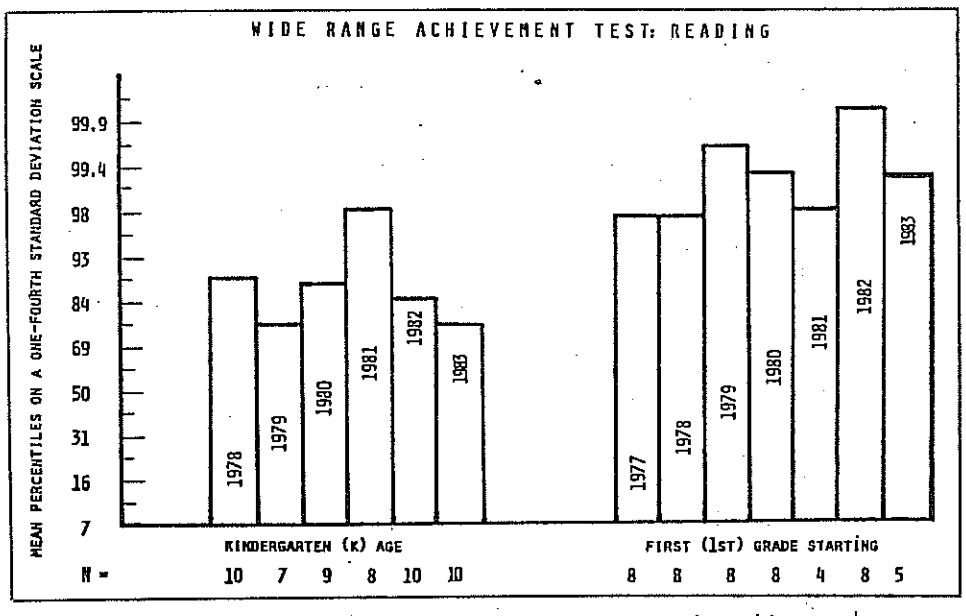


Figure 1: WRAT Reading across program years. Data are plotted in equal percentile units on a .25 standard deviation scale.

Returning to the performance of the Non-DI groups, one might expect that these children, by virtue of being competent only in the rudimentary skills, would rank relatively low with respect to their same-aged peers who comprised the WRAT standardization sample. Such is not the case. The average non-DI-trained child between 6 and 6½ years of age and about to enter first grade who obtains the raw score of 23.9 (Table 1) would place at the 47th percentile. This value compares favorably with the commonly reported 20th percentile found with disadvantaged children entering first grade (Becker et al., 1975). This favorable showing was replicated by the author with Head Start preschoolers, evaluated in 1982 ($N=8$) and 1983 ($N=12$) who placed, respectively, at the 42nd and 45th percentile.

That a preschool intervention program can be judged as a relatively successful project if normative data from the WRAT are used, even though its graduates are barely able to read, is possible because the skills tapped by the WRAT to gauge average first grade-entering performance are mediocre ones. Stated differently, entering first graders are not expected to be proficient at reading (nor at spelling or doing written arithmetic problems). The literature on entry skills in early reading provides strong empirical support. Durkin (1966) found that less than 1 percent of 5,103 beginning first graders in California could read a minimum of 18 words from her 37-item list which consisted of words common to the preprimers of three basal readers. Evaluating almost 4,500 New York City children with the same list, 4 percent reached her word recognition criterion. Her select group of early readers were, furthermore, distinguished as having relatively higher IQ's (a median of 121 for the California group and 133 for the New York City group). Evaluating the entering reading performance of over 1,000 disadvantaged urban Black children in the New York City public schools, Morrison et al. (1971) reported that only 4 percent could identify one or more words on the Detroit Recognition Test. Finally, in the nationwide Head Start Planned Variation (HSPV) Project that included eight different preschool models, the WRAT Reading subtest was administered as part of a large battery, but was found (along with the WRAT Spelling and written Arithmetic) to be "clearly too difficult for Head Start children" (Weisberg, 1973, p. 33).

As an aside, teaching the rudimentary skills contained in the WRAT cannot be considered a trivial accomplishment since many preschool programs fail to sufficiently establish even these skills. As such, the Head Start Child Development programs have done a credible job on this score: when compared to the over 2,000 one-year preschoolers in the HSPV Project, these two Non-DI programs came out somewhat higher than the overall HSPV mean on Letter Matching and Letter Naming.

Table 1
Mean WRAT Reading Subtest Raw Scores for DI and Non-DI Programs

		K-Age		1st-Starting Age	
Subtest	Maximum Score	DI (N=9)	Non-DI (N=25)	DI (N=8)	Non-DI (N=24)
Labeling two letters in name	2	1.5	1.3	1.6	1.8
Letter matching	10	9.9	9.7	10.0	9.9
Letter naming	13	6.2	5.2	10.9	10.0
Reading	75	9.1	0.2	28.4	2.2
Raw Score means		26.7	16.4	50.9	23.9

Primary Grade Achievement Tests

Although the amount of word recognition by preschoolers has been shown to predict later public school achievement in skills related to word meaning and comprehension of sentences and stories (Durkin, 1974), the WRAT does not assess any comprehension skills. Because the teaching or reading comprehension skills was part of the DI curriculum, especially during the second program year, a different norm-referenced test was needed to assess these skills. Reading readiness tests were of no help since they also do not directly measure reading comprehension (Nurss, 1979). We, therefore, chose first grade or primary level achievement tests. For the first evaluation year in 1977, the Gates-MacGinitie Test (Primary A, Form 2; Gates & MacGinitie, 1965) was used, but since then the evaluation instrument has been the Metropolitan Achievement Test (MAT) (Durost, Bixler, Wrightstone, Prescott, & Balow, 1971).

The median grade equivalent scores (G. E.) by MAT subtest for the 1st-starting ECDCC children by program year are presented in Figure 2. (As with the WRAT, averaging was based upon raw score conversions to standard scores, from which the median G. E. and percentiles for each year could be derived).

It is readily apparent that for most evaluation years the plotted G. E. either approximates or is higher than end-of-first grade normative performance for the MAT.[2] Just to single out the 1980 program year (when the MAT was also given to Non-DI Groups), the corresponding percentile values by subtest for the obtained median G. E. was: the 70th percentile for Word Knowledge (G. E. = 2.1); for Word Analysis, the 94th percentile (G. E. = 3.0); the 88th percentile for Reading Sentences and Stories (G. E. = 2.4); and for Total Reading (not shown in Figure 2), the 78th percentile (G. E. = 2.2).

The performance of the 1st-starting DI Groups seems remarkable in light of the fact that disadvantaged children are commonly from four to six months below grade level in reading by the end of first grade (see each of the control groups' first grade G. E.'s reported in Gray & Klaus, 1970; Miller & Dyer, 1975; and Morrison et al., 1971). This

Continued on Page 18

Preschool Reading (Continued from Page 17)

below-grade performance occurs even when they have been part of a perschool intervention project (Ramsey, 1968). The only published study this author is aware of which reported acceleration by beginning first graders on advanced reading achievement tests *measuring comprehension* was Durkin's (1966) select group of high IQ preschoolers who were taught reading skills at home.

Since the MAT contains a multiple-choice format, the raw scores of all groups from the 1980 between-groups comparison were examined to see which ones exceeded chance performance. Not surprisingly, both those children at the K-age and 1st-starting levels from the Non-DI Groups guessed freely and answered at chance level on each subtest. Answering according to chance is also what Kennedy et al. (1963) found for a large proportion of 300 Black first graders from five Southeastern States when they took a primary grade achievement test during the first few months of public school.

In contrast, the raw scores of the 1980 K-age DI-trained children exceeded chance on both the four-choice, 35-item Word Knowledge subtest, averaging 14 correct items ($p = .05$). (The scores for 1st-starting DI-trained children were appreciably higher, averaging 24 correct items on Word Knowledge and 34 correct items on Word Analysis). The K-age children, however, answered at chance level on the three-choice, 42-item Reading Sentences and Stories subtest, averaging only 11 correct items. (The 1st-starting children were above chance, averaging 26 correct items).

