Non-Profit Organization
U.S. Postage Paid
Permit No. 122 – Eugene, OR

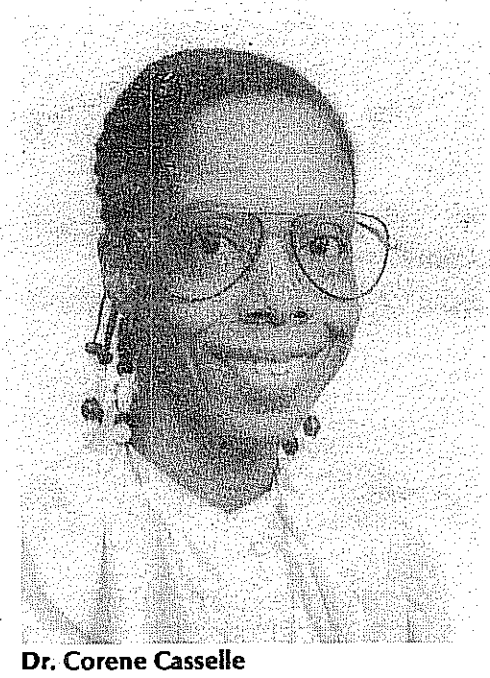
ADI NEWS

Volume 6, Number 1 | Association for Direct Instruction, P.O. Box 10252, Eugene, Oregon 97440 | Fall, 1986

ADI Excellence Awards Made at Annual Conference

by Wes Becker

Awards for excellence in contributions to the application of DI technology to education were presented at the 12th Annual Direct Instruction Conference in Eugene, Oregon. The Conference was the biggest ever, with more than 550 participants. Awards were made in teaching, supervision, and research.



Dr. Corene Casselle

Excellence in Supervision

The award for excellence in supervision was made to Dr. Corene Casselle, Assistant Professor at the University of Nevada, Las Vegas. Dr. Casselle was one of the early trainers at the Bereiter-Engelmann preschool (in a program to train master teachers of the disadvantaged, sponsored by the Carnegie Foundation.) From the beginning, Dr. Casselle has been dedicated to teaching children to be competent. One of her first DI tasks was providing training and supervision for the Nichols Avenue School in Washington, D.C. Her performance standards and expectations for teachers and aides didn't always make friends, but they did lead to better student learning. She also helped train Follow Through teachers and aides in East St. Louis, Illinois and Flint, Michigan.

In 1977, Corene completed her doctorate in education at the University of Nevada, Las Vegas. In 1979, Dr. Casselle and her family moved to Liberia, West Africa for three years, to supervise a program for improving teacher education and basic skill development in rural schools. One item from her vitae is most telling: "Supervised, managed and *maintained* 7 project vehicles and 35 project personnel for the efficient and effective operation of the project support system."

In 1977, Dr. Casselle founded a non-profit school in Las Vegas designed to teach reading (and later arithmetic, and language). This school is called the Institute for the Study of Individual Skills. The school was re-opened by Dr. Casselle after returning from Liberia in 1982. Dr. Casselle has been teaching reading at the University of Nevada during 1985-6. She was named educator of the year by the *Las Vegas Magazine* in February, 1984.

Corene Casselle is truly a most competent and dedicated educator in the best of DI traditions.

Excellence in Teaching

The award for excellence in teaching was given to Shirlee Lehnis from the North Thurston School District in Olympia, Washington. Shirlee runs a resource room at Southbay Elementary School. Shirlee was at the University of Illinois when Bereiter and Engelmann were running their experimental preschool. At that time, she did not consider their approach very favorably. About five years ago, she allowed a student-teacher to use DISTAR in her classroom and because of what she saw happening to student learning, she began to use DI herself. Shirlee has been responsible for much of the DI interest in the North Thurston School District. She provides DI inservices both before and after school and offers supervisory help to others.

Excellence in Research

The award for excellence in research was given to Dr. Robert Horner, Associate Professor, Division of Special Education and Rehabilitation, at the University of Oregon. Dr. Horner was our keynote speaker at the Eugene DI Conference last year. He received his B.A. from Stanford in 1971, his M.S. from Washington State in 1975, and his Ph.D. from Oregon in 1978. Prior to returning for his Ph.D. he worked as a behavior therapist for multiply handicapped boys and as a teaching parent for emotionally disturbed boys and girls.

Continued on Page 2

A Response to Attack on DI Preschool Programs by Schweinhart, Weikart, & Larner

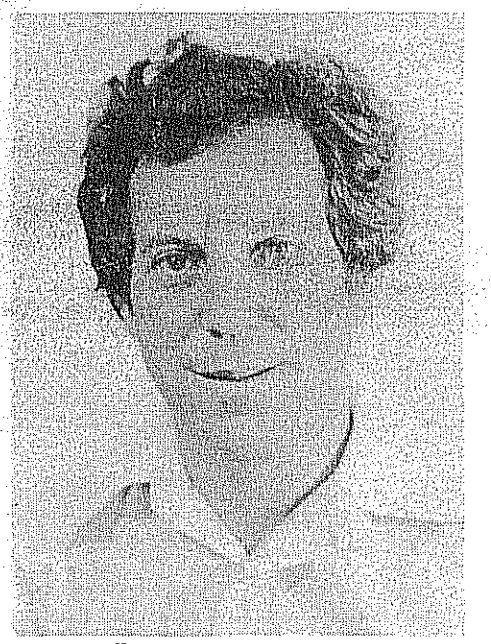
by Russell Gersten
University of Oregon

Editor's Note: This article critiques a widely publicized study purporting to attack DISTAR. It should be of considerable interest to ADI members. Reproduced from a prepublication manuscript with permission from Early Childhood Research Quarterly. *The paper will be published in Vol. 1, 1986, p. 293-302.*

There were several interesting features to the recent exploratory study of the potential long-term effects of preschool by Schweinhart, Weikart, & Larner, (1986) "Consequences of Three Preschool Curriculum Models Through Age 15," which appeared in the first issue of *Early Childhood Research Quarterly*. However, there were also some puzzling aspects to the study, a few curious omissions, two lapses in methodology and several serious flaws in interpretation that need to be pointed out. In particular, the authors' penchant for interpreting non-significant results has led to serious misconceptions about the findings.

