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ADI NEWS

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ADI Annual Awards for Excellence

ADI Award for Teaching
Presented by Bernadette Kelly

When I heard who had been selected for the 1987 ADI Teacher of the Year Award, I was thrilled. Pat Bauer is a regular first grade teacher who has taught at Westmoreland Elementary school in Eugene, Oregon for many years, but first heard about DI in 1974. She heard about it from a parent who had been told her son would never learn to read or write. The mother was subsequently introduced to Zig Engelmann and her son was reading within a few months. Pat Bauer was so impressed that she did all she could to find out more. She listened to Engelmann speak at every opportunity.

Pat Bauer, ADI Teacher of the Year

She attended her first DI Eugene Conference (the Second Annual) back in 1976, and with no financial support from her school district has been back to 4 or 5 more since then. She also attended workshops and took classes at the University of Oregon. She was and is still eager to learn, because she loves to teach kids, and to teach them well.

I first met Pat Bauer 2 or 3 years ago when I was supervising practicum students in her classroom. She was teaching a DISTAR Reading group on the other side of the room. I remember that first day because I was so impressed with her teaching skills and the rapport she had with her students that I found it very difficult to attend to the practicum student I was "supervising." I just wanted to watch Pat because I thought I would learn a few things.

I sometimes teach a methods class in DI Mathematics at the University (of Oregon). When we look at modifying basal texts, I warn students that it is a lot of hard work. It may involve resequencing skills, providing additional practice and supplemental worksheets, and replacing vague basal text guidelines with DI teaching formats. We concluded that it's virtually impossible, but I can tell you I have seen it done very successfully her in Eugene by Pat Bauer. To see her teach her entire class with her basal text's guide in her hand, her DI formats carefully pasted in, is something else!!

I spoke to Gerald Keener, Pat's principal, yesterday. He was thrilled to hear of her award. He said, "She has all the special qualities that make a *master* teacher. Not only is she able to work with the low-performing students and make them feel successful, but parents love her, and she is very skilled at motivating other staff. And, of course, she is always willing to welcome practicum students into her classroom."

Because she is a humble person, not expecting to be recognized or honored for what she does, she may not be fully aware of the impact she has had on the 20 or so student teachers who have worked with her in recent years, but I remember the end-of-term conferences I have attended. When I asked practicum students what they had found most valuable that term, they inevitably said, "Having had the privilege of being in Pat Bauer's classroom and watch her teach." They admired her energy level, her positiveness, her unwillingness to be daunted by any problem, and her respect for her students. They were contagious.

I spoke to one practicum student yesterday (now qualified) who spent a term with Pat Bauer. When asked what impressed her the most about Pat's instruction, she said, "She was extremely consistent with her students. That, combined with her approach to teaching that so effective, made me convinced that Direct Instruction is not just for certain kids, but for all kids."

Any teacher who is communicating that message to those who observe her teaching is one who truly merits this award.

ADI Award for Supervision
Presented by Geoff Colvin

The award for Excellence in Supervision was given to Ed Schaefer, Director of Special Education, Cape Henlopen School District, Lewes, Delaware. When Ed took over as elementary education director, and subsequently as special education director, he

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Correlates of Algebra Gains for High-Performing Secondary Students

by Meredith D. Gall
Russell Gersten
Dianne Erickson
Daniel Grace
Steven Stieber
University of Oregon

Paper presented at the annual meeting of the American Educational Research Association, April 1987, Washington, D.C.

Introduction

Research on teaching over the past two decades has shown that quality of teachers' instruction affects students' academic achievement (Gage, 1984). Most of this research has concerned instruction in basic academic skills at the elementary and junior high school levels, and has often involved teachers working with low-performing students. The teaching behaviors found to be effective in these settings have been synthesized into an instructional method by Rosenshine (1986), who has variously labelled it "explicit teaching" and "direct instruction."

The purpose of the present study was to determine whether the direct instruction method would be effective in a different, more complex teaching context, namely, intermediate algebra instruction in high school. The investigation of effective teaching behaviors in algebra instruction is timely because recent national commissions (e.g., National Commission on Excellence, 1983)) have recommended increased mathematics course requirements for high school graduation. A number of states have already acted on this recommendation. The increasing number of students who will take advanced mathematics courses such as algebra will need to receive high quality instruction if they are to be successful in them.

The extension of research on teaching to the high school level requires consideration of students' ability. Elementary school students typically all receive the same curriculum, but tracking is common at the high school level, especially in mathematics. This was the case in the present study, which was done in one of the largest school districts in the United States. Low-performing students were in a track that allowed them to complete a course of study in elementary algebra over a two-year period. Higher-performing students completed the same course of algebra study in one year, then went on to geometry, and then to intermediate algebra, the topic of the current study.

The grouping of students into instructional tracks raises the question of whether teaching behaviors that are effective for one track are also effective for the other track. This paper concerns the students who had completed elementary algebra in one year and were taking intermediate algebra at the time of the study.

Previous research on teaching was reviewed to identify instructional variables that might correlate with student achievement gains in algebra classes. Research on mathematics instruction, irrespective of grade level, was of particular interest. Also, studies of effective high school instruction were of interest, even if they concerned general academic achievement rather than mathematics achievement specifically.

The variables identified through this review process were grouped into the following categories: time available for instruction; developmental phase of the lesson; seatwork phase of the lesson; assignment of homework; and classroom management and climate. Research on specific variables is reviewed in the results section of the paper to facilitate comparison with the present findings.

Method

Subjects and Setting

All 34 mathematics teachers who taught Intermediate Algebra classes in 16 high schools of a large urban school district participated in the study. The district has large and small high schools, located in inner-city as well as in middle-class, suburban neighborhoods.

Students in Intermediate Algebra tend to have average or above average ability in math. Most of them completed the elementary algebra sequence as ninth-graders and took geometry as sophomores. Therefore, they were eleventh-graders at the time of this study.

Although some of the teachers taught more than one section of Intermediate Algebra, only one section per teacher was observed. Selection of the section to be observed was based on logistics of scheduling observations.

The same intermediate algebra curriculum and textbook were used in all district classes. Also, the length of lessons (50 minutes) and number of teaching days per year was the same across district classes. Therefore, all teachers in the study were allocated the same amount of time to teach the same algebra content.

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Dear Editor:

Last summer, I sent you information about a student who came to be called Peter in the Summer *ADI News*. During the 1986-87 school year, Peter's school day was split between our Middle School and my elementary school. He came to my Resource Room for reading and spelling. He was officially a sixth grader and my school is a K-5 elementary school.

He started in *Reading Mastery II* and *Spelling Mastery A*. We did not do every lesson in either of those programs. When the year ended, he was close to completing *Reading Mastery III*, Level A and *Spelling Mastery B*. The test results below are from September through April. During that time, we lost approximately 20 instructional days due to illness and family vacations.

For the 1987-88 school year, he will be placed full-time in our Middle School.

Test of Written Spelling	9/86	4/87
Predictable Words:	2.0	3.1
Unpredictable Words:	–.–	–.–
Total:	1.9	2.8

Comprehensive Inventory of Basic Skills by Brigance	9/86	4/87
Word Recognition Grade Placement	1	3
Oral Reading Grade Level	1-2	4
Reading Vocabulary	1	3
Passage Comprehension	1-2	4

This was Peter's first experience with DI reading and spelling. Earlier attempts to teach him to read and spell had produced limited results in both public and private schools and in regular and special education settings. Although I would prefer not to use the methods tried in the past, I did believe that the teachers that did work with Peter were well trained. I expected, then, to find a severe learning difficulty. I did not. I can only wonder what Peter's skill level would be now if he had been placed in a DI program five years ago.

Sincerely,
Roberta Bender
Tuscaloosa City Schools, Alabama

Dear Friends in ADI:

I wish to express my gratitude for the award granted to me at the recent 13th Annual Eugene Summer Conference. As requested, I have enclosed a picture of myself for use in the next issue of the ADI NEWS.

Though given to me, this award also reflects the achievements of the students, teachers, and aides who have worked so hard and so smart for so long. On their behalf and mine, I would thank the governing board of ADI for its thoughtfulness and continuing concern for the education of all our children. Once again, THANK YOU!!

Sincerely,
Edward Schaefer

A New, Six-Level DISTAR Arithmetic Series

DISTAR Arithmetic I & II will be revised. New levels 3, 4, 5, & 6 will be written. Zig and Doug would greatly appreciate feedback on any problems or suggestions for *DISTAR 1 & 2* and for *Corrective Mathematics*.

Please write us at:

Engelmann-Becker Corporation
PO Box 10459
Eugene, OR. 97440

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Treasurer's Report

by Wes Becker

A comparison of the financial reports for last year and this year (see Table 1) shows the enlarged activity for the handicapped preschool and for conferences. A good deal of the increase in administrative expenses is associated with the expanded preschool, and the increase in "General" is due primarily to the addition of books to our inventory for sale to members. The balance of income over expenses for 1986-87 is very deceptive because it does not show upcoming conferences expenses (losses in Milwaukee and Newport Beach) that pretty much wiped out that gain by August 31st. At the time of this writing, the Association has a carryover of assets of about $30,000. This is enough to allow us to plan for future issues of the NEWS and a new year of conference schedules, but it is much lower than we had hoped for entering into a new fiscal year.

Table 1. Treasurer's Report for Fiscal Year Ending June 30, 1987, Association for Direct Instruction.

	1985-86[1]	1986-87[2]
Public Support Income		
Handicapped Preschool Grant	$159,618	212,498
1984-85 carryover	$1,995	$3,119
Memberships	$11,031	$13,442
Donations (preschool)	$805	$2,357
Total Public Support	$173,449	$231,416
Revenue Income		
Educational Book Sales	$13,981	$14,318
Conference Fees	$37,004	$106,380
Tuition–Eugene Summer School	$10,615[3]	$7,587
Handicapped Preschool	$5,160	$5,530
Advertising	$1,425	$1,150
Dividends Earned	$1,052	$538
Shipping & Handling Fees	$1,105	$1,642
Miscellaneous	$2,069	—
Total Revenue	$72,411	$137,145
TOTAL PUBLIC SUPPORT & REVENUE	$245,860	$368,561
Expenses		
Program Services		
Handicapped Preschool	$166,270	$183,949
Educational Conferences	$42,218	$86,540
Eugene Summer School	$5,043	$7,586
General (ADI NEWS, Books, etc.)	$9,761	$31,880
Total Program Services	$223,292	$309,955
Administrative Expenses	$9,979	$33,417
TOTAL EXPENSE	$233,271	$343,372
Excess Income over Expenses	$12,589	$25,189[4]
Fund Balances Prior Year	$28,543	$41,132
Fund Balances Named Year	$41,132	$66,321

[1] Based on auditor's report prepared by Jerry C. Mohler, CPA.
[2] Based on accountant's year-end summary, pre-audit.
[3] Approximately $5,000 was a late payment for Summer, 1984, services.
[4] $11,064 was prepayment for handicapped summer preschool. Approximately $14,000 is prepayment for summer conferences.