The answering profile of the 1980 K-age DI group was typical of how K-age children from the other program years at the ECDCC did on the MAT. They are 'holding their own' both on decoding words, as relected by the Word Analysis subtest (selecting the same word as that dictated by an examiner) and on understanding simple vocabulary items, as reflected by the Word Knowledge subtest (selecting the word that best identifies an aspect of a given picture). They have a harder time with more difficult reading comprehension items, as manifested by sections on Reading Sentences (selecting the sentence that best describes or implies the meaning of a pictured scene) and on Reading Stories (selecting the word or phrase that answers a written comprehension item based upon a short reading passage).

It cannot be said that the K-aged DI children have the full complement of decoding skills to tackle any word. Having only one program year, they have not yet learned to distinguish between long and short vowel sounds in many words by applying the silent-*e* rule; they are unfamiliar with the sounds made by many letter combinations (*ea, ou, al*); they have not been taught capital letters so words containing these letters will cause problems, particularly when they are dissimilar to their lower-case counterparts (*A-a, D-d, G-g, R-r*); and, since they have not been phased out of the special Distar orthography containing macrons, joined letters, and so forth, the regular orthography inherent in primary grade achievement tests is likely to be troublesome.

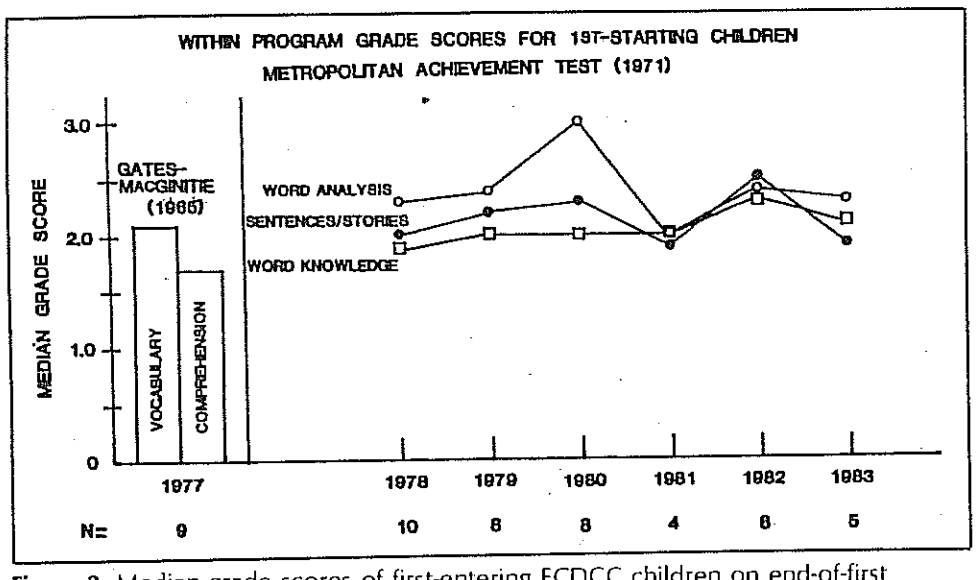


Figure 2: Median grade scores of first-entering ECDCC children on end-of-first grade reading achievement tests. For the Gates-MacGinitie (Form 2), the equivalent end-of-first grade score at the 50th percentile is 2.2 for Vocabulary and 1.9 for Comprehension. Comparable values for the MAT subtests are 1.8 for Word Knowledge; 1.7 for Word Analysis and for Reading Sentences and Stories; and 1.8 for Total Reading (not shown).

The K-age DI children are further limited since the first year of Distar Reading stresses reading for accuracy, rather than for sheer speed. Thus, they often do not finish all of the items of those MAT subtests that are timed, namely Word Knowledge and Reading Sentences and Stories. The items they do attempt, however, are more often done correctly and, if one looks at the items completed on Sentences and Stories, they are correct on 42 percent of those attempted, as opposed to only 28 percent correct when scoring is based on all of the subtest items, whether attempted or not.

Not only are the K-age DI children penalized for taking their time to decode words, many of which are irregular, they will have trouble with the meaning of many MAT words. They are not likely to know the meaning of *special, favorite, lick, pasture, flat, best,* and *starry night,* and they may not know what certain idioms mean, as in *to catch a bus, water meets land,* and so on.

Although they can cope with straightforward comprehension items, they are less able to deal with unfamiliar syntactical styles and inferential-based comprehension items that bring into play much outside information and relationships, as in, "I bring letters to your home. I wear a uniform. Who am I?"

All is not lost, however, for the K-age DI children. The 1st-starting children were in the same exact predicament as the K-age children just before they got another year of DI training. Fortunately, during that second year their promising decoding skills were enlarged to include a broader set of words and they were taught to read with increased fluency, speed, and expression, both during class and during independent reading activities. The greater stress in the second level of Distar Reading on developing comprehension skills, aided by the Distar Language II program which features more complex syntax, semantic relationships, and an enlarged vocabulary, inevitably helped them to read for information and meaning. No doubt the phonetically-based spelling component of the Reading II program, coupled with the opportunity to express their thoughts on paper, prompted some of them to compose their own stories, as illustrated by the one in Figure 3.