This is particularly important because, as most readers of this journal know, the report's findings have been picked up by the popular press, often in a sensationalized oversimplified form. The news media can be almost excused for their hyperbole when researchers fail to follow conventional scientific guidelines. Hechinger (1986) in the *New York Times* reported that "placing children in an early educational pressure cooker can do serious harm," and cautioned against the use of highly structured programs that, according to the study, "appear often to lead to antisocial behavior, delinquency, and even violence later on."

In the study, three groups of 18 fifteen year olds—all having experienced one of three different preschool programs when they were four years old—were compared. In all earlier research reports, the three types of preschool were labeled High Scope, Language, and Child-Centered Nursery. In the current report, the Language group is renamed "Distar." This is an inappropriate choice. *None of the students in the first two waves used the Distar curriculum;* the few students in the third wave who used it, did so for only four months out of the two years of the program. Rather, according to the program directors (Bereiter, 1986; Engelmann, personal communication) these students were taught basic language concepts, shapes, number concepts, colors and letters in a systematic way based on the principles of *Teaching Disadvantaged Children in the*



Dr. Russell Gersten

Preschool (Bereiter & Engelmann, 1966). Calling this group *Distar* has created widespread confusion and misinformation about the *Distar* curriculum program which has been successfully used with disadvantaged students in the elementary grades (e.g., Stebbins, et al. 1977).

Due to the extremely small sample size (18 in each experimental preschool condition) and the use of only one site, the authors should have emphasized that this is clearly an *exploratory* study of the later effects of various preschool models. Policy decisions never have been—and hopefully never will be—based on studies involving *brief interviews* and performance on *one test* of a sample of 18 adolescents.

Disparities in Characteristics of the Samples

Consider characteristics of the three samples involved in the study. They were comparable on many demographic variables, with at least four important exceptions:

Continued on Page 4

DI Presentations at ABA

At the Annual Meeting of the Association for Behavior Analysis (ABA) in Milwaukee, Wisconsin, four presentations related to Direct Instruction were made. These were sponsored by the DI Special Interest Group with Paul Weisberg Chairperson and Kathy Madigan Scribe. The four programs are described below:

1. SYMPOSIUM on "Field Testing of Direct Instruction Programs". Chaired by Roberta S. Weisberg, Tuscaloosa City School System, Tuscaloosa, AL. The discussant was Howard Farris of Western Michigan University, Kalamazoo. The presenters were:

Maria Collins, Boise State University, Boise, ID, on "Evaluating and revising the CAI *Reasoning Skills Program* with secondary school handicapped students."

Paul Weisberg, University of Alabama, Tuscaloosa, "Developing and evaluating calendar formats for instructionally naive students."

Nancy J. Lindahl, Kalamazoo Public Schools, Kalamazoo, MI, and Howard Farris, Western Michigan University, Kalamazoo, on "Evaluating the *Expressive Writing I* program with junior high special education students."

2. SYMPOSIUM on "Application of Direct Instruction Principles When Teaching People with Severe Disabilities." Chaired by Russell Gersten, University of Oregon. The discussant was Anthony Cuvo, Southern Illinois University, Carbondale. The presenters were:

Ruth Falco, Western Oregon State College, Portland, on "Design of instructional programs for people with severe disabilities."

George Singer, Oregon Research Institute, Eugene, on "Application of presentation variables to enhance performance during instruction."

Robert Horner, University of Oregon, Eugene, on "Use of stimulus control to manage instruction."

3. INVITED ADDRESS on "Teacher Training in Direct Instruction" by Kathleen Madigan, California State University, Stanislaus-Turlock, and Linda Youngmayr, Turlock Unified School District, Turlock, CA. The Chairperson was Saul Axelrod, Temple University, Philadelphia, PA.

4.INVITED ADDRESS on "Direct Instruction and CAI and Videodisc Technology" by Maria Collins, Boise State University, Boise, ID, and Douglas Carnine, University of Oregon, Eugene. The Chairperson was David B. Lennox, Monroe Development Center, Rochester, N.Y.

ABA – 1987

Association for Behavior Analysis, 13th Annual Convention.
Opryland Hotel,
Nashville, Tennessee
May 25-28, 1987.
Submission, convention or membership information, write
ABA, Department of Psychology, Western Michigan University, Kalamazoo, Michigan 49008.

The **Direct Instruction News** is published Fall, Winter, Spring and Summer, and is distributed by mail to members of the Association for Direct Instruction. Readers are invited to submit articles for publication relating to DI. Send contributions to: The Association for Direct Instruction, P.O. Box 10252, Eugene, Oregon 97440. Copyrighted by ADI, 1986.

Editors . . . . . Wes Becker
. . . . . John Woodward
Associate Editors for Research . . . . . Ed Kameenui
. . . . . Russell Gersten
. . . . . Craig Darch
. . . . . Robert H. Horner
Departments
Teacher-to-Teacher . . . . .
Administrator's Briefing . . . . .
Dear Ziggy . . . . . Ziggy Engelmann
Analyses of Curricula . . . . . Linda Meyer
Software Evaluation . . . . . Douglas Carnine
Microcomputers and DI . . . . . Samuel K. Miller
Art Director . . . . . Susan Jerde
Layout . . . . . Wes Becker
. . . . . Springfield News
Photography . . . . . Arden Munkres
Typesetting . . . . . Pan Typesetters
. . . . . Springfield News
Printing . . . . . Springfield News

ADI Expands Consulting Services

The Association for Direct Instruction is expanding its services to provide districts and teachers with a larger number of training sessions and with consulting services, which are shaped to the needs of the school or district. ADI will offer a series of workshops and institutes during the school year of 1986-87 and will be contacting school districts to assess their needs for consulting services. Workshops and consulting will be concentrated on the west coast —primarily Washington, Oregon, California, Utah, and Arizona.

An arrangement with the University of Oregon permits ADI to offer one unit of college credit for each 1½-day workshop at an attractive price of $20 in addition to the workshop fee. The workshops will provide 10 contact hours and will focus on *training*. The workshops for the current school year will cover the following topics:

- Teaching the beginning reader (training in *Reading Mastery*, 1, 2)
- Teaching expressive writing (training in *Expressive Writing* 1, 2)
- Teaching spelling (training in *Spelling Mastery* 1-5 and *Corrective Spelling Through Morphographs)*
- Teaching science in the middle grades (training based on efficient procedures for teaching Earth Science and Beginning Chemistry)
- Teaching arithmetic in the middle grades (training based on the Systems Impact videodisc courses dealing with fractions, decimals, percents, and ratios)
- Managing students with emotional problems (training based on effective Direct Instruction techniques for diagnosing and remedying inappropriate behaviors)
- Teaching decoding to the corrective reader (teaching based on *Corrective Reading* A, B, and C)
- Teaching corrective arithmetic based on Systems Impact videodisc programs and SRA's *Corrective Arithmetic Modules*.