Plan Now to Attend these Upcoming ADI Training Opportunities:

March 19 & 20 • Yakima, Washington
Second Yakima DI Mini-Conference

June 19-21 • Chicago, Illinois
Second Midwest Direct Instruction Institute

August 1-5 • Eugene, Oregon
14th Eugene DI Conference

August 8-12 • Salt Lake City, Utah
Third Salt Lake City DI Institute

August 8-12 • Kansas City, Missouri
Kansas City DI Institute

For more information on any of these training sessions, write to
ADI
PO Box 10252
Eugene, Oregon 97440

The First Midwest ADI Institute–

by Sara G. Tarver, Ph.D.
Dept. of Rehabilition, Psychology and Special Education
University of Wisconsin-Madison

Editors Note: For the past 14 years the Continuation Center and the Department of Psychology at Western Michigan University in Kalamazoo has held a regional DI Conference in Kalamazoo. The language used here is not intended to slight the contribution they make to providing Direct Instruction training

The first Direct Instruction Institute held in the midwest was a great success! 135 Teachers, supervisors, principals, and teacher trainers agreed that the Institute provided a unique learning experience which they hope will be repeated in future summers.

The consistently positive evaluations of the Institute are in due in large part, I believe, to the variety and the quality of the sessions that were offered. The variety made it possible for each participant to choose sessions appropriate to her level of experience with DI. Equally appropriate learning experiences were provided for the novice DI teacher who was just beginning to learn what DI is all about, the intermediate DI teacher who has used some DI programs successfully, but wishes to learn about others, and the highly experienced DI teacher who wishes to refine her techniques or probe DI theory in some depth.

Several teachers who probably fall into the novice category commented to me that they were delighted to learn that DI lessons can be delivered in dynamic and natural manner. The surprise they expressed at this discovery leads me to believe that they had probably been exposed previously to the all-too-common misperception of DI as a boring, rote learning approach in which the teacher reads a script and students respond on signal like Pavlov's dogs. I was glad to know that the DI trainers had successfully dispelled that myth and replaced it with a more positive and more accurate perception of DI. The novice teachers left the Institute with a full appreciation of well-designed curricula and the effective presentation techniques that constitute DI.

The variety of sessions offered also made it possible for participants to choose instructional areas of greatest interest. Those seeking to improve their teaching of reading could choose from a Corrective Reading session conducted by Paul McKinney, a Reading Mastery I and II session conducted by Phyllis Haddox, or a Reading Mastery III-VI session conducted by Jean Osborn. Those who wished to improve their teaching of math could choose either a Corrective Math session conducted by Maria Collins or a DISTAR Arithmetic I & II session conducted by Paul McKinney. Other options included a DISTAR Language I & II session by Jean Osborn, an Expressive Writing session by Jerry Silbert and a Spelling Mastery session by Maria Collins. Those primarily interested in managing and teaching the severely handicapped could attend two sessions on those topics conducted by Ann Arbogast. Highly experienced DI teachers could take Zig Engelmann's session on advanced DI skills and those with a bent toward the theoretical could take his session on DI theory. All the important instructional bases were covered well by this multi-talented group of trainers.

I have had the privilege of working with some teachers who have repeatedly demonstrated effective use of DI programs. Many of these teachers have produced achievement gains well in excess if one year's gain in less than one year's time with a variety of hard-to-teach students –students labeled LE, ED, or MR. The fact that these teachers produced large gains year after year suggests that the gains do not occur by chance and that the teacher does not just happen to get students who were going to learn regardless of the type of instruction provided. It seems apparent to me that the gains are due to the teachers' expertise in delivering DI. That expertise did not come easy. Each of those teachers has devoted much time and effort to the study of DI and each has continued to expand and refine his/her DI knowledge and technique over a period of years. I was delighted to hear those highly experienced DI teachers say that they, too, had learned valuable new teaching skills and strategies at the Institute.

The highly experienced teachers seemed to be particularly pleased with the information they gained from Zig Engelmann's presentation of advanced correction techniques and paradigms. I, too, attended Zig's sessions and acquired new information which I intend to incorporate into my methods courses at the University of Wisconsin-Madison. Zig demonstrated, for example, a part-firming procedure for errors that occur infrequently and a slightly different part-firming procedure for errors that occur frequently. He also taught a pradigm for correcting chronic errors on tasks that require the same student response and compared it to a paradigm for correcting chronic errors on tasks that require different student responses. To my knowledge, those particular correction paradigms had not been made explicit in previously published DI materials. I have found that teachers in training have more difficulty mastering correction techniques than any other DI techniques, such as signaling and pacing. Zig's paradigms should help alleviate that problem. And, by the way, those of you who like the currently popular term "strategies" may think of paradigms as "teaching strategies," because they are designed to be applicable to, or generalizable across, all examples in specified sets of errors.

I was glad to find that many of my friends and colleagnes in regular education, as well as those in special education, attended the Institute. A number of principals and curriculum supervisors in Wisconsin are working with their directors of special education to carry out pilot projects in which DI is implemented in the regular classroom — with "low" reading groups in some situations, with both "low" and "superior" groups in other situations, and with all students in still other situations. The results that have been reported thus far are exciting — low readers, average readers, and above average readers are benefiting from DI. And, the students who are labeled LD, ED, or MR are also benefiting from the implementation of DI in the regular classroom because the chances of successfully mainstreaming those mildly handicapped students are much greater when DI is used in the regular as well as the special classroom.

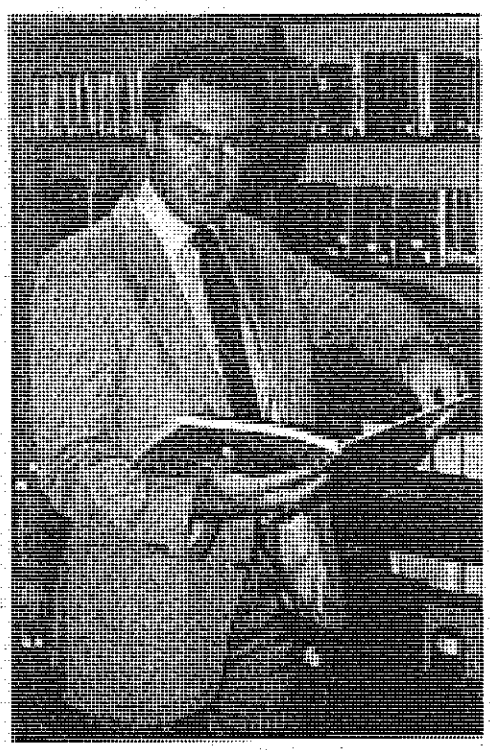
The DI Institute was a unique experience in many respects. It was certainly different from other professional conferences that I have attended across the years. Perhaps that uniqueness can best be summed up by a teacher's comment that I overheard toward the close of the Institute: "Boy, this has been a let's-get-down-to-business-and-start-learning-how-to-teach-kids experience from word go!" That's the kind of experience that good teachers are looking for. Obviously, they found it at the DI Institute in Milwaukee last summer.

Annual ADI Awards–

Continued from Page 1

determined that two variables were critical in improving students' performance in school: (1) stronger control over curriculum to insure effective and systematic materials, and (2) extensive training and supervision of teachers to insure implementation. To this end he placed Direct Instruction programs in all special education classrooms and in some selected regular education classrooms. In addition he developed a thorough inservice plan to ensure that teachers were highly competent in teaching these programs.

The following results speak for themselves on the effectiveness of the plan and on Ed's supervisory and leadership skills. In Delaware, each school district is required to test all students in basic skills (Comprehensive Test of Basic Skills). Cape Henlopen ranked about in the middle of the state the year before Ed became director of special and regular education. Following Ed's first year as Director, and every year since, Cape Henlopen has ranked number one in the state on the average score for elementary regular and special education students across the total test battery score. Prior to Ed's assumption of the directors position, it was standard procedure for 20 percent of the first grade students to repeat the first year. Ed introduced a transition class from kindergarten to first grade (see *ADI News* Spring, 1987) for students designated as likely to fail first grade. Again Direct Instruction programs were implemented and extensive staff training was conducted. The average grade level increase for these "at risk" students, measured by Woodcock Reading Mastery Tests, was 1.7 grades. In addition, the average increase was one standard deviation above the performance predicted from 1Q scores. Finally, the Normal Curve Equivalent scores (NCEs) for special education students in his district this past year averaged 41. The national average in regular education on this scale is 50. These changes all attest to the effective leadership given by Ed Schaefer.



Ed Schaefer, Supervisor of the Year

Ed has been the key organizer of the Annual Atlantic Coast Conference on Direct Instruction and Effective Teaching. Some 350 participants attended the Third Annual Conference this past July. Ed also presented two popular workshops at the ADI conference in Eugene this summer on implementing and supervising DI programs in schools. Ed Schaefer deserves our congratulations for providing us with a very positive example of what can be accomplished by a truly effective and dedicated supervisor in the best of DI traditions.

Correlates of Algebra Gains

Measures

Classroom Observation System

A classroom observation form was developed to permit both low inference and moderate inference observation of teacher and student behavior. The observed variables were derived primarily from studies of elementary mathematics instruction by Good and Grouws (1977, 1979), the study of junior high mathematics instruction by Evertson, Anderson, Anderson, and Brophy (1980), and Flanders' system of Interaction Analysis (Flanders, 1970). Each teacher's class was observed for three lessons during February and March 1985. The lessons were consecutive, or close to consecutive.

Observers collected data on the low-inference variables by coding which teacher and/or student behaviors occurred during each five-second interval of the 50 minute lesson. If just one behavior was coded, it was scored as having occurred for five seconds. If two behaviors were coded, each was scored as having occurred for 2.5 seconds.

After every four minutes of such observation, the observers took a twenty-second break during which they counted the number of students who were off-task.

At the end of each lesson, observers used a series of Likert-type scales to rate teacher performance on several moderate-inference variables such as the degree of teacher clarity, enthusiasm, and variety of teaching methods used in the lesson.

Five observers were trained to use the observation system. Eighteen of the 34 teachers were observed by pairs of observers to check interobserver reliability. The reliability for one of the variables—praise—was unacceptably low (r=.10), primarily because of its low frequency of occurrence. The reliability of the other variables ranged from .48 to .93, with a median reliability of .73. A definition of each variable, and its interobserver reliability where available, are presented in the appendix.

The temporal stability of teachers' scores on each observational variable across the three observed lessons was determined. The alpha coefficients for selected variables are as follows:

Teacher academic talk	.62
Teacher asks lower-cognitive questions	.79
Whole class has opportunity to answer question	.83
Student asks a question	.79
Teacher monitors seatwork	.55
Teacher does not monitor seatwork	.38
Teacher is interrupted, in transition, or engaged in non-academic talk	.75

It appears that the observed behaviors reflect a fairly stable individual differences in teaching style.

Questionnaire Measures

Each teacher and student was administered a questionnaire about a variety of algebra instruction practices near the end of the school year. Items concerning class attendance, homework, and review of previously studied content were included in the data analysis reported here.

Achievement Measure

District high school math teachers helped the researchers select a test that measured their major course objectives. The Algebra Test I, Form A, of the Cooperative Mathematics Test (Educational Testing Service, 1962) was utilized as the pretest. Although the test is old, the teachers considered the test valid and relevant to their curriculum. The mean score of the 34 classes on the pretest was 25.26 ($S.D.$=5.40), putting them at the 65th percentile on national norms. The posttest was the advanced form of this test (Algebra Test II, Form A). The mean score of the 34 classes on this test was 20.50 ($S.D.$=6.36). Each form of the test includes 40 items and measures primarily application of algebraic algorithms.