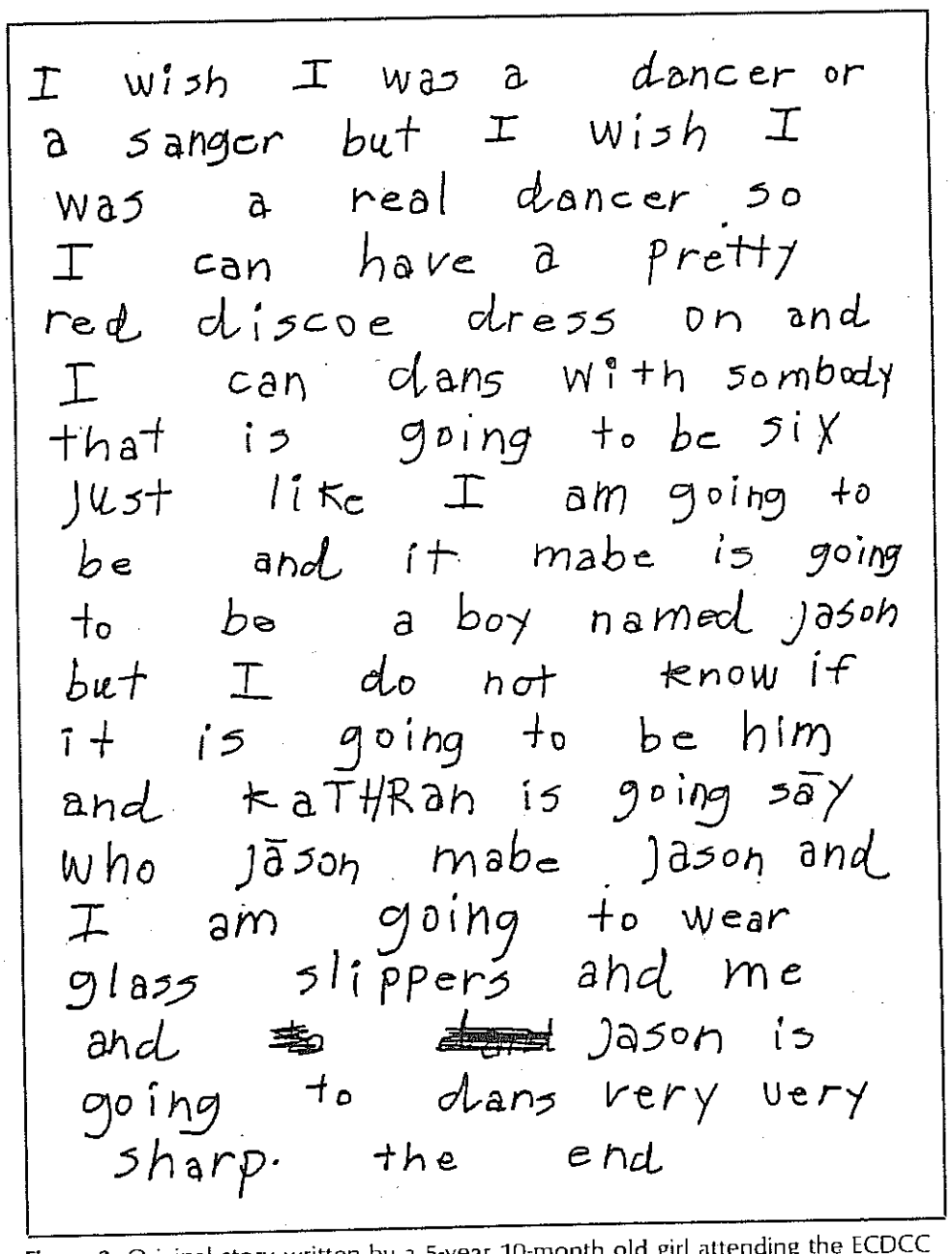

I wish I was a dancer or a sanger but I wish I was a real dancer so I can have a pretty red discoe dress on and I can dans with sombody that is going to be six just like I am going to be and it mabe is going to be a boy named jason but I do not know if it is going to be him and kaTHRan is going say who jason mabe jason and I am going to wear glass slippers and me and [illegible] jason is going to dans very very sharp. the end

Figure 3: Original story written by a 5-year 10-month old girl attending the ECDCC for almost two years (Jason is a classmate and Kathryn is her teacher).

One- versus Two-Program Years

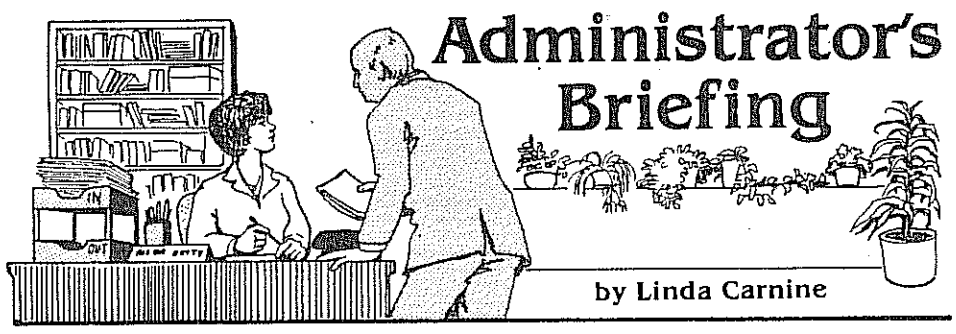
Of the 43 1st-entering children from the ECDCC who took the MAT, 12 and 31, respectively, completed one and two years of Distar Reading. As revealed in Table 2, length of program participation has a major effect on MAT outcomes. The standard score differences between the one-year and two-year children are significant for every subtest and for Total Reading (all p's = .001). The absolute differences in subtest grade scores, from 0.8 to 1.0 points, are what one would expect from an extra year of training in reading. Both groups are highest in the decoding based Word Analysis subtest, again lending credence to the power of the Reading program to teach this skill.

It is not the case that those with two-program years of Distar Reading were "smarter" than those with one-program year. The two groups were neither significantly different from each other in either entry Slosson IQ's nor in entry WRAT scores. Furthermore, after each group had one program year, they were similar in WRAT achievement in Reading, Spelling, and Arithmetic, and in IQ.

The Future

Although the answer to the question, whether educationally at-risk preschoolers can be taught advanced reading skills, is clearly in the affirmative, the more nagging and not as easily researched question of "what happens to the graduates?" is currently being pursued. We are finding that our preschoolers leaving with two years of Distar Reading are having an easy time in first grade and many of them begin reading at the second grade level without any problem. Our concern rests with those leaving with only one year of Distar Reading, either entering a public

Continued on Page 21



Administrator's Briefing

by Linda Carnine

Restoration of Standards* the Modesto Plan

By James Enochs

Editor's note: James Enochs is the Assistant Superintendent at Modesto Public Schools, California. Dr. Enochs has developed the nationally recognized program called "Academic Expectations and the Fourth R—Responsibility" which has been featured in national pulications, the Associated Press, CBS News, and on public television and radio in Canada and the U.S. In 1978, he received the National "Excellence in Education Award" and in 1980, he was selected one of North America's "100 Top School Executives" by Executive Educator *and* American School Board Journal.

In 1975, the Modesto City School District was a typical California school district: mediocre, but hip. In the name of innovation and relevancy, we suspended common sense and embraced the fashionable twaddle of John Holt, Herb Kohl, A.S. Neill, Jonathan Kozol, Edgar Friendenberg, and others. Their arguments were seductive because we all yearned to be so certain, so righteous, and so "with it."

Rather than be thought rigid in a period when flexibility was the highest virtue, we first relaxed our standards—and when that didn't do it—we abolished them completely. We began to feel guilty and proceeded to pull up our roots to examine them for rot. Homework, honest grading, demanding courses, required classes, earned promotion—up they came and out they went. We leveled the field so all could pass through without labor or frustration. No longer would anyone be able to blame us for everything from bedwetting to the military-industrial complex. We were *all* affective domain.

Grades became bloated and revealed more about the teachers who gave them, and the principals who tolerated them, than the students who received them. Social promotion and unearned diplomas moved undeserving students up and out of a system that had failed them, but, in a final act of conscience, compensated them with counterfeit paper.

The results of all this now seems predictable: In eight short years, 1967-76, every indicator of quality education nearly disappeared. During that period we managed to take some respectable bar graphs (academic performance, attendance, violence, vandalism, etc.) and turn them upside down.

Today we have them going in the right direction again and we are getting better each year. In 1982-83, nearly 80% of all our students were at or above grade level in reading and math on the Comprehensive Test of Basic Skills. Our college-bound seniors are scoring 25-30 points above the national mean on the verbal and math portions of the Scholastic Aptitude Test. On the California Assessment Program, a state-mandated testing program for all California schools, our district is exceeding, by as much as 30 and 40 percentile points, its expectancy bands on every area of the test at every grade level tested. Ninety-seven percent of our high school seniors pass a full battery of six competency tests and complete a required sequence of courses in one of three prescribed graduation plans.

In the critical area of what we call the Fourth R—Responsibility, we have reduced significantly vandalism and truancy. Our elementary schools reached 99.5% Average Daily Attendance (either in school or legally excused) in 1982-83. The high schools were slightly better than 98% Average Daily Attendance, approximately 7% above the state average. The cost of vandalism during the most current year was 30% below the year immediately preceding the adoption of our program. We do not have serious discipline problems on our campuses. Assaults on teachers do not exist.

It is important to note that Modesto City Schools' 20,000 students do not come from a middle-class community in which such results are both commonplace and easily attainable. Modesto is the fifth fastest growing community in the United States with a population of more than 150,000. Through much of the early 80's recession, Modesto's unemployment rate was second in the nation at over 20%. A high percentage of our students come from welfare homes: the percent of AFDC students places us at the 82 percentile in California. We have a large and increasing number of limited and non-English speaking students. The socioeconomic index of our parents (a figure based on how they make a living) places Modesto City Schools at only the 34 percentile in the state. These figures are mentioned in part for perspective, but primarily for those cynics wedded to the notion that all this talk of reform and progress is all very well for those districts which have none of the problems they face. We still receive these figures from the State Department of Education sociologists, but we have stopped taking them seriously as predictors of performance. After all, it was a lot of pop psychology and instant sociology that got us in trouble in the first place.