The workshop trainers have presented at the annual Eugene summer conference. They include: Dr. Phyllis Haddox, Dr. Geoff Colvin, Dr. John Noell, Dr. Gary Johnson, Robert Dixon, Jerry Silbert, and Gary Davis. Some of the workshops that are planned will be scheduled in conjunction with management workshops conducted by Dr. Randy Sprick and Marilyn Sprick.

All trainers for these workshops are certified. All have demonstrated great technical skill in teaching children; all have an exemplary record of training teachers and aides; and most have been responsible for massive program implementations that require coordination of all details, from designing schedules for schools that permit the greatest latitude in appropriately placing students in instructional groups to handling the problems of material logistics and providing in-classroom observations of teachers. ADI trainers are the best. In the next ADI News, we'll run profiles on several trainers and list some of their achievements.

The ADI Board feels that the workshop-consulting service is timely because of the increased popularity of Direct Instruction programs. During the past two years, sales of Direct Instruction programs have increased more than 25%, and the west coast is largely responsible for the increase. A few years ago, those using DI programs felt very isolated, and often had to work in an environment that ranged from non-suportive to hostile. That situation is changing, particularly on the west coast. Even larger school districts (which were historically opposed to DI) are implementing DI programs. Many teachers are teaching the Direct Instruction way for the first time. So there is an increased need for good training and consulting. ADI plans to satisfy that need. The workshop schedules are not set beyond November, but they will be soon. If your district or school has particular needs for training or consulting, let us know—soon. Call Bryan Wickman at (503) 485-1163, and he'll either set something up or put you in contact with the appropriate trainer.

ADI Excellence Awards

Continued from Page 1

Dr. Robert Horner

His publications, including books and book chapters, are in the 60-plus range. (I didn't take the time to count them!) Since 1982, he has been the principle investigator on a five-year contract funded by the Special Education Program, U.S. Department of Education, in the amount of $1,400,000. Those who heard his keynote speech at the DI Conference Annual Meeting last year, or have followed the many summaries of his research in the *DI NEWS*, will appreciate his contributions to the integration of DI teaching theory and behavioral analysis. In his numerous research studies, Dr. Horner has demonstrated the effectiveness of DI and behavioral theory in designing strategies for teaching severely handicapped learners generalizable community-living skills. These studies include such skills as table bussing, dressing, street crossing, grocery shopping, telephone use, use of vending machines, and work-skills useful in a sheltered workshop. In addition, Dr. Horner and those working with him have developed numerous "packages" for teachers to use in applying what has been learned in to assist the severely retarded in developing community-living skills.

Dr. Horner's contribution to our knowledge base is truly outstanding.

The Name of the Game is: Reading Mastering Tournament

by Nancy Turpen
Roberta Weisberg
Tuscaloosa City Schools
Tuscaloosa, Alabama

Tuscaloosa City Schools have been under Court supervision for over two decades. In 1981, the Federal Courts and the Justice Department accepted a compensatory instructional program in lieu of busing for three elementary schools serving all black, mostly poverty-level children. Within the order approved by the court was that the schools serve children in the bottom three stanines in reading and math through DISTAR Reading or the Reading Mastery Series in order to raise the academic performance of the students attending these schools.

The Reading Mastery III and IV Levels (Engelmann and Hanner, 1982; 1983) are very rich in science and social studies content and they contain a periodic cumulative review of content known as Fact Games. The games are played in small groups every ten lessons, with the students answering specific questions about science and social studies. There is a high degree of responding, and excitement is generated when classroom groups compete for highest scores or become the school's winning teams.

The Compensatory Schools had most of their third, fourth, and fifth graders reading in levels III and IV; and, in 1984, several teachers decided to have Fact Game competition teams within each school. The cross-classroom competition was set for the end of the school year for all children in Reading Mastery III and IV.

It became feasible to us as we planned within-school competition, that with just a little more effort and planning, we could have cross-campus competition and really find the "best school" in Reading Mastery. We added questions to those already provided in the Fact Games, color-coded question cards, so we knew at what point in the competition they were to be used, and organized teams.

The 1986 competition was limited to those students in Reading Mastery IV. They were older and more sophisticated, requiring less supervision from teachers as they played in groups.

What follows is a description of how we organized teams for cross-campus competition, wrote questions for the games, and produced both a worthwhile event whose core was academic achievement and pride in youngsters who are not typically considered "interested" in academic success.

Role of Coordinator

Four schools engaged in competition (an additional school had qualified as a compensatory school in 1981). Within each school, a teacher served as a tournament coordinator. Her responsibilities included: (1) accumulating questions for the competition from other teachers; (2) organizing the teams within her school; (3) arranging for in-school competitions; and (4) representing her school to plan for the inter-school competition which occurred toward the end of the school year.

Question Selection and Source

All teachers having students in the competition submitted questions for the tournament. These questions could be drawn either from the Reading Mastery IV Fact Games and Skillbooks or from important information about concepts the students had difficulty retaining. The selected questions were of the multiple choice, true/false or short answer variety. Answers to questions in the early rounds were of the convergent kind rather than open-ended; whereas final-round questions tested for more difficult thinking.

Three sets of 30 questions each were selected from all submitted questions. The first set contained the easiest questions, taken from Fact Games and those found frequently in the Skillbook, such as, "What do you call a group of kangaroos?" The second set, used with each school's top-selected teams, was more difficult. It included vocabulary definitions which required some interpretation to answer. For example: "Which planet is colder, Saturn or Uranus?" The last set was the most difficult, reserved for the final round and the top three teams in the competition. These involved reasoning skills and contained answers that were never directly stated in the Reading Mastery program. In this case, the answers could be short sentences requiring a statement about a relationship between two facts. "Tell the difference between a patent and a patent attorney," is an example of a final-round question.

The first two sets of questions were put on small cards and were color-coded according to the round in which they were to be used. Each team played with its own set of cards. The last, most difficult set of questions was printed only for the moderator in the final round.