The pretest was administered in September 1984, and the posttest was administered the following May. The research team administered both tests.

A residualized posttest score, adjusted for pretest score, was computed for each student, and then these scores were averaged to yield a mean score for each of the 34 observed classes. The mean residualized class scores were used in the data analyses.

Fifteen of the 34 teachers taught another intermediate algebra class in addition to the one that was observed. Because the algebra pre and post test was administered to all classes, it was possible to compute a residualized posttest score for these classes as well. The correlation between the mean scores of the observed and unobserved classes for the fifteen teachers was .73, indicating that teachers were fairly consistent in the level of algebra achievement that they produced in their classes.

Results

Correlational Analysis

Data for the three observations of each class were averaged to yield a mean score for each of the instructional variables. These variables were correlated with the class residualized achievement scores. The results are shown in Table 1.

Table 1. Correlations Between Instructional Behaviors and Achievement Gains in Algebra Classes (N=34)

Instructional Time	
Teacher is interrupted, in transition, or engaged in non-academic talk	-.39 ***
Number of students absent (teacher estimate)	-.39 ***
Number of students cutting class (student estimate)	-.34 **
Development Phase of Lesson	
Teacher academic talk	-.42 ***
Teacher use of explaining or transition links	-.48 ***
Frequency of review (teacher estimate)	.24 *
Teacher gives directions	.35 **
Teacher clarity (observer rating)	.03
Teacher asks lower-cognitive questions	.24 *
Teacher asks higher-cognitive questions	.02
Teacher asks questions that check for understanding	-.09
Teacher asks questions that ask students to solve a problem independently	.46 ***
Whole class has opportunity to answer question	.08
Only one student has opportunity to answer question	.30 **
Number of students called on (observer rating)	.41 ***
Student asks a question	-.20
Student initiates a comment	-.17
Seatwork Phase of Lesson	
Teacher monitors seatwork	.33 **
Teacher circulates during seatwork (observer rating)	.28 *
Teacher checks seatwork (observer rating)	.25 *
Teacher collects seatwork (observer rating)	.15
Teacher does not monitor seatwork	.18
Number of students assisted during seatwork (rating)	.32 **
Teacher worked with small group of students (observer rating)	-.32 **
Number of students who worked together (observer rating)	.14
Teacher gives quiz	-.21
Assignment of Homework	
Frequency of homework (teacher estimate)	-.06
Length of homework assignment (teacher estimate)	-.10
Classroom Management and Climate	
Percentage of off-task students	-.05
Teacher reminds students of expectations for appropriate classroom behavior	-.11
Noise level during seatwork (observer rating)	-.02
Number of students who enter late	-.12
Number of students who leave class	.04
Teacher praises student work or behavior	.17
Teacher criticizes student behavior	.06
Teacher enthusiasm (observer rating)	-.06
Teacher varies instruction (observer rating)	.55 ***

Note. -- All variables involve measurement of amount of time based on direct observation of classroom instruction, unless otherwise noted.

* p = .10 ** p = .05 *** p =.01

Instructional Time

Time allocated for instruction has been found to have a positive correlation with high school student achievement (Bennett, 1976). This variable could not be examined in the present study, because time allocated for math class was held constant by the school district. It was possible, however, to examine variations in the amount of instruction that occurred within the standard fifty-minute class. Variations occurred because some teachers digressed from algebra instruction, or used up time making transitions from one phase of the lesson to the next. Also, some teachers were interrupted during class time more than others. Frederick (1977) found that higher-achieving secondary schools had fewer interruptions than lower-achieving secondary schools.

These non-instructional uses of time (digressions, transitions, and interruptions) were combined to form the variable, amount of non-instructional time. As expected, the correlation between this variable and student achievement was negative at a statistically significant level (see Table 1).

Just as teachers must allocate time for instruction, students must allocate time to benefit from it. Students' time allocation is an important variable at the high school level, since school attendance is somewhat voluntary. DeJung and Duckworth (1985) demonstrated that absenteeism is a serious problem among high school students. Therefore, the frequency with which students skipped or missed class was included as a variable in the study. Both teacher and student reports on this variable resulted in significant negative correlations with residual achievement scores.

Demonstration Pbase of the Lesson

Mathematics teachers usually begin their lessons by explaining a concept or algorithm that will be the subject of the day's seatwork and homework. Emphasis on this "demonstration" phase, rather than on seatwork, has been found to be effective in several studies (correlational study of ninth-grade math classes by Evertson et al., 1980; correlational study of algebra classes by Seifert and Beck, 1984; experimental study of elementary math classes by Shipp and Dear, 1960, and by Shuster and Pigge, 1965; an experimental study of eighth-grade math classes by Zahn, 1966). Dubriel (1977), however, did an experiment with first-year algebra classes and found that emphasis on development relative to seatwork did not affect students' achievement.

Surprisingly, the correlation between teacher academic talk and residual achievement scores for the algebra classes studied here was significantly negative.

The ninth-grade math study by Evertson and her colleagues found that asking frequent questions during the demonstration phase was effective. However, Good and Grouws found in their correlational study of fourth-grade math classes that asking product questions (i.e., questions having a single correct answer) correlated positively with student achievement, but asking process questions (i.e., higher cognitive questions) had a negative correlation. The Evertson study found that calling on volunteers to answer the questions is effective. Also, their study found that student-initiated questions and comments, which are most likely to occur during demonstration phase, is effective.

Continued from Page 1

The present study found that asking lower cognitive questions was effective (the coefficient was marginally significant, $p = .10$), and higher cognitive questions were neither effective or detrimental. Contrary to the Evertson study, it was more effective for the teacher to call on a student directly to answer the question than to give all students the opportunity. While singling out students to answer the questions, the more effective teachers also made it a point to call on many different students during the demonstration phase (see correlation for "number of students called on" in Table 1). Also contrary to Evertson's study, allowing students to initiate questions and comments was negatively correlated—but not significantly so—with student achievement.

Two studies (a correlational analysis of data from an experiment with fourth-grade math classes by Good and Grouws, 1979; an experimental study of algebra classes by Saxon, 1982) both found that spending some time during the demonstration phase in reviewing previously studied content had a positive effect on student achievement. The present study also found a positive correlation that approached statistical significance ($p = .10$) for this variable.

The demonstration phase of a math lesson is usually dominated by teacher talk. The extent to which this talk was judged to be clear was found to correlate positively with student achievement (Good and Grouws, 1977; a study of ninth-grade algebra classes by McConnell, 1977). Clarity in the present study was measured by observer ratings and by counting linking statements, which have been found to be an indicator of teacher clarity (Rosenshine, 1971). Contrary to the previous studies, clarity did not correlate positively with residual achievement scores. The strong negative correlation for linking statements probably reflects a tendency for more talkative teachers to have more opportunity to make such statements.

Controlled practice is a key element of direct instruction (Rosenshine, 1986). This type of practice involves asking students to solve one or two problems during the development phase to check whether students understand the process being taught. Students' performance on these problems tells the teacher whether it is necessary to reteach before moving to the seatwork phase. A strong positive effect was found for this variable in the present study. A related practice—simply asking students whether they understand what the teacher is saying—did not correlate ($p = -.09$) with residual achievement scores, however.

Seatwork Phase of the Lesson

As stated above, most studies have found that emphasis on development rather than seatwork promotes student achievement. (The one exception is the study of algebra classes by Dubriel.) Conversely, then, emphasis on the seatwork phase has been found to be negatively correlated with student achievement. In the present study, the opposite result was obtained. Seatwork, whether monitored or not, was positively associated with residual achievement scores.

Bennett (1976) found that teachers in higher-achieving secondary schools had more *monitored* seatwork than teachers in lower-achieving secondary schools. The study of ninth-grade math classes by Evertson and her colleagues found that the type of monitoring is important. Brief, private, student-created academic contacts were positively with student achievement, but long contacts of this type had a negative correlation. The present study produced the same results: monitoring seatwork, circulating, and assisting many students was positively correlated with residual achievement scores, but taking time to work with only a small number of students had a negative correlation.

Good and Grouws found in their fourth-grade math experiment that the practice of teachers holding students accountable for their homework was positively correlated with achievement. The two variables relating to seatwork accountability in this study (teacher checks seatwork and collects it) produced similarly positive correlations.

Slavin (1980), among other researchers, has found positive effects of cooperative learning on student achievement. This practice was operationalized in the present study by counting the number of students who worked together during seatwork. A modest, nonsignificant positive correlation was found for this variable.

Assignment of Homework

Homework has been consistently found to have a positive effect on student achievement across grade levels and subject areas (Walberg, 1985). For example, Good and Grouws (1977, 1979) found such an effect in two studies of fourth-grade math classes. In the present study, neither frequency nor amount of homework affected residual achievement scores.

Classroom Management and Climate

Two correlational studies (the study of fourth-grade math classes by Good and Grouws; the study of ninth-grade math classes by Evertson, et al.) both found that student achievement is higher when the teacher is an effective classroom manager. In the present study, however, none of the various indicators of the teacher's management effectiveness (off-task behavior, management statements, noise level, students entering or leaving the room) correlated with student achievement.

The study by Evertson and her colleagues found that teacher praise correlated positively with student achievement, but Good and Grouws found that their more effective teachers used less praise (and less criticism) than their colleagues. Neither praise nor criticism affected residual achievement scores in the present study. (The non-significant result for the praise variable must be discounted because of poor inter-observer reliability.)

Both the study by Evertson and the study by McConnell of ninth-grade algebra classes found a positive correlation between student achievement and teacher enthusiasm. No such effect was found in the present study.

Variety in instruction has been found to be positively associated with student achievement in previous research on teaching (Rosenshine, 1970). This was true in the present study as well. Surprisingly, this variable had the highest correlation with student achievement of all the variables measured in the study.

Table 2. Time Use (in Minutes) by the Five Most Effective and Five Least Effective Teachers

Development Phase of Lesson	Most M (SD)	Least M (SD)
Teacher academic talk (p=.01)	16.60 (5.53)	27.09 (4.40)
Teacher use of explaining links (p=.03)	.24 (.07)	.72 (.32)
Teacher gives directions	.87 (.56)	.43 (.31)
Teacher asks lower-cognitive questions	2.22 (1.06)	1.66 (1.45)
Teacher asks higher-cognitive questions	.06 (.06)	.20 (.34)
Teacher asks questions that check for understanding	.38 (.02)	.43 (.33)
Teacher asks questions that ask students to solve a problem independently (p=.03)	3.43 (2.23)	.52 (.86)
Whole class has opportunity to answer questions	1.89 (.80)	2.03 (1.65)
Only one student has opportunity to answer question (p=.03)	1.53 (1.04)	.22 (.43)
Student asks a question	1.17 (.82)	1.85 (1.13)
Student initiates a comment (p=.03)	.26 (.25)	.86 (.44)
Seatwork Phase of Lesson		
Teacher monitors seatwork (p=.05)	12.75 (7.46)	3.67 (3.89)
Teacher does not monitor seatwork	3.02 (1.69)	1.40 (1.69)
Teacher gives quiz	0.00 (0.00)	1.06 (2.37)
Non-academic Time		
Teacher is interrupted, in transition, or engaged in non-academic talk	5.24 (3.61)	7.46 (1.75)
Classroom Management and Climate		
Teacher praises student work or behavior	.09 (.09)	.09 (.08)
Teacher criticizes student behavior	.11 (.11)	.02 (.03)
Teacher reminds students of expectations for appropriate classroom behavior	.13 (.17)	.30 (.18)

Contrasted-Groups Analysis

The correlational results were clarified by determining how lesson time was spent in high-achieving and low-achieving classes. The 34 teachers were rank-ordered on the mean residualized posttest score of their class. The five highest-ranked teachers (mean score = 2.01) and the five lowest-ranked teachers (mean score = -2.05) were selected for comparison. Interestingly, three of the five highest-ranked teachers also had an unobserved intermediate algebra class ranked among the eight highest-ranked classes of the total of 49 classes tested. Two of the five lowest-ranked teachers also had an unobserved intermediate algebra class ranked among the eleven lowest-achieving classes.