A Modest Proposal

Early in 1976 we embarked on a program which, we unblushingly conceded, represented a return to some fundamentals we should never have abandoned. The program, "Academic Expectations and the Fourth R: Responsibility" was not offered as a cleverly innovative panacea. It was a modest proposal to get us back on the high road from which we strayed in the mid-1960's. It was designed to restore educational standards and the confidence of our clients.

We began in what may seem to some an unorthodox manner. We publicly documented our shortcomings (a euphemism for failure). Specifically, we framed the issue as follows:

1. The incidence of conflict, disruption, and crime in the nation's schools is growing at an alarming rate. This has been accompanied by a steady decline in the academic performance of students.
2. The public is becoming increasingly concerned.
3. There is no reason to believe that Modesto will be exempt from either the problems or the reaction.

We then proceeded to provide data which verified that, in fact, number 3 was virtually upon us.

Once we had established that we were in trouble, and that didn't take much convincing, we presented our Board of Education with a statement of principles. We had two purposes in mind. First, we wanted to get our Board on record in support of a significant change in philosophy and direction. In effect, we were saying, *"If you can't buy the principles you'll faint away when you see the program we have in mind."* Knowing full well that Boards are better on ideas than practices, we expected and received their unanimous endorsement. (What else could they do after we had documented our failures just two weeks before?) Second, we wanted a clear signal to students, parents, and staff that we were about to sweep away a lot of conventional wisdom and we were going to do it all at once. No safe little pilot programs, no endless studies, no big committees seeking "input" and "feedback," no tinkering at the edges. One grand swoop. After all, no guts, no glory.

I would like to mention a few of those principles to give you a sense of the tone we wished to set:

1. It is essential that a public institution clearly define itself; to say unequivocally what it believes in and stands for.

In many school districts there is considerable confusion—not just in the public's mind, but among educators themselves—over this matter of what we are about. And the Old Philosopher was right: If you don't know where you're going, Lord help the followers.

So, we laid it all out in plain English: This is our program. This is what we expect in behavior and academic performance. This is what happens to those who meet our standards. This is what happens to those who fail to meet our standards. At regular intervals we'll tell you how we are doing. At the end of the year we'll tell you how we did, the district as a whole and at each school and every grade level. And these are the people who are in charge and responsible, at the district level and at each school. This process not only defines the institution for its clients, but for its employees as well. It has been a useful guide to collective bargaining. We'll talk about anything on the union's agenda, but we won't barter away our principles—what we believe in and stand for.

It also addresses one of the best kept secrets in America: *Kids want adults to act like adults.* One of the best things we have going for us in education is that kids have a low tolerance for ambiguity. They want to know who's in charge. They want to know what's expected and the consequences. And they want to know that what's right and wrong today will be right and wrong tomorrow—even if ten parents show up at the Board meeting and say it isn't so.

2. The development of responsible adults is a task requiring community commitment. It cannot be left solely to the public schools.

We wanted to make two points with this statement, both of which led to specific programs we had in our package. At one level we wanted to remind the community that schools are not the only public institution receiving tax dollars for the purpose of helping children. We let them know that we were not getting the cooperation we needed. Instead of all the buck-passing, we were going to start expecting police, the district attorney, the juvenile judges, the probation officers, and social workers to work with us. In short, we were tired of the all-purpose brushoff, "That's a school problem."

On a different level, we were challenging the community to provide recognition to outstanding students. As with most communities, there was a good deal of pretty mouth-music about the kind of young people we should encourage, but the real recognition was limited to star athletes. It is a kind of prolongation of adolescence on the part of adults who should know better. And the impressionable young are left with the impression that Saturday's hero is more important than the Monday-through-Friday good citizen and scholar. In effect, we were asking the community to help students get their priorities straight by getting their own straight.

3. The principal tasks of the public schools cannot be achieved if a disproportionate amount of time and resources must be given to maintaining order.

We wanted it clearly understood that there comes a point at which the schools must be able to say, "These few make it impossible to teach the many, and they must go." If we can't guarantee the safety of a child's person and property, we can't possibly provide the kind of environment a child must have in order to learn anything. And that's our principal task. So after we've done all that can reasonably be expected of us, get ready community we're going to show some of them the gate.

Continued on Page 20

* Excerpted from paper presented at the October 15, 1983 conference "Improving Instruction in High Schools: a workshop for Secondary School Administrators", Eugene, Oregon. As an aside in this address, Dr. Enochs took time to thank Engelmann and co-workers for the DI programs that were an important element in Modesto achieving its goals of higher standards.

Seattle Teachers Describe DI Applications

Editor's Note. *The following is taken from the Seattle Public Schools Special Education Newsletter* OPEN DOORS, *April, 1983 and is reproduced with permission.*

Elementary Mildly Handicapped

Teachers at Madrona, Latona, and Bagley (Gary Jennings and Karen Meyers) are using Science Research Associates' direct instruction format in Corrective Reading to teach both decoding and comprehension skills to students with mild handicaps; Louise Herbold (Green Lake/Blaine) teaches decoding skills. The three teachers who are systematically using the strategies attended inservice training last spring and/or last fall. Other teachers, for instance diagnostic prescriptive teacher (D.P.T.) Dorothy Palmer, are using some of the methodology, without the published format of Science Research Associates' Corrective Reading for individual or small group instruction. While it initially requires a teacher commitment of between 10 to 20 hours for training, once trained, teachers feel that they save preparation time, as the published direct instruction reading material features the following:

1. Group instruction (from 4-15 students) between 35 to 45 minutes in length.

2. Each strand is set up for continuous skill development.

3. Each component program is designed as a core program, not merely as ancillary material. The programs teach the skills that are introduced, rather than simply exposing students to examples that require the teacher to provide additional applications.

4. The teaching of new skills demonstrates the discriminations to be learned and provides practice to assure that what has been demonstrated is applied to a range of applications.

5. The skills that have been taught are cumulative, which means that once a skill has been taught it is continually reviewed or it becomes a component of a more complex skill that is introduced later.

6. Each program is made up of daily lessons that contain activities for 35 to 45 minutes of teacher-directed work and independent student applications.

7. Each lesson specifies both teacher and student behavior and provides a test of skill development.

8. Individualization can be achieved for students in group settings by providing several entry points.

9. The lesson sequences provide controlled increments of skill difficulty so that, after students are placed appropriately, they are introduced to skills that effectively build on their acquired skills.

10. Records of each student's performance on daily criterion-referenced measures provide fine-grained documentation of progress. The decoding programs measure accuracy of oral reading, rate of oral reading, and accuracy of written answers to comprehension questions. The comprehension programs measure accuracy of independent work that assesses specific comprehension skills. The records provide the basis for awarding grades and for demonstrating to students that they are progressing in specific skill areas.

11. The uniform reinforcement system, based on student performance, is designed to emphasize improvement through repetition, points earned, and positive verbal feedback. Students' ineffective habits will not be changed quickly; to change them will require continual reinforcement.

12. The placement test is administered individually and is designed to measure relevant skills. The decoding part of the test measures skills in decoding; the comprehension part tests performance on analogies, similarities, recitation behavior, deductions, and other skills assumed in complex comprehension activities.

13. Component programs are designed to be used independently. They can also be used to either strand sequences or level sequences.

In order to expand this methodology to other classes, there will be in-service training sessions on direct instruction (corrective reading) offered to all teachers of elementary students with mildly handicapping conditions, beginning in May through August of this year. The June issue of *Open Doors* will outline the schedule of this training, as well as other inservice training, to be offered this summer.