Forming the Teams

Fourth-and fifth-grade children, who were being instructed in Reading Mastery IV and had reached lesson 30 by March, were allowed in the competition. Included were mainstreamed special education, Chapter I, and regular program students. The school coordinator ranked these youngsters on a roster from the top-performing student, attaining the highest lesson number completed, to the weakest performer, at the lowest completed lesson. She created teams of four members by drawing first the top name and then the bottom name and then back to the top and so forth, until four names were selected for a team. The rationale was to match smart students with slower learners so no team would be at a disadvantage.

Children on the roster were called to the cafeteria and were seated as teams. Each group selected a team name, such as Jaguars, Falcons, or Bears. The date of the first round competition was then announced.

Within School Competition-First Round

The first round had members belonging to the same team who played against each other. This round gave the children the experience of intramural competition and got them used to the setting, the questions, and the game format. Teams were seated around a table with a pile of colored 3x5 question cards and an adult monitor who had an answer sheet and kept the game moving. Children took turns reading the questions aloud and answering them. They were allowed five seconds to think. If correct, they kept the card; if wrong, they returned it to the bottom of the deck. At the end of the first five-minute game the students totaled their winning cards and gave this information to the monitor. After the first game an average team member would earn four to seven points. The cards were gathered up, shuffled, and games two and three were played in the same way. A typical team member would now be earning five to nine points per game. After the third game, points for correct answers over all games were tallied. The first round was not a competition round, but served as a means to identify a child's position on his/her team.

Within School-Second Round

According to their team ranking; e.g., top scorer, high-middle scorer, low-middle scorer, or low scorer, each student could earn entering-second-round points based on how he/she fared in the competition.

Teams were split up and regrouped for tournament competition. According to their entering-second-round points, each team member was placed homogeneously in tournament groups of four. Students earning the highest entering-second-round points were competitors within the same tournament group. In the same way students earning the lowest points played against each other in another tournament group, as did the members comprising high-middle and low-middle teams. Thus, every tournament group had students from four different teams.

The second round was played exactly as the first. The students played three games of five minutes each. At the end of the round, points earned were converted into entering-final-round scores based on the point distribution outlined in Table 1.

These earned points were brought back from the second round tournament competition to the original team, e.g., the Jaguars. Since points were always assigned according to scoring position after a round was played, the top scorer in a tournament round always brought back the same number of points to his or her team. The top scorer of a "smart" tournament group brought six points to his or her team as did the top scorer of a "slow" tournament group. Likewise, the lowest scorer of a "smart" tournament group brought back the same two points as the lowest scorer of a "slow" tournament group (see Table 1). In case of ties, the team players were assigned the points indicated in Table 1. The three teams receiving the highest total final round scores in each school were selected to play in the inter-school tournament.

Inter-School Competition

Before assembling the three top scoring teams from each of the four schools, each school played a first round using the second set of questions which were more difficult that the first. This within-team competition allowed for practice using a new set of questions and for members to earn entering-second-round points for the inter-school tournament. The members on a team played each other to earn entering-second-round points which allowed the inter-school director to then place members in homogeneous second-round groups according to their individual scores. This procedure was identical to the one used in forming the tournament groups for the within-school competition.