Table 2 shows how the five highest-ranked (most effective) and five lowest-ranked (least effective) teachers used their time in the standard fifty-minute lesson.

The most effective teachers spent approximately 29 minutes of the lesson on the development phase, whereas the least effective teachers spent 36 minutes. Within the development phase, however, the most effective teachers spent more time than the least effective teachers on controlled practice (i.e., asking questions that require students to solve a problem independently) and in asking questions directed to a particular student.

The most effective teachers allowed for approximately 16 minutes of seatwork during the lesson, but the least effective teachers allowed only five minutes.

Differences between the two groups in non-aeademic time and time spent on classroom management and praise were negligible.

Discussion

A previous study of algebra instruction (Dubriel, 1977) found no effect for emphasis on development over seatwork. Otherwise, previous studies have found that such emphasis is effective. Surprisingly, the present study found a negative correlation for development and a positive correlation for seatwork.

Inspection of the time use data in Table 2 helps to clarify this result. The most effective teachers spent 29 minutes on development

Continued on Page 12

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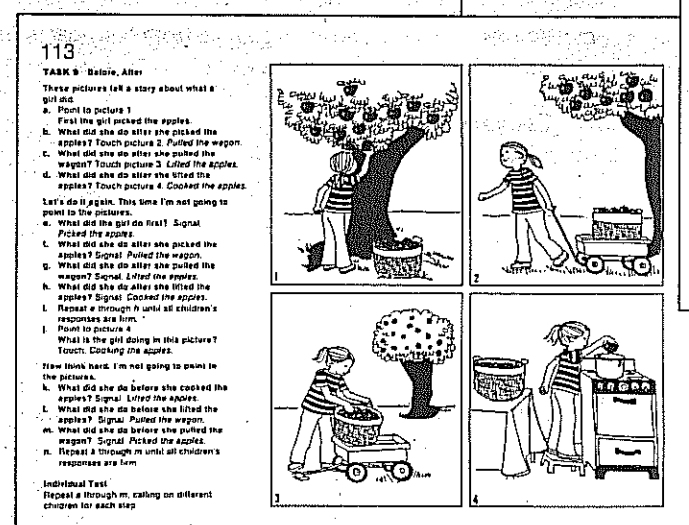
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TASK 9 Before, After

These pictures tell a story about what a girl did.

a. Point to picture 1. First the girl picked the apples.
b. What did she do after she picked the apples? Touch picture 2. *Pulled the wagon.*
c. What did she do after she pulled the wagon? Touch picture 3. *Lifted the apples.*
d. What did she do after she lifted the apples? Touch picture 4. *Cooked the apples.*

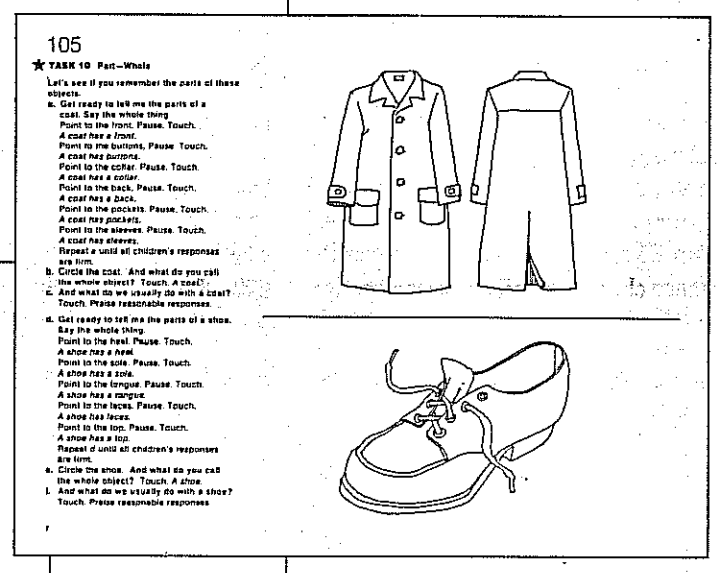
Let's do it again. This time I'm not going to point to the pictures.

e. What did the girl do first? Signal. *Picked the apples.*
f. What did she do after she picked the apples? Signal. *Pulled the wagon.*
g. What did she do after she pulled the wagon? Signal. *Lifted the apples.*
h. What did she do after she lifted the apples? Signal. *Cooked the apples.*
i. Repeat e through h until all children's responses are firm.
j. Point to picture 4. What is the girl doing in this picture? Touch. *Cooking the apples.*

Now think hard. I'm not going to point to the pictures.

k. What did she do before she cooked the apples? Signal. *Lifted the apples.*
l. What did she do before she lifted the apples? Signal. *Pulled the wagon.*
m. What did she do before she pulled the wagon? Signal. *Picked the apples.*
n. Repeat k through m until all children's responses are firm.

Individual Test
Repeat k through m, calling on different children for each step.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★ TASK 10 Part—Whole

Let's see if you remember the parts of these objects.

a. Get ready to tell me the parts of a coat. Say the whole thing. Point to the front. Pause. Touch. *A coat has a front.* Point to the buttons. Pause. Touch. *A coat has buttons.* Point to the collar. Pause. Touch. *A coat has a collar.* Point to the back. Pause. Touch. *A coat has a back.* Point to the pockets. Pause. Touch. *A coat has pockets.* Point to the sleeves. Pause. Touch. *A coat has sleeves.* Repeat a until all children's responses are firm.
b. Circle the coat. And what do you call the whole object? Touch. *A coat.*
c. And what do we usually do with a coat? Touch. Praise reasonable responses.
d. Get ready to tell me the parts of a shoe. Say the whole thing. Point to the heel. Pause. Touch. *A shoe has a heel.* Point to the sole. Pause. Touch. *A shoe has a sole.* Point to the tongue. Pause. Touch. *A shoe has a tongue.* Point to the laces. Pause. Touch. *A shoe has laces.* Point to the top. Pause. Touch. *A shoe has a top.* Repeat d until all children's responses are firm.
e. Circle the shoe. And what do you call the whole object? Touch. *A shoe.*
f. And what do we usually do with a shoe? Touch. Praise reasonable responses.

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★ TASK 4 Locations

Today we're going to learn about a farm.

a. What do we call a place where food is grown? Signal. *A farm.*

Here's a picture of a farm. I'll name some of the things you see on a farm. Watch. Point to each item in turn.

b. This is a cow. What is this? Touch. *A cow.* Cows live on farms and give us milk.
c. These are sheep. What are these? Touch. *Sheep.* Sheep give us wool.
d. This is a barn. What is this? Touch. *A barn.* A barn is where farm animals live.
e. This is a tractor. What is this? Touch. *A tractor.* The farmer is plowing the field with the tractor.
f. These are chickens. What are these? Touch. *Chickens.* Chickens give us eggs.

Let's see if you remember the names of these things.

g. Point to the cow. What is this? Touch. *A cow.*
h. Point to the sheep. What are these? Touch. *Sheep.*
i. Point to the barn. What is this? Touch. *A barn.*
j. Point to the tractor. What is this? Touch. *A tractor.*
k. Point to the chickens. What are these? Touch. *Chickens.*
l. Repeat g through k until all children can identify all of the items.
m. What else do you see in the picture? Call on different children.
n. Circle the entire picture. What do we call the place you see in this picture? Touch. *A farm.*
o. Can you think of something else you would see on a farm? Accept reasonable responses.

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Using DI in a Victoria, B.C. Resource Room

by Lawrence A. Chamberlain

While Special Education teachers, and in particular Learning Assistance teachers, over the last decade have been exposed to the claims of various "innovative" approaches to remediation, much concern has been generated by a recent interest in "back to basics". The purpose here was to describe the effects of one "back to basics" approach to Reading called "Direct Instruction" in a Learning Assistance classroom from 1980 to 1986. The three essential components of Direct Instruction: Program Design, Instructional Organization, and Presentation Techniques are explained in detail by Carnine & Silbert (1979).

By their nature and purpose, experimental studies do not necessarily reflect the day-to-day realities of the Learning Assistance or Resource Room setting. For example, which teacher would knowingly "randomly assign a student to a control group," which may indeed adversely affect that child's future by *not* providing effective and efficient instruction! The reader is probably aware of many other ethical issues which must be taken into consideration by parents, teachers and administrators. This is not to distract from the importance of well-documented and well-designed research, but to identify the limitation of the present paper. No experimental or even quasi-experimental controls were attempted. It is descriptive only, hopefully reflecting a realistic Learning Assistance environment.

Table 1. Group Means 1980-86

Classroom Reading Inventory: Decoding (N = 6 to 9 per class)							Classroom Reading Inventory: Comprehension (N = 9 to 11 per class)						
Year/Grade	1	2	3	4	5	6	Grade	1	2	3	4	5	6
1980		.47	1.27	2.60	3.50	4.25			1.24	1.86	3.30	5.25	4.75
1981	.18	1.95	3.71	4.91	5.25	5.28		.36	2.58	4.14	5.00	6.25	5.14
1981		.26	1.85	3.00	4.33	5.00			.59	2.62	3.00	4.50	5.00
1982	.30	2.15	3.38	6.00	5.50	6.00		.43	2.38	3.77	5.00	5.83	6.50
1982			.84	2.73	*	*				1.27	3.55	*	*
1983	.76	2.24	2.75	4.18	*	*		1.20	2.45	3.29	4.82	*	*
1983			1.38	2.57	2.50	*				2.50	3.71	3.50	*
1984	.91	2.09	3.40	4.43	4.00	*		1.27	2.23	3.67	4.71	4.57	*
1984		.32	2.00	3.25	4.75	4.50			.80	3.00	4.00	5.13	5.00
1985	.42	2.20	4.50	6.00	6.11	7.00		.76	2.72	4.00	5.00	5.89	6.00
1985		.78	2.00	3.00	6.00	5.91			1.20	2.83	2.00	5.00	5.82
1986	.53	3.00	4.00	5.00	6.50	7.09		.98	3.17	3.83	5.00	6.00	6.64

* No classes at these grades for these years

Method

The Children

The participating children attended grades 1 to 6 from 1980 to 1986 in a suburban, middle class elementary school in Victoria, British Columbia, Canada. Regular classroom teachers, and sometimes parents, identified those children who experienced difficulty in acquiring basic reading skills. These children were referred to the Learning Assistance teacher. Each child met individually with the Learning Assistance teacher and was assessed. The child was then either:

1. Placed in the appropriate Learning Assistance program, or
2. Referred for evaluation by the district psychometrist which at times resulted in placement in a special class program, or
3. Placed on a program (sometimes modified) in the regular classroom without receiving Learning Assistance help.