Secondary Mildly Handicapped

While middle school-aged students who are poor readers are often hard to motivate in reading, Hal Johnston (Eckstein), Don Hanson (Whitman), and Pat Guenther (South Shore), find that students in their Corrective Reading (Decoding B) class are "turned on" to the process—some students experiencing success for the first time. Pat Guenther held a "graduation" ceremony on March 25 for her two groups of reading students. At the "graduation," a ceremonial reading from the last story in Corrective Reading (Decoding B) was held, with students reading in turn:

> *. . . Suddenly all the people stopped joking around. Everything was quiet, except for the sound of logs on the fire. Then Thin Jim said, "We all want to thank you, Salt. It's your birthday, but we're the ones who had the party. We used to be a bunch of old people, just sitting around here. But you showed us that we can still laugh and have a good time. We've got a lot of fun left in us. We--"*
>
> *Thin Jim began to choke. He had tears in his eyes.*
>
> *Someone yelled, "Let's hear it for Salt. Hip, hip, hooray! Hip, hip, hooray! Hip, hip, hooray!"*
>
> *Tony never forgot the sound of those people yelling, "hip, hip, hooray" at the top of their lungs. He never forgot the look of joy in their eyes.*

All who attended the ceremony (including parents and school administrators) will never forget how "seriously" each student took the event: dressed-up, attentive behavior, with a look of pride as a Certificate was handed to them, with words of commendation by Pat Guenther, Peggy McLeod (consultant) and John Thorp (principal).

The enthusiasm for the direct instruction methodology is well based according to Pat Guenther and Don Hanson (Whitman), who share the following about their students enrolled in reading and spelling classes:

- Students are now more confident to read aloud; five of Pat's students have volunteered to read the Pledge of Allegiance over the school intercom.

Continued on Page 21

Restoration of Standards (Continued from Page 19)

4. Parents must consistently support the proposition that students have responsibilities as well as rights, and schools have an obligation to insist upon both.

Let's face it, when parents are suing schools to force the promotion of kindergartners, it's time for a little perspective. In examining sample codes of students' rights and responsibilities provided by the Center for Law and Education at Harvard, we found an interesting consistency. Nearly every code had a specific and comprehensive compendium of student rights, including detailed appeal procedures and committee structure. The section on student responsibilities was often no more than a single paragraph written in general terms: "Students rights also entail responsibilities." We had in our plans a little program which would link rights and responsibilities in such a way that if you didn't meet the latter you lost some of the former.

5. High performance takes place in a framework of expectations:

It's a useful proposition to let people know what is expected of them. It is equally important that there be no confusion about the consequences of failure to meet those expectations and the rewards if they are met. If mediocrity and excellence or disrespect and civility are not received with significantly different consequences, the distinctions between them will soon be lost on impressionable minds. Standards without rewards and consequences are not standards at all. So we wanted to let folks know that we understood that the trick was to have the integrity and courage to enforce our expectations after they were set.

6. There is nothing inherently undemocratic in requiring students to do things that are demonstrably beneficial to them.

We wanted to make it clear that we did not count it an impulse to decency or democracy to allow children, in the parlance of the day, "to do their own thing." While it was once possible to assume that most students brought certain shared values with them to school, it is no longer so. Toward that end, this was to be our justification for a character education program in the elementary schools. The program is predicated on the belief that there are still some consensus values upon which reasonable people agree.

7. Finally, in order for a program to succeed it must be left in place for a reasonable period of time and be assured of continued support despite periodic criticism and the lure of faddishness.

We expected criticism from those with honest concerns about the direction we were taking as well as those who greet any new example of common sense with incredulity. But, above all, it was a challenge to our Board. We knew there would be those long nights when parents came to protest our citizenship program and the ineligibility of football players, or the sons and daughters who did not graduate. For despite the considerable rhetoric about school reform, parents tend to view the restoration of standards in much the same way they view religion—it's good for the other people, but I didn't think you meant me.

Next came the program, and just as the statement of the problems led the Board to the principles, the endorsement of the principles insured the adoption of the program.

It is important to note that while many of the problems we were faced with were at the secondary school level, inherent in all that we did was the belief that reform must begin both in program and with students long before they reach high school. By the time our students enter the ninth grade they should have been systematically exposed to eight years of clearly defined expectations. It is a basic tenet of all that we have done that there must be no gaps in accountability for students or staff. The program touches every grade level and every program.

Nor do we believe that those components designed to deal with behavior can be separated from those dealing with academic performance. For example, although we have a very specific program for reducing truancy, it may well be that the realization on the part of students that they can't pass the competency tests unless they attend school on a regular basis is the best anti-truancy program of all.

Note: For more information regarding the major pieces of the Modesto program—e.g., the Special High School Graduation plan, Written Student Conduct Codes, Active Control of Truancy, etc.—contact:

Dr. James Enochs
Modesto City Schools
426 Locust Street
Modesto, CA 95351

Research on Class Size

By Kathleen Cotton
& William G. Savard
Northwest Regional Educational Laboratory
Portland, Oregon

Author's Note. This report is one of several in a series of reviews of research literature conducted for the Alaska School Effectiveness Project. Each of the reports addresses a topic which is deemed to have an impact, actual or potential, on school effectiveness.

This report is not intended to represent the "final word" on the topic considered. Rather, it represents the analysis of a particular collection of research documents at this time. There may be other documents that were not found because of time or other limitations. There may be new research published tomorrow. This present report represents our best judgment of available information at this time. This format allows for modification and reanalysis as new information becomes available or old information is reinterpreted.

Overview

The relationship between class size and educational outcomes is a controversial and much-investigated subject. Many educators, parents, students and others argue that small classes result in higher achievement and better teacher and student morale than do large classes. This contingent contends further that these superior outcomes justify the higher costs associated with operating small classes.

These views are countered by the arguments of other groups both within and outside the educational community. Some claim that smaller classes do not necessarily promote better learning and learning environments. Others argue that, even if smaller classes are best for maximally effective schooling, they are simply too expensive.

In both of these sizeable camps are people who speak from personal preference, other who argue from experience in educational settings, and still others who cite research findings in support of their point of view.

There is no doubt that operating small classes is more expensive than operating large classes. Before considering cost factors, however, it is important to ask what is known about the relative merits of small and large classes as regards their effects on achievement and other educational outcomes.

Considerable research effort has been devoted to studying the relationship between class size and: (1) academic achievement in various subjects and at various levels; (2) student behavior/attitudes; (3) teacher morale/satisfaction; (4) instructional methods; (5) classroom management and other variables. While many well-designed and carefully conducted studies have been published, an individual seeking to extract meaningful conclusions from the class size research confronts several problems. "Small classes" and "large classes" are not defined in a consistent way from study to study, (for example, "small" classes may range from three to twenty) which makes difficult the task of examining the studies in relation to one another. Some studies draw conclusions about the relationship between class size and achievement, for example, without examining the influence of other important variables on the outcomes noted. Some researchers draw conclusions about the effects of class size generally, even though data are drawn from only one grade level. These limitations notwithstanding, some patterns do emerge from the research on class size, and these are presented in this paper.

Thirty-five documents on class size were examined. Fifteen of these were excluded, either because they were judged invalid or were not reports of research at all. Of the 20 valid studies which remained, 15 were primary sources and five were secondary sources. Ten were concerned with the relationship between class size and academic achievement in one or more areas, five examined class size in relation to one or more aspects of educational environment, and five looked at the effects of class size on both achievement and environment. Seven of the studies/reviews involved elementary students, two involved secondary students, six were concerned with both levels, and five did not specify the age/grade range studied.

Findings

The studies reviewed suggested three hypotheses:

1. Small classes have a positive effect on the academic achievement of elementary and secondary students.
2. Small classes have a positive effect on student attitudes and behavior, teacher morale, classroom processes and other indicators of the quality of the classroom environment.
3. There is no optimal class size for all instructional situations. Appropriate class size is dependent on student age/grade, student aptitude, subject taught and instructional methods used.