Continued on Page 4

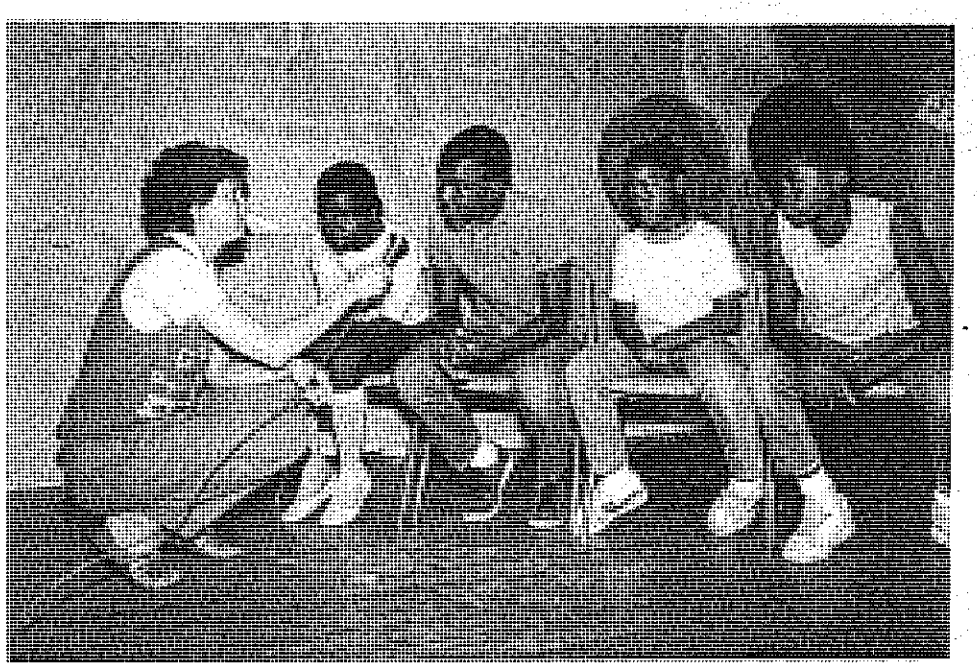


Table 1. Arbitrary Point Assignments Based on Position on a Team

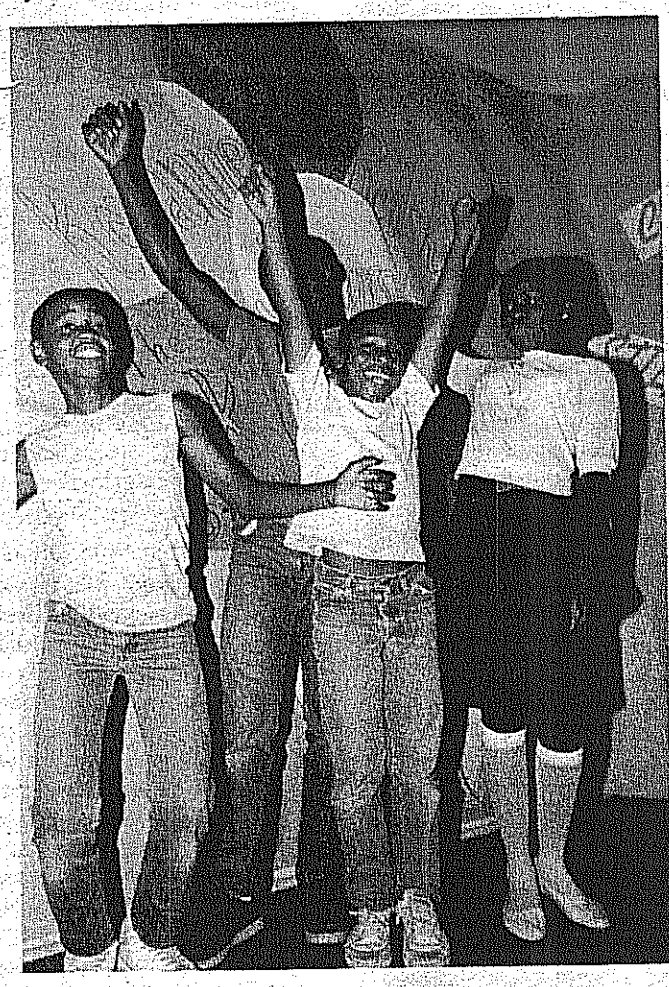
Team Players Scorers	Point Assignment for Different Outcomes							
	No Ties	Tie for Top	Tie for Middle	Tie for Low	3-Way Tie Top	3-Way Tie Low	4-Way	Tie for Low and High
Top	6	5	6	6	5	6	4	5
High Middle	4	5	4	4	5	3	4	5
Low Middle	3	3	4	3	5	3	4	3
Low	2	2	2	3	2	3	4	3

Reading Mastery Game

Continued from Page 3

The second and final round inter-school tournament was set two days after the first round. The three winning teams from each of the four schools were brought to the cafeteria in one of the schools. Students wore big attractive buttons saying, "1986 Reading Mastery Tournament," which were given in their home schools. These served as rewards and motivators for past and continued effort. Each group had a teacher who served as a monitor.

Team names printed on poster board were positioned around the perimeter of the cafeteria so that youngsters knew where to sit as they arrived in the cafeteria. After all teams were assembled, the director of the tournament called children's names and assigned them to tournament groups which met in the center for competition. These groups were formed by the director according to each student's entering-second-round points. There were three games, each lasting approximately five minutes. The participants continued to use the second set of questions. Game totals were converted into entering-final-round points for each student, and the winning three teams were selected in the same manner as they were selected from each school. These teams were assembled on a stage in the cafeteria for the final tournament competition which determined the very best team of all four competing schools.



The Final Tournament Round

Each team selected a spokesperson to give answers for the group. A Quiz Master, using the third and most difficult set of questions, asked each team a question in turn. The team had ten seconds to respond to the question through its spokesperson. A point keeper (one of the Assistant Superintendents) made tally marks on a blackboard when a team got the correct answer. One monitor from each school served as a judge in the event that answers needed further elaboration. Missed questions were held in case of a tie at the end of the 30 questions.

The climate of the final round resembled an athletic event. As each team earned a point, those in the cafeteria from the same school cheered and applauded. There was great excitement and suspense as the team spokesperson came to the microphone to give the team's answer. Members of the winning team received first place trophies, and the remaining two teams got second and third place ribbons at the end of the competition.

As a final bonus to the festivity, a local businessperson furnished free pizza and drinks to all who had participated. The city's TV station filmed the final round and coverage was shown on the evening news.

Conclusions

The Reading Mastery Tournament served a special purpose for children in our Compensatory Schools. They are considered to be "at risk" for failure in academic subjects. There is little in their natural environment that creates an interest in learning or reinforces practice and effort to achieve mastery of academic content—they are not typically studious. What began as simply following the Reading Mastery Series directions for playing Fact Games within classrooms led to within-school and finally across-school competition. Teachers who noticed the increased on-task behavior of their students when Fact Games within their classes were played, realized that this same interest could be generated if the children knew about cross-campus competition and the fun they would have. The tournament provided the reinforcement contingencies for hard work and learning which the unprogrammed natural environment failed to do.

The Reading Mastery Tournament of 1986 showed students, teachers, parents, and community that academically at-risk children do learn and are smart.

Response to Attack on

1. *Level of mother's education.* The mothers of students in the child-centered Nursery approach had significantly more education. This might tend to bias the results in favor of the Nursery group, as Schweinhart, et al., mention.

2. *Unequal representation of the sexes.* Of the 18 students in the Direct Instruction sample, 10 (56%) were boys. For the High Scope sample, 7 (45%) were boys, and for the Nursery School group, 8% were boys. Considering that the focus of the delinquency subscale items is on problems typical of teenage boys, this might tend to bias results in favor of the High Scope and Nursery groups (Bereiter, 1986).

3. *Frequencies of parents out of the home.* Not only did the Direct Instruction group have the highest percentage of single parent families (31 percent as opposed to a mere 12 percent for the Nursery group and 3 percent for High Scope), but more Direct Instruction mothers were employed (44 percent versus 38 and 33 percent respectively). Assuming that the majority of the single parent families were headed by the mother, more of the Direct Instruction students were unsupervised during after school hours, which may have had an impact on their social behavior through adolescence. Here, again there would be a bias in favor of the Nursery group and High Scope.

4. *Amount of preschool expierence.* This fourth point is extremely important, and one which is dealt with rather lightly by the authors. Thirty nine percent of the students in the Direct Instruction (DI) and Nursery School samples experienced only one year of preschool. The remaining 61 percent experinced two years of the intervention. In contrast, all of the High Scope students experienced a full two-year intervention. This might tend to bias results in favor of High Scope.

In an earlier report on the academic and social progress of these students, Weikart, et al., (1978) argued that students in the first wave should not be included in the analyses. They explained that "since children in Wave 5 (called "the first wave" in the current study) experienced different educational programs as three year olds and were not enrolled for two consective years in one of the three CD Project programs they are not included in the longitudinal sample" (p. 19). Since 39 percent of the High Scope sample in the current study experienced one more year of treatment than the DI or Nursery groups, their reasoning still seems sound. Schweinhart, et al., (1986) now assert that the second year of preschool has had no impact on subsequent performance. But how can one be sure it has no impact on the child's social behavior in adolescence until after the evaluation is complete? Clearly, the unequal amounts of preschool is a potential source of bias, favoring the High Scope group.