Procedures

The children in the Learning Assistance programd were tested, taught and then tested again at the end of the year. Many children who were diagnosed by the psychometrist as possible "learning disabled" or as possible "slow learners", continued in regular class with the support of Learning Assistance. Each group consisted of 6 to 9 children from grades one and two, and 9 to 11 children from grades three to six. Each group met for about 40 minutes every day, five days a week. Most groups began in early September and finished in mid June, while other groups began in January or February and ended the following December. Most Learning Assistance children received help in grades one and two. Children from grades three to six who were new to the school, were helped for usually no more than two years. A few children previously identified as "learning disabled" or "slow learner" (who did not attend a special class) received Learning Assistance during almost every year that they were registered at the school. This is sometimes called "mainstreaming."

Direct Instruction was the only approach implemented in Learning Assistance classes. Some Reading programs are "basal" in emphasis such as *Distar* or *Reading Mastery*, while others are "corrective" such as the *Corrective Reading Program.* Four of the eleven programs which were taught during the 1985-86 school year in the the Learning Assistance class are briefly described below.

Reading Mastery I teaches children most of the basics skills needed to decode words. The major skill areas are: sound-symbol identification, left-to-right sequence, and oral blending of sounds to make words. Word and sentence reading then follow. As in all Direct Instruction programs, emphasis is on continuous evaluation and eventual mastery of the skills and concepts taught. This program was used with grade one and some kindergarten children.

Reading Mastery II teaches children comprehension and advance reading skills. Emphasis is placed on reading and learning how to follow written directions. The children's sight vocabulary increases, but they continue to use their word-attack skills. This program was used with grade two and some grade one children.

Reading Mastery V teaches children more advance reading skills. Emphasis is on extensive independent reading, development of critical reading through analysis and interpretation, appreciation of classic and modern literature, and proficiency in reference and writing skills. Daily written work includes many activities that relate to the science and social studies concepts found in the programs. Special projects may be given to students to apply what they have learned. This program was used with grade six and some grade five children.

Corrective Reading Program: Decoding Level B teaches children critical letter and word discriminations, letter combinations, story reading and comprehension. This program is useful with children who have not mastered the basic decoding skills, but can read to some degree. This program was used with grade three as well as with some grade two and four children. It is interesting to note that the *Corrective Reading Program: Decoding Level B* from 1976 to 1979 was taught predominantly to children in grades five, six and seven, but from 1983 to 1986 was taught only in grades two, three and four.

Although only 4 programs have been identified here, there are 11 Reading, 9 Spelling, 7 Language/Comprehension, and 7 Arithmetic programs available to the teachers at this school. Many of these children have therefore been introduced to a variety of Direct Instruction programs. Some of these 34 programs were taught in the Learning Assistance class while others were taught in the regular class by regular classroom teachers.

Many reading tests are available, including group, individual, diagnostic, norm-referenced, criterion-referenced, and mastery. Mastery testing is an important part of each Direct Instruction program. The tests described below are individual, norm-referenced, and may be typical of those used in Learning Assistance or Resource Room classes. The *Schonnel Reading Test* and the *Classroom Reading Inventory* (C.R.I.) were used to determine baseline and summative performance levels.

The *Schonnel Reading Test* is a graded word list which tends to reflect the performance (grade score) of children in the daily classroom reading. It is also somewhat sensitive to change in word recognition performance.

The *Classroom Reading Inventory* is an informal reading inventory. Only the Decoding and Comprehension scales were used. Ten graded stories are read orally with word recognition errors being recorded.

For those children in *Reading Mastery I* or for those children who have not completed *Reading Mastery II*, both the *Schonnel Reading Test* and the *Classroom Reading Inventory* are presented to them using the *modified orthography* (font) *found in the reading programs.*

Results 1980-1986

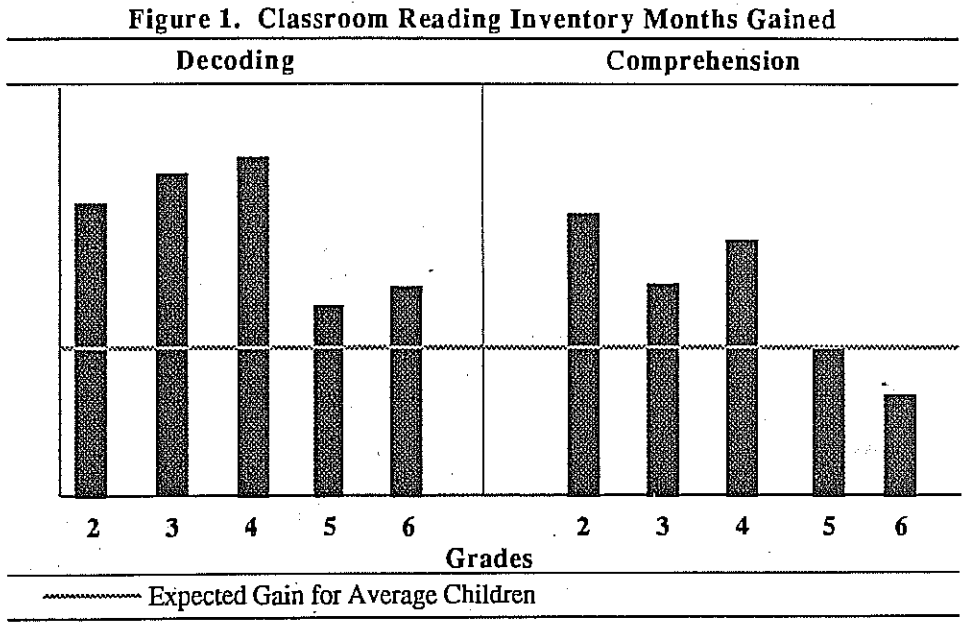
The results presented in Table 1 are from pre- and post-test data collected from September 1980 to June 1986. As the children at each grade level change from one year to the next, the means will vary when cross checking grade and year for a particular group of children. The data are further fragmented by children entering and leaving the program at different points in time. However, these results are similar to those of the previous years 1976-1980.

((Table 1))

The expected mean gain for children not requiring Learning Assistance would be about *ten months* for each year of instruction. The average amount of measured gain for Learning Assistance children in grades two to six when collapsed across all years was *eighteen months* for Decoding and *thirteen months* for Comprehension. This represents the combined test results for over *120 chil-*

Continued on Page 8

Figure 1. Classroom Reading Inventory Months Gained



DI Resource Room— *Continued from Page 7*

dren. Presented in Figure 1 are the average number of months of gain at each grade level when collapsed across all years (1980-1986). The overall gain averaged over 1 1/2 months for each month of instruction. In most cases, those children who had made gains greater than this overall average no longer required Learning Assistance in the area of reading.

As noted earlier, several older children have received Learning Assistance help since they first entered this school (kindergarten for some). For the majority of these children the *Corrective Reading Program: Decoding Level B* was taught in grades three or four and *Reading Mastery V* in grades five or six. Presented in Figure 2 are the results obtained from grades three through six over a four year period. Systematic progress over these four years is clearly demonstrated in decoding and comprehension skills.

The widely accepted belief among educators that the earlier the intervention, the more effective it is, has most definitely been the experience by this author.

Presented in Figure 3 are the results for 12 grade two students, including data from the *Gates-MacGinitie Reading Tests* which was administered and scored by homeroom teachers. Nine of these children received extensive as well as intensive Learning Assistance help in arithmetic, spelling, language, and reading for a total of 105 minutes, five days a week. The groups were distributed throughout the day so as to give the children a break between classes.

In my opinion, the results presented in Figure 3 could not have been achieved without an effective Direct Instruction program like *Reading Mastery II.* Similar gains in other areas were also achieved by these children using *Distar Arithmetic II, Distar Language II,* and *Spelling Mastery: Level C.* With the exception of three children (one new to the school, one new and repeating for a second time, and one diagnosed as "well below average functioning overall on the *WISC-R*"), these children will probably not require Learning Assistance again in these areas.

As noted above, one of these grade two children was assessed by the school psychometrist and described as "well-below average". Presented below are some excerpts from the May 2, 1986 Psychometric report on this child.

"Janie shows well below average functioning overall on the *WISC-R*, with handling of many tasks being approximately one to two years delayed."

"Janie's achievement in basic academic skill areas is somewhat stronger than what might be predicted from her overall level of functioning on the *WISC-R*, reflecting the positive effects of her Learning Assistance Program."

On the *WISC-R* test, all but two of the subtests were one or more standard deviations below the mean. Academic tests were also administered by the psychometrist. These results are presented below.

Wide Range Achievement Test (Revised)

Word recognition	mid-grade-2 range
Spelling	end-grade-2 range
Arithmetic	beginning-grade-3 range