Each of these hypotheses has considerable support, but the third hypothesis—that there is no optimal class size in isolation of other factors—is supported by both the largest number of studies and the largest number of high-quality studies. What this means is that the research to date tells us that reducing class size (or, for that matter, increasing it) will not automatically produce any particular, foreseeable result. Other factors, such as the instructional methods used in a class of a given size, are as important or more important than the class size *per se*.

However, although a certain class size cannot be expected to lead to any particular outcome *in general*, the research does suggest that small classes can be beneficial in certain situations. There are indications, for example, that the achievement of disadvantaged, low-ability, special education or primary age students is enhanced by smaller classes. Very small classes, those with five or fewer students, appear to produce considerably higher achievement than average size classes, although the evidence for this has emerged chiefly from studies of short-term instructional situations. Some studies found both that smaller classes are beneficial and that large classes—especially very large classes—are detrimental.

The evidence is stronger concerning the relationship of class size to various indicators of the quality of the educational environment. Nine of the documents reviewed found better student behavior, higher teacher morale and more effective instructional practices in conjunction with small classes. Moreover, the non-research writings examined indicated that students and parents generally preferred smaller classes and that teachers overwhelmingly preferred them.

Continued on Page 23

Seattle DI –

(Continued from Page 20)

- Students are volunteering to read aloud, not only in the special education classrooms, but in contact general education classrooms as well.
- Students are correcting themselves on their reading and spelling errors with little self-consciousness on their part; they are willing to try and risk making a mistake.

Middle school teachers using the direct instruction format of corrective reading, spelling, and mathematics indicate that not only are students making progress, they look forward to class. The teachers, after initial training, find that they spend less time on preparation, are less concerned with behavior management and attendance problems, and are still able to be creative (as well as being able to make decisions and judgements based upon student performance).

Because the direct instruction materials have been validated nationwide, across a wide variety of students, and because of our students' and teachers' enthusiasm, we will, beginning the next school year, have minimally one resource room teacher at each middle school offering corrective reading. This will serve to support elementary students who have been in corrective reading, and who have moved up to middle school. It will also provide a broader based approach for students who have never been exposed to direct instruction methodologies. In addition, we will begin piloting the corrective reading materials at the high school level. Inservice training sessions on direct instruction procedures and materials will begin this spring and continue through August.

Preschool Reading (Continued from Page 18)

Table 2

Mean MAT Subtest Scores of First-Starting Children with One versus Two Years of Distar Reading

MAT Subtest	Type of Measure*	No. of Program Years: One (N=12)	Two (N=31)
Word Knowledge	Mean S.S.	33.6	49.4
	Mean G.E.	1.5	2.3
	Mean %-ile	28th	77th
Word Analysis	Mean S.S.	37.2	51.2
	Mean G.E.	1.7	2.7
	Mean %-ile	46th	92nd
Reading Sentences and Stories	Mean S.S.	31.6	50.4
	Mean G.E.	1.4	2.4
	Mean %-ile	22nd	88th
Total Reading	Mean S.S.	32.1	49.1
	Mean G.E.	1.5	2.4
	Mean %-ile	23rd	88th

* S.S. = Standard Score; G.E. = Grade Equivalent Score; Percentiles (%-ile) are based on an *end-of-first* grade norm group.

school kindergarten or first grade program that does not build on the moderate reading skills we developed. Fortunately, Distar Reading is catching on in the city schools so the issue of program continuity can be addressed.

Footnotes

[1]The author is indebted to all of the ECDCC teachers who taught so well to make the children proficient at reading and so eager to succeed at it.

[2]By giving our pre-first graders a primary level achievement test because it is commensurate with their functional reading skills, we have followed the suggestion of Horst, Tallmadge, and Wood (1975). We recognize the problem of generalizing from primary grade-based normative data for pre-first graders; if anything, however, we are applying overly strict standards to assess the children's achievements.

References

Weisberg, P. Education and enrichment approaches. In C.E. Walker & M.C. Roberts (Eds.), *Handbook of Clinical Psychology*. New York: John Wiley, 1983.

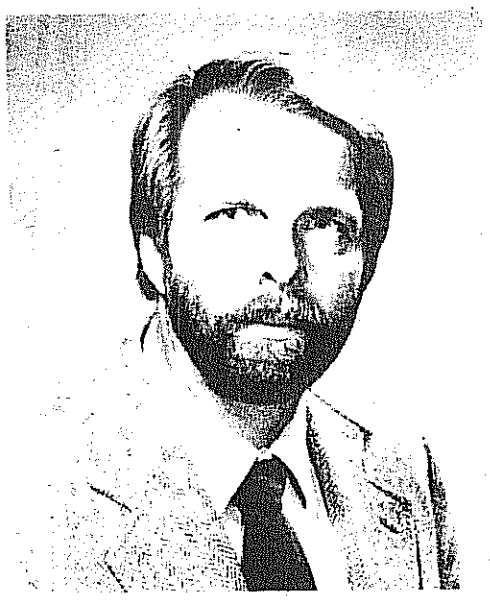
Weisberg, P., & Sims, E.V., Jr. Accelerating reading and comprehension in poverty-level preschoolers using a synthetic phonics program—Distar. Paper presented as part of a symposium on *Engineering early reading* at the meetings of the Association for Behavior Analysis, Milwaukee, WI., May 1983.

THE NINTH ANNUAL SPECIAL EDUCATION CONFERENCE

"TECHNOLOGY AND EDUCATION"

MARCH 2—3, 1984

TWO LOCATIONS: Spalding Hall, Lewis-Clark State College Campus, Lewiston Idaho
Ed Minster Student Union, North Idaho College Campus, Coeur d'Alene, Idaho



Dr. Alan M. Hofmeister, Dean, School of Graduate Studies and Associate Vice President for Research at Utah State University. Author of *Microcomputer Applications in the Classroom* Dr. Hofmeister's presentation "Microcomputer Applications in the Schools" is appropriate for all school personnel - administrators, teachers, parents, and community members.

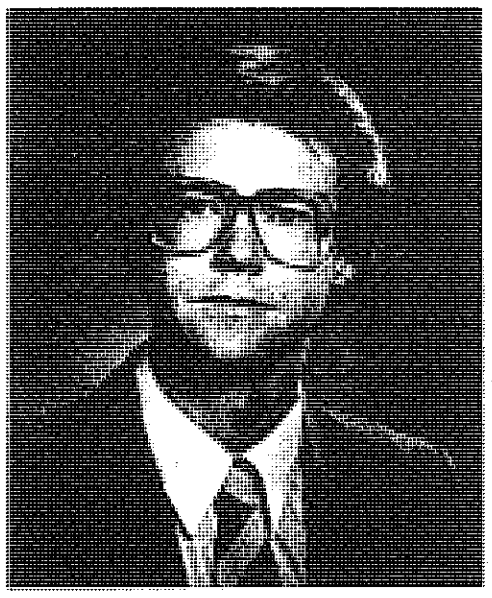
**** OTHER TOPICS ****

WORKSHOP:	Precision Teaching Essentials
WORKSHOP:	How To 'Turn On' Your Micro
WORKSHOP:	Software Evaluation
SESSION:	DI and the Politics of Reading
SESSION:	Microcomputer Report Writing
WORKSHOP:	Secondary School Behavior Management
WORKSHOP:	Corrective Math
WORKSHOP:	Spelling Mastery
WORKSHOP:	Reading Mastery

AND MANY OTHERS!

**** DISPLAYS ****

Microcomputer Hard & Software
Instructional Materials



Dr. Randy Sprick, Consultant and Assistant Professor for Special Education and Educational Psychology at The University of Oregon. Author of *The Solution Book: A Guide to Classroom Discipline*. Dr. Sprick's presentation "Solutions to Classroom Discipline Problems" is appropriate for both elementary and secondary school personnel and parents.