Thus, despite the random assignment of subjects to treatment at age three or four, several demographic factors were operating then that potentially favor the Nursery and/or High Scope groups. This conclusion is different than Schweinhart, et al.'s, assertion. "We conclude from the analyses presented in Tables 1 and 2 that any outcome differences between the High Scope group and the Distar (sic) group are probably not attributable to group differences in program-entry characteristics." (1986, p. 24)

The Validity of the Measures

The authors used what many would consider a narrow range of measures. Many reasonably objective measures were available, but not utilized: e.g., school achievement (grades and standardized test scores), suspensions and retentions, truancy, and special education placements. Unlike previous work by Weikart and colleagues, this study relies almost exclusively on self-report measures, all of uncertain reliablility and unknown, rather dubious validity.

The self-report measures included: (a) Perceived Locus of Control—Bialer (1961) scale, with an unacceptably low reliability (coeffecient alpha of .34); (b) a measure of self-esteem, the Rosenberg (1965) scale, with an acceptable coefficient alpha reliability of .70. (No validity data reported.) The crux of the evaluation hinged on data gathered by self-report procedures, by a structured interview covering a range of *antisocial activities* which was rather unfortunately labeled "Juvenile Delinquency Scale," and by a rather scattered series of questions on family life and life at school.

The only reliabilities reported are internal consistency estimates. While coefficent alpha is an acceptable way to gauge reliability of academic measures, it is inappropriate for self-report measures, since if an individual is dishonest or distorts information in either direction—either by concealing antisocial or shameful criminal activities or by "boasting" about non-existent criminal activities—he or she would actually inflate the coefficient alpha. A measure of temporal stability would have been superior.

No validity data are provided on these self-report measures and, reading the results of some items on the scale, one wonders about the teenagers' candor. When asked, "Have you ever . . . . argued or fought with parents?" the mean score for the High Scope students was 1.11 (where 0 = never, 1 or 2 means once or twice in your life, 3 means three or four times, and 4 means 5 or more times). It seems amazing that any adolescent, let alone those adolescents, half of whom had been arrested by the age of 15, with an average of 2.2 suspensions from school, had argued or fought with their parents only once in their lifetimes.

The other measures included a paper and pencil multiple choice test on knowledge deemed necessary "for educational and economic success in modern society," called the Adult Performance Level Survey (APL), and information on number of suspensions gathered from school officials. The rationale for administering the APL was that it "can provide insights into the real-world competence these adolescents have developed in applying skills learned in school to the demands of adult life" (p. 28). Reliabilities for each subscale are reported; they are quite low, ranging from .32 to .63 with a median of .58. The reliability of this measure borders on being unacceptably low. No validity information is

DI Preschool Program Continued from Page 1

reported. Information on the number of suspensions was collected, but, for some strange reason, not analyzed by curriculum model. Only the overall mean was reported.

Interpretation of Results

It is interesting to speculate what would have happened if the data from this study had been reported and analyzed by a team of independent evaluators, such as the professional groups used to analyze and discuss the evaluation of Follow Through—rather than a team of researchers directly affiliated with one of the three curriculum approaches evaluated. Unlike Schweinhart, et al., (1986) they would use the conventional .05 level of significance. The authors would let the reader know which statistical tests were used, and perform post-hoc tests to delineate which of the three groups were significantly different from each other. Considering the heavily skewed distribution on most of the items dealing with antisocial behavior, they would need to use nonparametric tests. They would need to deal with the Delinquency Scale on an item-by-item basis, rather than creating five subscales out of a mere 18 items. Of course, the evaluators would not interpret non-significant findings. And thus, I believe a quite different picture would emerge.

This mythical report would begin with the objective data—a mean of 2.2 suspensions for the entire sample of 54. It would indicate that no significant differences were found among the three samples on this measure, which is presumaably the case. Next, the report would indicate that half of the students in the total sample reported they had been arrested at least once by age of 15. Again, apparently no significant differences existed between the groups.

The report would next indicate that there were no significant differences in self-esteem, as measured by the Rosenberg scale. (The locus of control measure would be dropped due to its low reliability.) Table 1 indicates the only items for which significant differences were found. This of course assumes the results for these items would still be significant when appropriate (nonparametric) statistical tests were used to compare differences.

The evaluators would indicate that the lack of significant differences between the three preschool models is unsurprising, considering the array of experiences in school and out of school since the age of four that were much more likely to have an impact on their lives. The report would conclude that, while preschool appeared to help all three groups during the primary grades (as evidenced by some elevation in IQ scores, and reasonable achievement scores in first and second grade), the students don't appear to be doing too well in junior high school; many have serious problems in school and with the courts. They might well conclude that more effective education in the elementary schools and junior high schools might have helped.

Summary of Findings

What can one conclude from these data? First, the students, overall, are not doing very well; half have been arrested, and many have been suspended from school. For suspension rate and self-reports of arrests, no differences were found between the three curriculum models. Nor were there differences in self-esteem. Of the numerous self-report categories (including damage to school property, serious fights, stealing, use of weapons) no differences are significant.

The achievement level of the students is unknown. No normative data are presented for the Adult Performance Level survey, so we cannot ascertain how these students fared compared to their peers. All we know is that of the ten subtests of the Adult Performance Scale, differences between the three samples were significant on only one.

Significant differences were found in only three areas—sports participation, being appointed to an office or job at school and running away from home. Though many would consider playing basketball or being on the track team nice, surely failure to do so is not a cause for alarm. It is unclear that any of these are evidence of hardcore juvenile delinquency. Students may well have good reasons for running away from home.

There are many ways to approach item 4 on Table 1. One third of the DI students thought that their family felt they were doing poorly, while none of the High Scope students, and only one of the other 18 Nursery students felt this was the case. Considering the arrest records and frequency of suspensions, which group presents a more accurate picture? This mythical report would conclude that of the many, many comparisons made on the self-report measures, only four were significant—and none were in crucial areas. None had anything to do with delinquency. These few differences could be due to the somewhat different male /female ratios between the groups or perhaps even unequal exposure to preschool experience.

Achievement and IQ During the Elementary Grades

In their report, Schweinhart, et al., (1986) also devote a considerable amount of time to summarizing their earlier findings on the achievement of these students in first and second grades, and their IQ's up through fourth grade. Here, too, some of their interpretations are a bit misleading.