Durrell Reading Test

Oral Reading	high grade 2 rate
Paragraphs	overall

Figure 2. Present Grade-6 Class

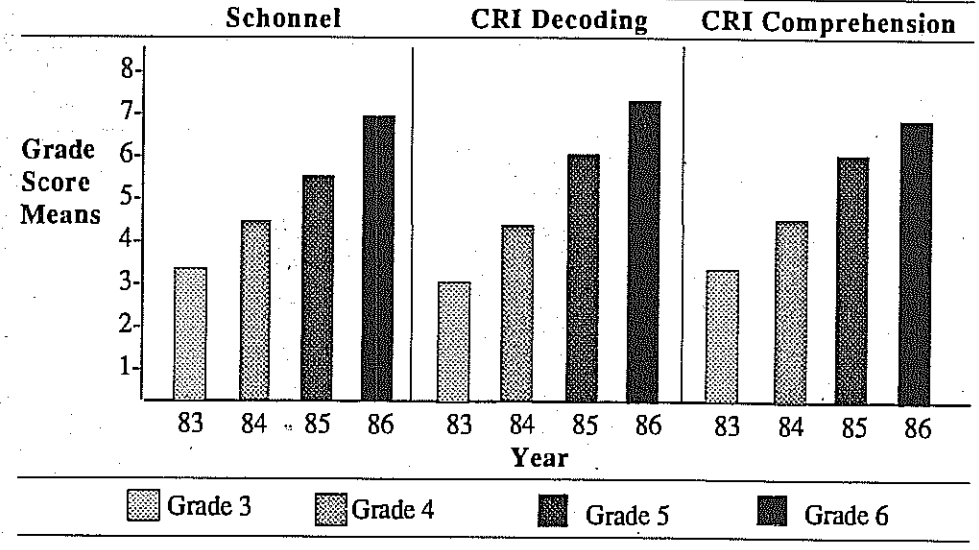


Figure 3. Present Grade 2 Class

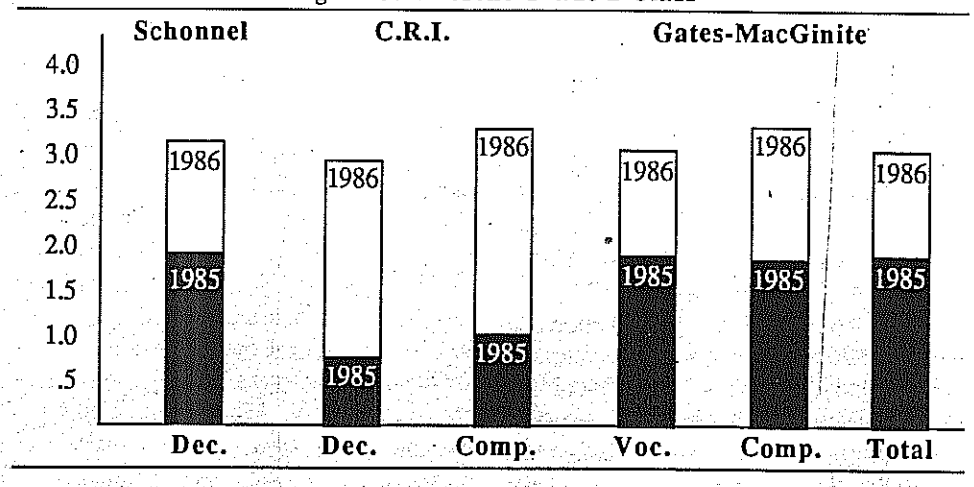


Table 2. In-School Test Results for Janie

	Schonnel Reading Test	Classroom Reading Inventory		Gates MacGinitie		
		Decoding	Comprehension	Vocabulary	Comprehension	Total
June, 1985	1.8	.3	1.0	1.5	1.5	1.5
February, 1986				2.2	2.2	2.2
June, 1986	3.1	3.0	3.0	2.3	2.6	2.5
Growth 1985-86	1.3	2.7	2.0	.8	1.1	1.0

Table 3. Learning Assistance Test Averages for the 1986-87 Groups

		Schonnel Reading			Classroom Reading Inventory					
					Decoding			Comprehension		
Grade	N	Pre	Post	Gain	Pre	Post	Gain	Pre	Post	Gain
1	13		1.61	--.--	--.--	.6	--.--	--.--	.8	--.--
2	13	1.68	2.79	1.11	.5	2.7	2.2	1.2	2.7	1.5
3	8	2.89	4.05	1.16	2.5	4.2	1.7	2.6	3.9	1.3
4	5	4.38	5.84	1.46	3.6	5.2	1.6	4.0	5.2	1.2
5	2	4.30	5.70	1.40	3.0	6.0	3.0	5.0	6.0	1.0
6	3	5.63	6.53	.90	5.3	6.3	1.0	4.7	5.3	.6
7	7	6.31	7.10	.79	6.7	7.6	.9	6.3	7.1	.8

Janie received the same amount of Learning Assistance time as the other children in her groups. Presented in Table 2 are the 1985-86 regular class and Learning Assistance test results for Janie.

Even with low IQ's, children can acquire academic skills using programs of instruction that work (a dramatic, large sample demonstration of this was showed by Gersten, Becker, Heiry, & White, 1984, using DI Follow Through data). Special class placement may not necessarily be the only alternative for these children.

Results 1986-1987

Additional data are available on 51 of the 93 students participating in the Learning Assistance program this past school year. The findings are summarized in Table 3. As can be seen from Table 3, the results from this recent year are very comparable to those in Figure 1 for the previous six years.

Discussion

Over a period of nearly ten years Direct Instruction has grown from one to more than a dozen teachers from this school. Fewer children have been referred for special classes. Many "slow learners" and "learning disabled" children have been successfully taught each year. District/Provincial guidelines suggest that from 30 to 50 children may be served by a Learning Assistance teacher in one year. At this school between 60 to 70 children have been taught each year. If Direct Instruction works so well, why then has "Distar" not been universally accepted? For those who are interested, Chapter 3 *"The Politics of Reading: Distar"* in *Making Schools Work* by Robert Benjamin (1981) will help to answer this question.

There are a few special concerns for those who are new to Direct Instruction that need to be examined. The modification or possibly even the used of any *Distar, Mastery or Corrective* program by a person who has not had the intensive training needed to carry out Direct Instruction could most certainly destroy its effectiveness. Presented below is an opinion offered by two Educators from London, Ontario:

"As with any kind of teaching method, successful implementation of Direct Instruction is not a simple matter. Direct Instruction is almost doomed to fail if teachers are forced to use the program, or if the system fails to provide the teacher with the basic support necessary for successful implementation.

"Direct Instruction may not be new, but it is sufficiently different and specific enough that teachers require thorough initial training. Simple attendance at an information session, or the mere provision of material and a guide book is insufficient for a teacher to start the process. Following initial training, a teacher needs to be supported by direct supervision and monitoring of classroom presentation (video tape is a splendid assist in this regard).

"Errors, omissions or changes in programming presentations must be noted and corrected as soon as possible. Direct Instruction teachers require regular opportunities to meet together as a group to review common problems, 'trouble-shoot' for possible solutions, and generally support each other." (Isaacs and Posno, 1978)

If one intends to use Direct Instruction programs and wants to be effective, first browse through *Direct Instruction Reading* (Carnine & Silbert, 1979). This will give some an idea of what is involved and can be used as an excellent reference manual. Then *start right!* by making sure of adequate training before beginning the teaching of any Direct Instruction program. This training will be most valuable even if you never use a published Direct Instruction program. Do not rely on help from teacher organizations, colleges or universities, but seek out those people in the field who have had adequate experience and training. Start teaching one group, work hard, keep "hard data", listen to those around you and you may hear statements like the one made to me by a fellow teacher; "This is the first time I have sent a child to Learning Assistance, and that child has come back improved." By their comments you will know when to share, i.e., let your product sell itself first. Then you can invite parents, teachers, and administrators in to see you teach. Do this several times during the year. Explain what you are doing and why you are doing it while you are instructing a group. Most will respond positively, but many are still searching for innovations (magic?) and may tend to overlook

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Corrective Reading Evaluation Study

by Stacey J. Kasendorf and Peter McQuaid
East County Special Education Region, San Diego County

The following report is the final evaluation study for the Lottery Project, *Direct Instruction for Low Achieving and Special Education Students*, funded by the County Office of Education for the 1986-1987 school year. It includes the background, evaluation design, training, and results of the year-long project.

The small and mid-sized districts which receive services from the East County Special Education Regional Office have substantially higher percentages of low-achieving "quartile one" pupils than their larger district counterparts. Some of the small rural schools finds as many as 50% of their pupils eligible for Chapter I programs and possess limited resources to meet this challenge. This situation tends to lower their CTBS scores and precipitates large numbers of referrals to already over-taxed special education programs.

With these circumstances in mind, the project was designed to increase the effectiveness of reading instruction in selected regular and special education classes by introducing direct instruction materials and methods. In addition, because of the large number of students in the special education classes, the ability to provide individualized attention is greatly hampered. The selected materials help this situation by providing effective small-group versus individualized instruction.

Teacher Selection

Administrators from Mt. Empire, Alpine, Lakeside and Lemon Grove were approached with the project proposal. It was explained that the *Corrective Reading Series, Decoding B*, published by Science Research Associates, was designed for use with 4-12th graders who are having difficulty in reading. Principals recommended special and regular education teachers who appeared willing to participate and who taught students with low reading performance. Ultimately, 14 teachers were chosen to participate in the study.

Training

In September, the two project directors met first with principals and directors and then with teachers to explain the involvement and commitment required. At that time, the instructional materials were introduced and the study design was outlined. On October 17, 1986, a day-long inservice was held at the County Office of Education. Dr. Gary Johnson, staff development specialist from the Washington School District in Phoenix, Arizona, conducted the training. Dr. Johnson is one of the authors of the Corrective Reading Series and is an expert in the use of the materials.

Throughout the fall, the two project directors observed, coached and monitored the teachers. On January 30, 1987, a follow-up workshop was held in Alpine for the teachers. At this inservice, Dr. Johnson returned with additional training and more ideas for continued motivation of both teacher and students. The teachers were feeling successful with the materials and were encouraged to continue with as much enthusiasm.

Evaluation Design

In October, two or three randomly selected students from each of the 14 participating classrooms were pretested on the *Woodcock Reading Mastery Test*. Test results were sent to the Regional Special Education Office. During the last week of May and first week of June, posttesting was conducted on the same students if they were still in the program. Thirty-six students were tested in the fall and 32 remained for testing in May. Test results were compiled and analyzed by the project directors.

Results

The duration of implementation varied by classroom from 7 to 8 months. Number of lessons taught ranged from 50 to 91. One teacher started in *Decoding A* and then taught 40 lessons in *Decoding B*. The other teachers taught *Decoding B*. Thus, the results to be shown, while very promising, do not fully reflect what could be accomplished if a full 140 lessons had been taught.

The means and standard deviations for gain scores are presented in Table 1. Because of the way the Woodcock is constructed, grade equivalent scores had to be used for the statistical computations. This is not the most desirable state of affairs, but the results are strong enough to override any doubts about averaging grade equivalent scores.

As can be seen in Table 1, the greatest gains were on the *Word Attack* subtest. This is to be expected since *Corrective Reading, Decoding B* focuses primarily on word-attack skills (fluent decoding). However, it is not unexpected for students to improve on measures of comprehension when they can decode better. Three of the students gained over 7 years on the *Word Attack* subtest which involves reading some 50 words. Fifteen of the 32 students gained 2 years or more. The results show that these "poor readers" were gaining at an average rate in comprehension skills, and three times an average rate in decoding skills.

Table 1. Means and Standard Deviations of Grade Equivalent Gain Scores on the Woodcock Reading Mastery Test (N = 32)

	Word Attack	Passage Comprehension	Total Reading
Means (Years)	2.38	.75	.88
Standard deviations	2.44	.59	.54

The teachers in the study were asked for their comments about the program. Their feedback is summarized in Table 2. Clearly, the teachers found the program most helpful in achieving their goals.

Table 2. Comments from Participants

When asked, "What do you enjoy most about the Corrective Reading Program?" the following responses were received:

- "The boys in my group are finally working together on something."
- "One mom said her son was becoming a 'school-phobic' last year – dreaded going to school, was constantly in trouble, etc. This year he was sick one day but convinced his mon he could go to school to 'do reading'. He made it through reading group, and then went home with his fever at 101°."
- "I have been visited by the principal, school psychologists, a principal from another school, and other staff members. They are all impressed with how quietly the class is working during reading. In fact, many staff members have expressed an interest in using the same program next year."
- "...the high levels of concentration and enthusiasm"
- "seeing the students progressing and becoming confident of their ability"
- "the rapid pace of instruction and growth of the students"
- "the built-in discipline"
- "enthusiasm of the children coupled with (or because of) the kids being able to see and feel their individual growth"
- "easy to administer"
- "marked improvement in both reading skill and behavior"
- "the structure of the 'script' and the consistency of the program"
- "the positive attitudes generated by the students' awareness of their improvement"
- "it's intensity, effectiveness, built-in management system; the students want to do reading and are excited about reading!!"
- "not much preparation needed"
- "the structure allows children to be successful and results in progress"

Resource Room

Continued from Page 8

concrete evidence supporting a so called "back to basics" approach. There is, however, a final message perhaps best phrased by the noted Educator and Lawyer Dr. Barbara Bateman in a letter I received from her dated November 26, 1980:

"The evidence in favor of DI is so clear, convincing, and over-whelming that a reasonable person has no alternative but to accept it. To refuse to do so is, in my opinion, legally foolhardy and professionally irresponsible."