THE NINTH ANNUAL SPECIAL EDUCATION CONFERENCE

The Ninth Annual Special Education Conference will address issues of concern to a broad range of educators related to "Technology and Education." As elements of this conference the following major areas will be discussed in a wide variety of short, small group workshops and two longer large group addresses:

1. Behavior Management— Classroom management as a major concern of educators will be addressed by Dr. Randy Sprick in large group presentations and by several other speakers in small group workshops. Behavior management as a technology is perceived to be the systematic arrangement of environmental (classroom) variables in order to change student behavior. This includes both variable which occur before as well as those which occur after the student behaves or misbehaves.
2. Direct Instruction— The development and continuing evolution of Direct Instruction as the single most effective and efficient teaching strategy available to teachers will be discussed primarily in small group workshops. The emphasis during these workshops will be on skill and competency development rather than issues discussions, although some treatment of the philosophy will occur.
3. Precision Teaching— Precision teaching is essentially a monitoring and data display strategy designed to aid the teacher in instructional decision-making. The charting of rate data for correct and error responses provides the information necessary for predicting when a student will arrive at mastery - a tool necessary for planning annual goals and intermediate instructional objectives.
4. Microcomputer Applications— The application of microcomputers in the classroom is the final technology that allows the other maximum effectiveness and efficiency. The recordkeeping and student data management capabilites of computer managed instruction (CMI) free the teacher to spend more time working with students. The simulation and drill-and-practice potential of computer assisted instruction (CAI) provide additional instruction resources for the teacher.

For more information write or call

Dr. Stephen W. Ragan
206 Spalding Hall
Lewis-Clark State College
Lewiston, Idaho 83501

Conference Fees

	Register by 2/1/84	*Register by 3/3/84*
½ day	$10.00	$15.00
1 day	$16.00	$24.00
2 days	$25.00	$35.00
Credit Fee*	$15.00	$15.00

**One credit (SE 491) is available with two day registrations.*

"TECHNOLOGY AND EDUCATION"

Registration by mail before February 1, 1984 is recommended.

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
TELEPHONE _____
School or Institution (if applicable) _____
Professional Position (if applicable) _____
Amount Enclosed _____ Location to be Attended: ☐ LCSC ☐ NIC (check one)

Make checks Payable to Lewis-Clark State College

Returned to: Office of Continuing Education, Lewis-Clark State College, Lewiston, ID 83501

An Approach to Mainstreaming – The Teacher Consultant

By Charles Arthur
Winchester Public Schools, Mass.

In working with special needs children for over eleven years, I have come to the conclusion that it is possible to provide more effective services to special needs children than what is now being provided in most schools—and at a lower cost. This is stated without discrediting the dedicated, hard work that is now being expended in most schools. The fact of the matter is there presently exists two highly researched and developed kinds of programs that are scarcely used in the greater Boston area schools. If these programs were put to use, striking improvements in the results and costs of teaching special needs children would occur. This could mean a reduction of work load and, perhaps, could even allow for cut backs in some areas of special education programs.

One class of programs falls under the heading of Direct Instruction. They have been developed over the last 19 years by Engelmann, Becker and others. They include the Distar Programs for the primary grades and the Correctional Programs for grade four and above. Most of these programs have been extensively tested, at considerable public cost, and have proven to be very effective in providing the kind of instruction that many special needs children, along with other children, could receive in the regular classroom.

It is not unusual to hear about alternative curriculum programs in regular classrooms on the secondary level, but it is unusual to hear of it in the elementary grades. These specialized programs can be used for low functioning children in regular classrooms along side the regular curriculum.

The other kind of program that can have this same impact deals with classroom behavior and motivational problems. This also is a set of programs. These programs were developed and researched by Hill Walker and his associates at the University of Oregon. (See ADI News, winter, 1982.) They include several well planned, rather sophisticated, direct intervention procedures that focus on some of the more frequent behavior problems present in classrooms.

These programs have also been carefully developed over the last 15 years. They have been tested at each step of development and have finally been put together into four detailed standard treatment packages. The are the most highly develped examples, that I know of, of behavior modification procedures for classroom use. The unique aspects of these programs are that they are complete in every detail, well tested in the final form, and are mainly designed for regular classrooms. Variations, however, can be applied to other settings.

I think that one of the major difficulties in putting either of these programs to use, and possibly one of the reasons they are not in wider use, is that, in order to gain the most benefit from them, *they must be used in the regular classrooms*. In order to do this, the teachers need extra help in setting them up and carrying them out. For some of the procedures, this may be quite extensive in the early stages. This means that a special needs staff member, or other outside staff member, must be free to spend more time in the classrooms. Most existing staff members are not able to spend this amount of time in the classrooms. Therefore, until some transition has taken place, additional staff needs to be hired to some extent for this purpose. However, the cost of setting up and sustaining in-class programs, as long as they are effective, is still less per student than the cost of carrying on out-of-class programs that require more staffing.

The additional staff member, whether it be on a contractual part-time basis or a case-by-case basis, would work as a teaching consultant and specialist in those programs. The person doing this job would set up specific programs, orienting and training those involved—teachers, principals, parents, other specialists. He/she would also be directly involved, along with the teachers, in establishing these programs. A concentrated amount of time would be provided at the early stages when a lot of extra time and attention is needed to gain the initial changes in behavior and learning. In the curriculum area, this would mean establishing and helping carry out pilot group programs in classrooms. In the behavioral area, this would mean doing the same thing with individual children who have been identified and evaluated using Walker's procedures. For the curriculum, this could mean anywhere from 10-20 hours of the consultant's time for each pilot program. For the behavioral programs, it could mean from 30-50 hours of the consultant's time, depending on the seriousness of the problems. In both cases, this time would be concentrated into a prearranged length of time, anywhere from 3-5 weeks.

Although the use of a Teaching Consultant may be the most ideal way to accomplish the objectives of instituting more special programs in the regular classrooms, I think that there are other ways that these objectives can be met over a longer period of time. With a commitment to move in this direction, and with good planning, the same objectives can be worked towards from other existing positions. For example, if priorities are set, some Resource Room positions or substantially separate Learning Disability or Behavior Disordered classroom positions can be gradually changed into a position similar to the teaching consultant concept.

My major point is that I think there are adequate, tested programs that are not presently being used that can accomplish these goals if there are people from the Special Education profession that can help establish and carry them out.

Schoolwide Implementation — By Douglas Carnine, U of O

Many of the recent findings about effective teaching grew out of comparisons of good and poor teachers. While variability in teaching performance is helpful to researchers, it is often harmful to students. Uniformity, at least along some instructional dimensions, may be necessary to reduce academic failure. A valiant effort by a second grade teacher can be negated by lackluster performance by third and fourth grade teachers. Thus, core changes, changes that affect the entire school, are needed at the school level to ensure that students achieve their capabilities *each* and *every* year.

A critical review of both the research literature and case studies of successful educational change efforts leads to the conclusion that several elements appear to be necessary for effective change on a schoolwide basis:

- consistent feedback and technical assistance to teachers,
- incentives and emotional support for teachers from peer groups and/or from administrators,
- a system for continual monitoring of student progress and use of this information to improve the quality of classroom instruction, and
- high expectations for students' achievement.

The following section describes how the Direct Instruction Model provides one of the elements listed above. Other elements will be addressed in future issues.

Consistent Feedback and Technical Assistance to Teachers

A comprehensive plan for improving academic instruction must look at everything from curriculum and critical teaching behaviors to placement of students and procedures for assessment. Such a plan should be viewed as developmental, much like reading instruction. In developmental reading programs, the initial emphasis is on lower level skills with higher degrees of structure and teacher guidance. Later, students become sophisticated, independent learners. Similarly, school improvement efforts probably need to take a developmental perspective. Conducting inservices with great amounts of diverse information—and then expecting teachers to revise or devise a better reading instructional program—is probably unrealistic. Instead, school improvement efforts would initially focus on lower level skills with high degrees of structure. That might mean prescribed procedures, detailed curriculum, and intensive coaching. This early stage may not seem noxious if it is viewed as only a first step in a developmental progression.