The mean growth in IQ between the ages of 4 and 10 for all three groups is impressive. Students tended to begin the program with a mean IQ of 79 at the age of 3, and the average IQ at age 10 was 93. However, the readers should note that the sample size was 55 at pretest and a mere 29 at posttest. Schweinhart, et al., might also have pointed out that the predictive validity of IQ scores obtained before the age of 5 is close to zero (McCall et al., 1975). The reason for this may be clear if one thinks about the difference between the type of items a three year old takes versus those a ten year old takes in the Stanford-Binet.

Though there were not significant differences in IQ scores at age 10 between the three experimental samples, the Direct Instruction group mean was over one-third of a standard deviation higher. It is odd that this is the one time Schweinhart, et al., *chose not to interpret a non-significant finding*, one that meets common criteria of educational significance. It is also strange that no IQ measures were administerd to these 15 year olds.

The achievement data based on the California Achievement Test indicates that no sifnificant differences appeared between the three samples in achievement in first and second grade. However, the achievement level at both grades was at or near grade level. Again, one wonders why no measures of achievement were collected or reported for students at age 15. The high suspension rate in junior high school may indicate that academic achievement is not at a very high level. Other longitudinal studies of low income, minority students have noted increasing losses against the norm sample in the later elementary grades and in middle school (Becker & Gersten, 1982; Stebbins, et al., 1977).

Table 1. Mean Scores on Items Where Significant Differences Were Found by Schweinhart, et. al., (1968)[a]

	Direct Instruction	High Scope	Nursery	P[c]
Adult Performance Level Survey				
Occupational Knowledge	2.4	3.7	3.7	.04
(All other scales non-significant)				
Self Report				
1. Have you ever run away from home?[b]	.38	.17	0	.02
2. Appointed to a school office or job?	0	12%	33%	.02
3. Participation in sports.				.02
Often	17%	50%	44%	
Sometimes	28%	44%	28%	
Never	56%	6%	28%	
4. How does your family feel about how you're doing?				.03
Great	0	6%	6%	
Alright	67%	94%	89%	
Poorly	33%	0	6%	

[a] Standard deviations unavailable
[b] 0= never, 1= once, 2= twice, 3= three or four times, 4= 5 or more
[c] Type of statistical test performed is unavailable

Summary of Problems

Aware of the problems in extrapolating from a study based on such a small sample, Schweinhart, et al., (1986) indicated "this report requires *major restraint in its use and interpretation*" (emphasis added), (p. 43). Yet in the next sequence, the policy implications are clearly drawn. Their choice of the phrase "pressure cooker" to describe the Bereiter-Engelmann approach for teaching language concepts was immediately picked up by the popular press. This is despite the fact that a naturalistic observational study failed to find any significant differences, in how teachers and students interacted, between the alleged "pressure cooker" approach and Weikart's own "cognitive" approach (Seifert, 1969). The percent of verbal feedback was essentially the same for the two groups, as was the percent of pupil initiating, and percent of time teachers spent on management. Interestingly, neither were there any differences between the two approaches in the percent of time teachers spent on affect issues. The only difference was that significantly more verbal interaction went on in the Direct Instruction preschool.

In a response to the *New York Times* article (Hechinger, 1986), after noting the unequal demographics, Carl Bereiter (1986) stated, "For those who associate direct instruction with harsh discipline, it may be important to know that the supervisor of [the] direct instruction group reported (McClelland, 1970) that punishment was not used and discipline problems were virtually nonexistent."

Bereiter then asked, "How could direct instruction at age three or four have led to delinquency at age 15?" It is equally reasonable to assume that the unequal demographics, the high proportion of males in the direct instruction sample, and/or the higher number of students coming from homes without parent supervision, contributed to the few significant differences found. In addition, the children's experiences in kindergarten, elementary school and junior high school would certainly have some impact on their lives at age 15. Yet nothing has been recorded about the children's later educational experiences. Material on the current demographics and status of the students' families might also help understand some of the differences. Obviously, home situations change over a 12-year period, particularly in a high unemployment state such as Michigan, and these factors should have been recorded.

Though a few statements appeared in the article formally stating that further research is needed before firm policy conclusions can be drawn, the authors make numerous inferences regarding the impact of the curricula used in preschool on children's future delinquency. At times, the text is written as if self-reports were the same as actual behavior (e.g., 'The Distar group engaged in five times as many acts of property violence. . . ." (p.34)). The authors' setting of an extremely liberal .10 significance level is inappropriate. In a study such as this, we need to be sure *before* inferences are made.

Continued on Page 7

Distar Language—
A powerful tool for teaching

A powerful tool for teaching:

- A basic vocabulary
- A rich body of knowledge about the world
- The oral language and writing skills needed to ask precise questions and to communicate ideas.

These are the abilities that a new report, *Becoming a Nation of Readers*, lists as being *important* to all children who are learning to read... *critical* for children who have not grown up with oral language that resembles the language of school and of books...because these abilities are the basis of comprehension.

And these are the abilities that teachers have been successfully teaching children for almost twenty years with Distar Language programs.

But Distar Language does more than teach the complex language skills needed to understand classroom instruction and comprehend written text. Distar Language programs go beyond the content of other language programs to give you the help you need to teach critical thinking skills, skills that enhance a child's intellectual development.

With Distar Language you teach logical thinking through:

Classification
Analogies
Deductive reasoning
Inductive reasoning

You teach students to be "THINKERS" who use language as a tool. And that is the foundation for eventual success in all school subjects.

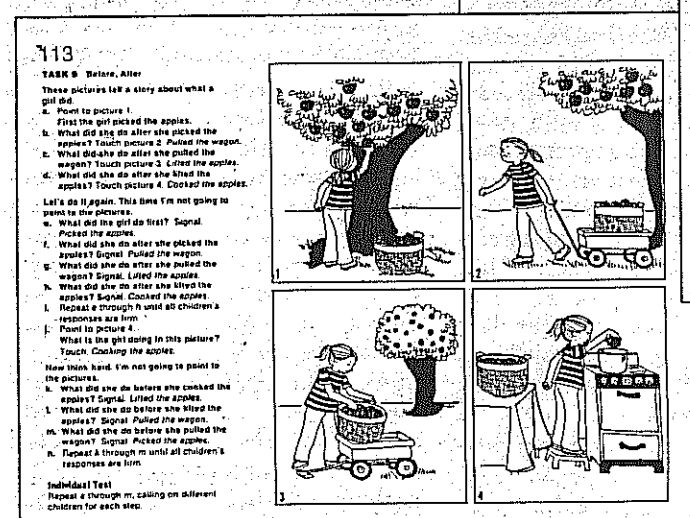
And now the Distar Language program is better than ever! Distar Language I has been revised to give you:

Expanded Language Activities—ideas for fun-to-do songs, read-aloud stories, nursery rhymes, and plays. These informal lesson extensions encourage students to apply their language skills in classroom activities. Language achieves full naturalness at a remarkably early stage.