About the author: After 7 years and 2 degrees in Education, the author started spending summers in Eugene, Oregon where he began to learn about Direct Instruction from Zig Engelmann, Doug Carnine, Jerry Silbert, John Chadwick (all from the University of Oregon); and Jean Osborn, Gary Johnson, Susan Hanner, Bob Dixon, Linda Meyers and many others (all from the ADI Conferences). The author has also been a research assistant and instructor at the University of Victoria, Special Class teacher, Supervisor of Special Services, and for the past ten years, a Learning Assistance teacher.

A Dissertation on Math Instruction

by Barbara Diane Kinder
Special Education
University of Oregon

Recent studies have begun to qualitatively examine effective (expert) math instruction and to explore the phenomenon of transfer of training. This study described in detail the instruction provided by a sample of 4 highly trained Direct Instruction teachers who were, until recently, part of the Follow Through Program.

The subjects were teachers in low-income, Black elementary schools in Flint, Michigan. The experienced former Follow Through teachers were selected based on recommendations from supervisors, consultants, and student achievement. Their math classes were observed on 3 consecutive days. The observations included low-inference items—such as number of product and process questions, interaction rate, the number and types of corrective feedback, and student success rate. Moderate-inference items included ratings of organization, managerial effectiveness, accountability, and clarity. Each teacher was also interviewed.

Data were analyzed from three perspectives. The teachers' performance was compared to empirically-derived effective instruction principles. These teachers' performance was compared to teachers in the district who had no contact with Follow Through. Finally, transfer of Direct Instruction components to traditional basal materials was assessed.

The results showed that the former Follow Through teachers' instruction matched descriptions of effective math instruction for low socioeconomic status students (e.g., Good, Ebmeier, & Beckerman, 1978) with the exception of "frequent use of praise." Their instruction was significantly different from the other teachers in their use of product question; strategy models; adequate examples; guided practice; and ratings for organization, managerial effectiveness, accountability, and clarity. These teachers transferred not only most Direct Instruction presentation techniques, but they also adapted and improved basal texts. They employed empirically-derived principles of curriculum design to improve the basal math series, providing specific problem-solving strategies and formats. They included review and an adequate number of examples, far more than were used in basals. The only principle they did not follow was the use of discrimination items.

Graduate Training in Special Education

by John Woodward
Douglas Carnine
Russell Gersten
Siegfried Engelmann
Mary Gleason
University of Oregon

This article describes one of the doctoral program options in Special Education at the University of Oregon. This option places central emphasis on actual classroom details and realities, such as how much practice does it take for the average student to learn a specific skill, and how much practice is required for the teacher to present acceptably. This doctoral program, which is now in its fifth year, is supported by the US Department of Education through a grant for preperation of leadership personnel. The assumption of the doctoral program is that an instructional leader in a school district or educational setting must be fully versed in the specific details of instruction. Only with this knowledge can the leader make decisions that will lead to desired outcomes.

Improving the Quality of Instructional Services in Special Education

Current school improvement efforts have increased expectations for special education services in the public schools. A recent evaluation in New York City, for example, has found these services in need of a major overhaul (Turgend, 1985). Among the problems cited in the commission report was that the least qualified teachers were educating those students with the greatest problems. Moreover, the report argued that far too much time was spent on evaluation and diagnosis at the expense of actual instruction.

Our recent research in a major California school district (Gersten, Davis, Miller, & Green, 1986) found that instructional supervisors, though well-intentioned, were neither knowledgeable nor skilled enough to provide systematic teacher feedback that would result in improved instruction for difficult-to-teach students. Special education personnel were unable to offer sufficiently detailed recommendations that would lead to better teaching. These shortcomings can be directly attributed, in a large part, to teacher training programs at colleges and universities.

Changing Definitions of Instructional Leadership

These problems come at a time when a changing definition of effective educational leadership has emerged in the research literature (Clark, Lotto, & McCarthy, 1980; Edmonds, 1979). A consistent body of research has shown that effective instructional leaders—be they special education administrators, supervisors, or professors at teacher training institutions—must be knowledgeable in the precise, day-to-day details of education. This includes a thorough understanding of reading, language, and mathematics curricula programs; the ability to observe and analyze teacher performance; use of student performance on academic tasks as criteria for placement and grouping students; and procedures for consistent, criterion-referenced monitoring of student progress.

Analyses of successful adoptions of innovative educational programs by Berman and McLaughlin (1975), Huberman and Miles (1984) and Loucks (1983) indicate that two elements are consistently related to success. First, when implemented, these educational programs succeed with "hard to teach" students. Second, when teachers present classroom problems to consultants or supervisors, the consultants offer specific, concrete solutions (Loucks, 1983). Above all else, these solutions work.

In our view, the training of those interested in leadership positions in special education should be rooted in a working knowledge of the details of instruction. These individuals should know how to implement educational models that have empirically proven success with handicapped students. We are in full agreement with Markel's (1984) assertion that advanced graduate training is not merely an art, one based on insight, empathy, and elusive, interpersonal communication skills. The central concerns of advanced graduate work are a detailed knowledge of instructional techniques and procedures for evaluating classroom teaching situations.

Training Special Educators to be Leaders

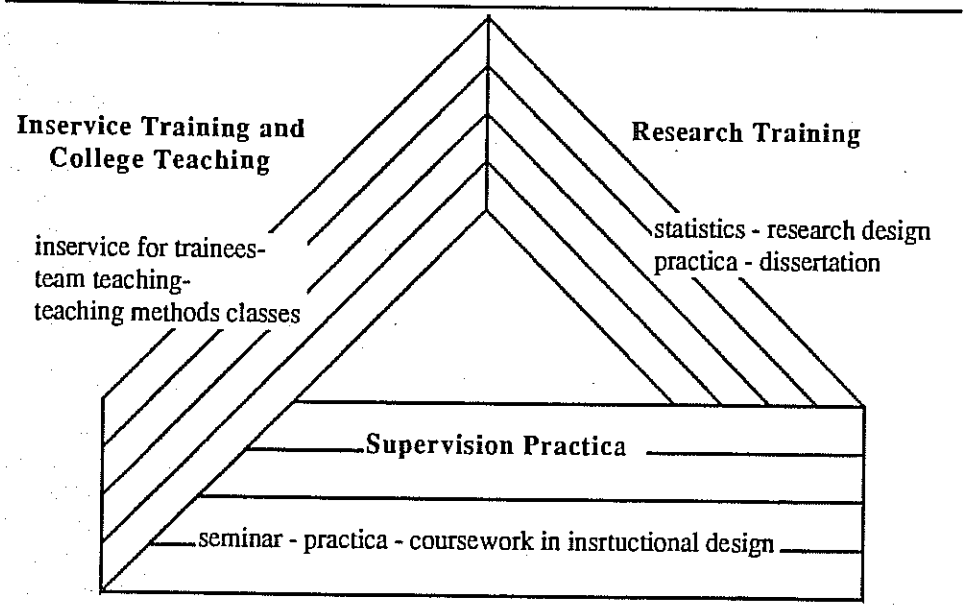
Over the last five years, we have developed a graduate level program at the University of Oregon that trains instructional leaders in special education. Our graduate students have become experts in providing concrete, specific solutions to the problems encountered in classrooms servicing handicapped students and in training teachers of the handicapped. They are particularly adept in translating the research on instructional procedures into day-to-day, effective teaching practices. In the end, we expect that the training in instructional design and effective teaching will deeply influence the eventual work our graduates pursue at teacher training institutions and in school districts as administrators and instructional supervisors.

Our program is based on practices that have extensive empirical support — direct instruction and effective teaching — (e.g., Englert, 1984; Fabre, 1983; Gersten, 1985; Reith, Polsgrove, & Semmel, 1982). Thus we are confident that we are training graduate students in procedures and practices that do, in fact, have the capability of improving a special education student's learning. Furthermore, the program is being carried out by faculty members with years of experience in the design, implementation, and evaluation of practices that improve student learning. These core faculty are committed to a unified training program that stresses a tight interrelationship between coursework, practica, and other academically related activities.

Content of the Instructional Leadership Training Program

Essential to our training program is work in (a) supervision (b) inservice training and college teaching, and (c) research and evaluation. In our program, the three areas constantly interrelate. The graduate student is continually building his or her working knowledge through a series of supervised, structured experiences in teacher training, curriculum design, and research. Unlike many training programs, where students enroll in a smattering of unrelated courses and practica, the different experiences in our program are integrated (see Figure 1 below). What is learned from supervising teacher trainees, for example, is later applied in research activities and college teaching. Throughout training, these experiences interweave, allowing the graduate student to apply his or her knowledge in broader and more challenging contexts.

Figure 1. Components of the Oregon Training Model



A second theme that runs through these areas is the gradual movement from observer to autonomous decision maker. Repeatedly, our graduate students are paired with mentor supervisors, core faculty, or researchers who guide the them toward an increasing independence in their work. This mentor relationship permits a high degree of feedback, and it enables the core faculty to coordinate objectives across the three areas of training. Nowhere is this theme more evident than in the program's dominant and most unique area: supervision training.

Supervision Training

Through supervision, graduate students observe concrete examples of how teacher trainees respond to attempts to improve their teaching behavior. They also get to see the effect this change has on the learning performance of the trainee's mildly handicapped students. The context provides our graduate students with a range of experiences that allow them to clearly see the impact of instructional variables discussed in the effective teaching literature. Graduate students in our program learn to identify a specific instructional problem and provide a specific instructional remedy. Furthermore, they learn to follow up on return visits to assure that the teacher trainee is consistently providing the remedy, and it is succeeding with the children.

For example, new teacher trainees often conduct lessons at a slow pace. Inadvertently, they attend to a lot of distracting, off-task behavior from their students. Supervisors will model for trainees how to teach at a faster pace and manage distracting behavior by reminding students of rules at the beginning of class and/or ignoring mildly off-task behavior until a break in the lesson. The trainee then resumes the role of the teacher, and at the end of the session he or she receives feedback from the supervisor. Over the coming weeks, the supervisor will continue monitoring the trainee's ability to maintain an acceptable pace, ignore minor off-task behaviors, and document if this has led to improved learner performance in the lesson. Many of the critical supervision skills used by our graduates are listed below in Figure 2.

In our supervision training, all graduate students spend two years as supervisors, beginning with "basic" teaching assignments and gradually moving into more difficult supervision situations. In the first term, our new graduate student will always be accompanied by a mentor supervisor (usually a senior doctoral student) or a core faculty member. This "novice" supervisor will practice diagnosing and prioritizing teaching skills that the teacher trainee needs to improve. The mentor supervisor will demonstrate how to assist teacher trainees who are weak in a range of critical teaching skills—such as correction procedures, pacing of a lesson, and/or classroom management skills. At times, this may mean that the mentor "steps in" and teaches a part of the lesson. Most of the time, the feedback is verbal and follows the lesson. However, feedback is always specific.