A comprehensive study of how school districts use test scores (Kennedy, 1981) noted that while there is a growing movement in school districts to monitor each classroom's performance, based on achievement tests, rarely does the data lead to real help or training for teachers whose test scores demonstrated deficiencies. To merely monitor—in the sense of judging and criticizing teacher performance—without offering suggestions on how that performance can be improved —seems fruitless and almost unethical. Systems that monitor classroom performance will not work unless they are coupled with concrete, practical methods of teacher training.

As the Direct Instruction model has evolved over the past fourteen years, a subtle shift has occurred in the nature of teacher training. In the earlier years, teacher training consisted of out-of-class demonstrations and role-playing combined with discussions of philosophy and exhortations on issues such as maintaining high expectations for all students and maximizing allocated academic time. As the years passed, most of the supervisors found that what worked best with the students also worked best with the teachers—modeling, guided practice and independent practice. This lesson provides several suggestions for supervisors working with teachers:

- organize time so that teachers spend a high proportion of their school time teaching,
- use training materials that are at an appropriate difficulty level for each teacher and that systematically break large tasks into small components,
- conduct much of the training in the classroom to allow for frequent supervisor-teacher interactions,
- provide considerable specific, immediate feedback to teachers about the accuracy of their teaching.

A supervisor must not just be able to identify problems, but also to determine remedies, prioritize the remedies, and succinctly describe options for solutions. At times, the supervisor may need to teach the students to demonstrate to the teacher how to carry out the solution. After modeling the procedure, the supervisor would then observe the teacher to see if further explanations and demonstrations were necessary. Effective supervisors are more than just good teachers; they must also be diagnosticians, problem solvers, diplomats, and articulate speakers. But their role is critical; they are the ones who can turn good intentions into good teaching.

Class Size

(Continued from Page 21)

Recommendations

1. It would be inadvisable to reduce or increase class size generally in hopes of producing any particular educational outcome. Some kinds of instructional methods appear to work best with—or are only possible in—smaller classes. Following the recommendations of several researchers, we would recommend devoting attention to improving instructional methods, rather than altering class size in general.

2. However, operating smaller classes for academically needy and younger students appears beneficial, and schools are advised to make possible smaller instructional settings for such children if resources can be made available to do so.

3. Additionally, since small instructional groupings are possible within large classes, it is recommended that schools consider ways to make small group instruction available, especially to academically needy children, for some portion of the school day. Use of aides as small group instructors, for example, could occur simultaneously with larger group activity conducted by the classroom leader.

4. It is not recommended that additional research on class size be initiated—at least not the kinds of research conducted to date—as it is likely to produce more of the same contradictory findings noted in this paper.

Time Management for Teachers By Mary Meier

Editor's note. *Mary Meier has been a DI teacher for eight years. Currently she is teaching language arts and math at Kennedy Middle School in Eugene, Oregon. She is a co-author of levels A and B of* Mastery Spelling. *In her free time, Mary enjoys swimming, reading, and bird watching.*

Back in 1977 I saw an advertisement for a workshop to teach time-management skills to executives. The ad listed "bankers, salespeople, managers,and administrators" but nowhere did it mention teachers. At the time I thought, "Teachers make as many executive decisions in their classrooms as any manager who runs a department with 25 or 30 employees." So I registered for the class and over the past six years I have found a way to apply almost all of the principles which I learned during that workshop.

1. *"No one has enough time but everyone has all the time there is."* This cliche accurately describes the dilemma of people in positions of responsibility. Since your required tasks always exceed the time you have to accomplish them, you must give yourself limits. Decide exactly how much time you want to devote to your work. You may decide to go beyond an 8:00-4:00 day but set a limit nonetheless. When I first started teaching, I was willing to work until 6:30 or 7:00 on a weeknight but I made a rule never to work on the week-end. Some people stick to 8:00-4:00 each weekday but set aside Saturday morning for work-related tasks. Now that I am more experienced and make more efficient use of my time, I set the limit at one extra hour per day.

2. *Set priorities.* When you have established a finite amount of time in which to accomplish your tasks, set priorities. Even though the most important task may be boring or inconvenient, do not allow yourself to procrastinate or become distracted. Start with the most important task before you and work at it until it is completed. Then begin on the second most important task. This technique is probably the single most powerful skill you can learn.

3. *Know when to cut your losses.* If a lesson did not go well, if you assigned too much written work and you simply cannot correct it all, if your bulletin boards say "Happy Halloween" and it's January—know when to quit. Instead of trying to go back and make it right, simply re-evaluate your goals, design new tasks to accomplish those goals, and get on with it.

A note about bulletin boards: bulletin boards can be terrible time wasters. Unless they serve a specific instructional purpose, make them as simple as possible and make them all-purpose. Don't design a bulletin board that can become outdated or obsolete.

4. *Keep all your information in two locations:* A small file folder and your lesson-plan book. When you go anywhere, take your lesson-plan book. When you go to a staff meeting, take any handouts, read them, transfer any dates or appointments to your lesson-plan book and *throw the paper away!* When you go to your mailbox, transfer any important information to your lesson-plan book (dates, events, reminders) and then throw the paper away. Keep a small file of absolutely essential documents and throw those away at the end of the year. Make a note in your lesson-plan book of phone calls which you need to return and return them all at once at a preset time. Don't run back and forth to the phone.

5. *Set deadlines.* Give yourself deadlines for major projects. For example, make a year-long plan for your reading book. Decide where you want to be every four to six weeks. Record those deadlines in your lesson plan book. *Then put reminders a week or two ahead of the deadline.* These reminders will help you set your priorities for the upcoming week.

6. *Know how to delegate.* Most of us are fairly good at delegating tasks to students and aides. Remember that as well as delegating *down*, you can delegate across (to a fellow teacher) and delegate up (to your principal, curriculum specialist, or superintendent). Get together with a colleague and agree that, for example, you will order the health films if he or she will preview the new workbooks. When your principal asks you to do a task which is part of his or her job description you can simply say, "I don't feel that this task is part of my responsibilities as a teacher." Obviously, if the principal insists that you take it on anyway, then you may be stuck, but it's remarkable how often a principal will acknowledge that what he or she is asking is inappropriate.

7. *Work smarter, not harder.* Using these techniques will allow you to work more efficiently, accomplish more of what you want to accomplish and be able to truly enjoy your leisure time. You'll be accomplishing the important rather than the urgent and your effectiveness should increase significantly.

Join the ASSOCIATION

Membership covers the period from September 1 through August 31.

OPTIONS:

a. Student membership... $7/year (includes DI News and a 40% discount on ADI sponsored conferences and 20% discount on publications).

b. Regular membership... $15/year (includes DI News and a 20% discount on all ADI sponsored items and events).

c. Sustaining membership... $30 or more/year (helps to insure our survival).

d. DI News subscription only... $5/year.

ADI sponsored products and events include books and other materials published or marketed by the Association (DI Reading, DI Mathematics, Theory of Instruction, the Annual Direct Instruction Training Conference, and on-site training/consultation available from ADI staff or contractors.

The Direct Instruction News is published four times a year (Fall, Winter, Spring, Summer).

To join the association, clip out this form and mail it in.

ASSOCIATION FOR DIRECT INSTRUCTION

CHECK ONE P.O. BOX 10252, Eugene, Oregon 97440

1. I WISH TO BECOME AN ASSOCIATION MEMBER. ENROLL ME AS A:
- ☐ A. STUDENT MEMBER ($7 ANNUALLY)
- ☐ B. MEMBER ($15 ANNUALLY)
- ☐ C. SUSTAINING MEMBER ($30 OR MORE INITIALLY)

☐ 2. I WISH TO RECEIVE THE NEWS ONLY. A CHECK FOR $5 IS ENCLOSED.

NAME: _____

MAILING ADDRESS: _____