Under the guidance of the mentor supervisor, the novice will assist in conducting the supervisor - teacher trainee conference, and with follow up on the teacher trainee in the coming weeks of the term. As our novice supervisor becomes more competent, he or she will take on more responsibility and be introduced into more demanding situations (e.g., situations where the children have more severe learning/ behavioral problems). This will probably begin during the last term of the first year. Increasingly, the novice supervisor will supervise teacher trainees independently.

In the second year, the novice supervisor will refine his or her skills learned in the first year without direct guidance from mentor supervisors. As in the first year, these skills will be enhanced in the weekly supervision seminar conducted by two core faculty members throughout the year and by required coursework in instructional design. The seminars provide problem solving opportunities for all supervisors, while the coursework allows students many practice opportunities in designing curriculum (e.g., brief instructional routines for teaching an addition skill, more complex formats for rule applications in science).

Midway through the second year, the novice supervisor will finally move toward mentor supervisor status and in doing so, begin supervising first year graduates in the program. This role will continue for the third year of the program should the student pur-

Figure 2. Skills Used in Supervision

Monitoring Group Instruction

_____ Are you close enough to see the children's faces?
_____ Are you close enough to intcrvene without disruption?
_____ Have the children been informed of your role (e.g., by the trainee, cooperating teacher, by you)?

Diagnosis of Trainee's Performance

_____ Are you focusing on the major problems and not picky details?
_____ Are you correlating student performance with the trainee's instruction?
_____ Can you prioritize three major areas for assistance?
_____ Are you using the trainee's data on student performance to help in diagnosis?
_____ Is the trainee giving mastery or criterion tests?
_____ Is the trainee firming (or skipping) skills when appropriate?

Remediation and Intervention Techniques

_____ Can you model the remed y or specific technique yourself?
_____ In light of the trainee's current skills, have you chosen a remedy that he or she can implement?
_____ Are you providing enough practice for the trainee (e.g., before and after teaching, at another time in the day)?
_____ Are you consistent in your recommendations?
_____ Are you following up in subsequent sessions to see if the remedy is maintained?
_____ Can you fade your direct assistance appropriately?

Verbal Communication

_____ Is the trainee comfortable when you supervise and give feedback?
_____ Is your feedback clear, concise, and specific?
_____ Do you maintain eye contact?
_____ Do you check to make sure that the trainee understands the feedback?

Written Communication

_____ Are you limiting you recommendations (maximum of 3)?
_____ Do the recommendations refer to learner performance?
_____ Are you reinforcing trainee improvement?
_____ Are your recommendations clear, concise, and specific?
_____ Are you following up on your recommendations in later observations?

Figure 3. Technical Assistance Form

Observation of: _____ Date: _____

Subject Taught: _____ Lesson: _____

Supervisor: _____

Well Implemented Teaching Skills:

____ Following Formats
____ Maintaining a Good Pace
____ Correcting Errors
____ Firming Students on Weak Skills
____ Reinforcing Students
____ Using Signals in Group Instruction
____ Giving Individual Turns

Further Comments:

Recommendations for Improvement:

sue a doctoral degree.

The key principle in supervision: A focus on the learner. The teacher trainees participate in a one year practicum, and they are systematically phased into increasingly difficult or technically demanding teaching situations. Throughout this training, the supervisor stresses learner performance as the fundamental basis for instructional decisions. If a group's oral reading error rate, for example, exceeds ten per story, it is likely that the children need to review the lesson rather than going on to the next one. In doing this, the group is continually firmed to a high criteria. Similarly, mildly handicapped students who falter for three consecutive days in performing a long division problem need to review those steps in the strategy that lead to the error(s). Direct instruction in the strategy for working the type of problem causing errors would be provided. Focusing on these kinds of details throughout the year is what leads to expertise in instruction and supervision. Teacher trainees receive a technical assistance form (see Figure 3 below) after each observation by a supervisor.

Training in a consistent setting. The quality of supervision training is largely contingent upon key elements in the training environment. The cooperating classroom teacher must be able to exhibit highly quality, direct instruction teaching skills. Because our graduate students can supervise each teacher trainee only two or three hours a week, much of the responsibility for the trainee rests with the cooperating teacher. When we began our program five years ago, we trained many cooperating classroom teachers in direct instruction and effective teaching methods before their classrooms were used as practicum sites. Without a high level of expertise from cooperating teachers, training supervisors and teacher trainees would have been much more difficult.

A second component that enhances the training process for both the supervisor and the teacher trainee is a consistent, high quality curricula. All trainees begin with commercial direct instruction materials, thus permitting the trainees and the supervisor to initially focus on teaching behaviors alone; not teaching and curriculum design at the same time. As they reach the middle of the year, trainees start modifying or developing curriculum to meet the particular needs of the mildly handicapped students in their practica sites. This process is closely monitored by the supervisors at the sites and by a faculty member who conducts the weekly practica seminars.

Inservice Training and College Teaching

At the beginning of the first term in the program, our graduate students attend a two week inservice program for new teacher trainees. In this inservice, trainees are introduced to the curriculum that they will be using at their practicum sites and trained in direct instruction teaching skills (e.g., keeping a brisk pace during teaching, maintaining a high on-task rate, maintaining a high success rate, closely following the curriculum). Initially, our graduate students observe different training sessions and "back-up" the mentor supervisors and faculty (e.g., monitor practice sessions). In the second term, the novice supervisor makes a presentation to the entire group of teacher trainees and coteaches special training sessions (e.g., intermediate reading for those teacher trainees who will be in practicum sites where this will be part of daily instruction). Eventually, the inservice responsibilities extend to group presentations and entire training sessions.

A similar pattern is established in the college teaching. Second year graduate students enroll in two terms of practicum in college teaching and work closely with a third year graduate student — typically, the instructor for the course — and a faculty member. In this practicum, the second year student will prepare some course materials and deliver two to three course lectures. Each activity is reviewed beforehand by the course instructor, and lectures are critiqued afterwards.

In the second term, the second year graduate student teaches the entire class, with frequent visits by a faculty member. Lecture style, appropriateness of class activities and assignments, etc., are all critiqued. Not only is the graduate student given the experienee of college level teaching, but also the opportunity to transfer the knowledge obtained from supervision and instructional design coursework to lectures and activities in the course. This knowledge goes well beyond entertaining anecdotes, and graduates are more likely to infuse lectures with specific examples of errors mildly handicapped students typically make at different points in a curriculum, methods for correcting these errors, strategies for teaching various skills, etc. In this way, experiences in supervision and inservice training fold over into college teaching, allowing the graduate student to use his or her supervision training in a broader context.

Research Training

For those students pursuing a doctoral degree, a range of research activities occur over the three years of their program. Coursework in statistics, research design, and a seminar in instructional research lay the foundation. Next, they assist in at least one research project — either a project being conducted by a faculty member or another graduate student's dissertation. Throughout this research practicum, the student helps develop curriculum, measures used in the study, and/or teach in one of the experimental conditions.

The final research activity is the dissertation. The very nature of the program and the interrelated experiences up to the point of a dissertation make an instructional issue — usually examined through an experimental study — the most likely topic. Recent dissertation work has been in reading comprehension, math word problems, coaching techniques for inservice training of paraprofessionals, and instructional design issues in CAI. A dissertation of this kind provides students with the opportunity to merge their detailed knowledge of effective instruction with research skills in a sophisticated fashion. In virtually all cases, the dissertation research has led to publication in a professional journal.

Conclusion

The graduate program at the University of Oregon trains special education leaders who are knowledgeable in the day-to-day details of instruction. The training — which tightly weaves supervision, college teaching, and research activities — is contingent upon the commitment of a core faculty to a specific idea of instructional leadership, one that seriously considers implementation of the research on effective teaching practices by both special and regular educators as a paramount concern. The program requires coordination with the masters level special education practica programs in direct instruction for teacher trainees and highly skilled cooperating teachers in the local schools.

By focusing on the learner, the graduate student in our program develops an understanding of the intricate relationships between the actions of the supervisor, the teacher trainee's instruction, and the performance of the handicapped students being taught. Training with this kind of focus enables the special education leader to offer detailed, effective solutions to instructional problems that typically occur in the classroom. These skills are essential for those who return to their districts after a year or two of training to act as resource consultants, as well as for those graduates of the doctoral program who become faculty at teacher training institutions or take on administrative positions in the public schools.

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Correlates of Algebra Gains– *Continued from Page 5*

— less time than the least effective teachers, but still a substantial amount of time. Good and Grouws (1977), however, observed very low amounts of development time in elementary math classes. In fact, the modest goal of their intervention program, designed for use in several experiments, was to get teachers to spend at least five minutes on development before seatwork. In another study (Gall, Fielding, Schalock, Charters, and Wilczynski, 1984) in which time spent on development was measured precisely, elementary teachers were found to spend only an average of 12 minutes on the development phase of their math lessons. By this standard, the 29 minutes spent by the most effective teachers was very substantial. Furthermore, the effective teachers used the development phase in ways that were likely to promote learning — allocating time for review of previously learned content, controlled practice, and directing questions to many students.

The real problem appears not to be with development, but rather with seatwork. The least effective teachers spent only 5 minutes on seatwork. This seems hardly enough time for students to practice algebra skills. Even the sixteen minutes spent by the most effective teachers does not seem excessive considering that the lessons lasted 50 minutes.

It appears, then, that less effective algebra teachers spend too much time talking and not enough time allowing students to practice their algebra skills. The tendency to talk excessively was a phenomenon observed by Ksyilka (1969) in a study comparing verbal behavior of algebra and social studies teachers. He found that algebra teachers talked much of the lesson, even more so than social studies teachers.

The strong positive correlation for the variable of variety was surprising. In fact, during data collection the observers commented to each other that they were finding little evidence of variety of instruction among the teachers they observed. Further research is needed to better understand what variety of algebra instruction means.

Classroom management was found to have an effect on student learning in basic algebra classes but not in the intermediate algebra classes reported on here. This lack of effect can be explained by the characteristics of students who take intermediate algebra. Generally, they are collegebound students who understand the importance of obtaining a satisfactory grade in this course. Therefore, effective classroom management would not be necessary to keep these students motivated and on task.

The negative correlation for number of students missing class is not surprising: if students miss class, they have less opportunity to learn and practice algebra skills. It is not clear, however, why students miss class. Is it because of teachers' management policies or weak instruction? Is it because they are doing poorly in the class and so find attending class is aversive? Or is some other factor involved? The present study does not provide an answer to these questions.

A positive effect for lower-cognitive (i.e., routine application) questions, approaching statistical significance, was found. Higher-cognitive questions were neither effective nor ineffective. Since the criterion algebra test consisted entirely of items measuring routine application of algebra skills, lower-cognitve questions would be appropriate for fostering such skills. We do not know what types of instructional practices might be effective if a test of algebra problem-solving had been administered as a criterion measure of achievement in the course. The observers found virtually no instruction in problem solving, so administration of such a test probably would not have been appropriate in this study.

The many significant correlations obtained in this study demonstrate the utility of instructional variables found to be effective in previous research on teaching. However, the relationship of some of these variables to student achievement gains was different in this study than in previous research. It appears that a general model of effective instruction, such as the direct instruction model proposed by Rosenshine, may need to be modified when applied to a particular type of teacher (in this case, algebra teachers) and a particular type of learner (in this case, motivated collegebound students).

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