Fast Cycle—an in-lesson skipping schedule eliminates unnecessary drill and practice for average and above-average students. A "star" identifies the tasks that you teach to all students. You are free to skip the remaining exercises with the faster children. Lessons are easier to adapt to student ability.

Take-Homes—lively pencil and paper activities teach color, shape and workbook skills. Activities reinforce skills, demonstrate that students can apply language concepts. Illustrations are improved. There is more to do on each page.

Use this order form to receive these exciting new materials as soon as possible.


113

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.*

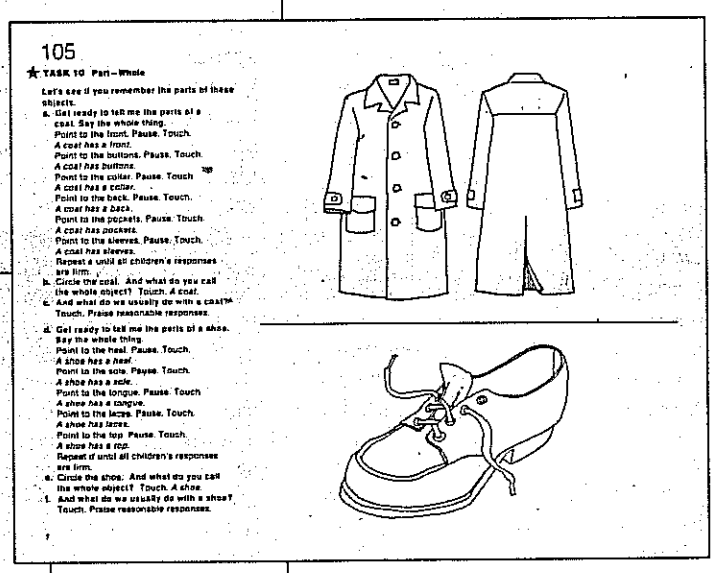
Let's do it again. This time I'm not going to point to the pictures.

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 e through m, calling on different children for each step.

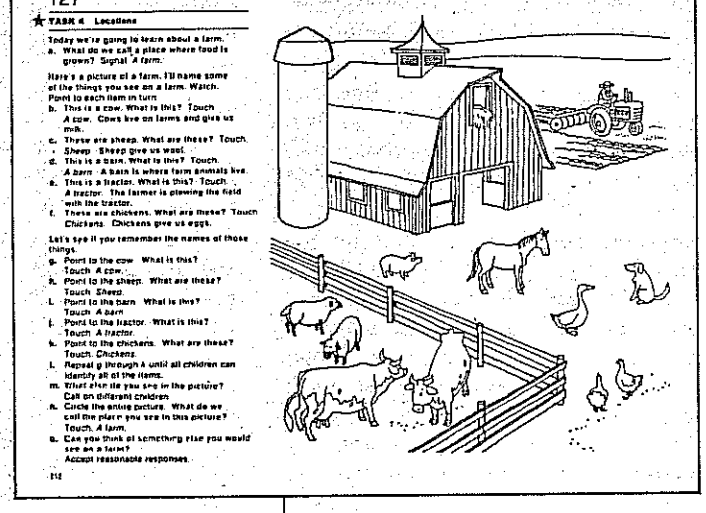

105

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.


127

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 those 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.

112

Examples from Teacher Presentation Book D

SRA®

Mail to: SRA, 155 N. Wacker Drive, Chicago, IL 60606

Quantity			Price	Extension
_____	7-7340	Distar Language I Classroom Kit	$280.00	_____
_____	7-7346	Additional Teacher's Guide	10.00	_____
_____	7-57347	Take-Home Workbook 1 (pkg of 5)	14.85	_____
_____	7-57348	Take-Home Workbook 2 (pkg of 5)	14.85	_____
_____	7-57349	Take-Home Workbook 3 (pkg of 5)	14.85	_____

Ship to:

Date _____ SRA Account Number _____

Purchase Order Number _____

Ordered By _____

Account Name _____

Address _____

City, State, Zip Code _____

Attention _____

Telephone Number _____ Good time to reach _____

Sold to:

SRA Account Number _____

Account Name _____

Address _____

City, State, Zip Code _____

Attention _____

Telephone Number _____ Good time to reach _____

Tax Exemption Number _____

Preferred Delivery Method _____

All orders are offers to purchase, subject to acceptance or rejection by SRA in Chicago, Illinois, in accordance with SRA's published terms and conditions of sale. Customer pays all shipping charges. Prices subject to change without notice.

An Evaluation of the *Mastering Fractions* Level-One Videodisc Program

by Ted Hasselbring
Bob Sherwood
John Bransford
The Learning Technology Center
George Peabody College of
Vanderbilt University
Nashville, Tennessee

This report describes an evaluation on the use of an instructional videodisc program for teaching fractions. The evaluation was conducted under a contract from the Tennessee Valley Authority. The primary purpose of the evaluation was to determine the effects of the *Mastering Fractions* instructional videodisc program (Systems Impact, Inc., 1986) on student achievement in fractions. A secondary purpose of the evaluation was to evaluate teacher and student attitudes toward this instructional program.

Problems with Instructional Media Evaluations

Over the past decade, much of the research examining instructional technology has attempted to isolate the influence of various media on learning by comparing the relative achievement of learners who have received similar subject matter from different media. For example, a large number of researchers have simply compared the effects of media delivered instruction (i.e., T.V., computer, videotape) with more traditional teacher delivered instruction, however, most of these media comparison studies have failed to control for instructional content and methodology.

Recently, a number of researchers have challenged the fruitfulness of simple media comparison studies for determining the effect of technology on learning. For example, even in cases where dramatic changes in achievement or ability have followed the introduction of a medium, as was the case in a study by Schramm (1977), it has been argued that it was not the medium that caused the change, but rather a curricular reform that accompanied the change. Clark (1983) has argued convincingly that instructional technologies are ". . . mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition" (p. 445). Clark has suggested that the positive outcomes attributed to learning from media are as likely to be the effects of novelty, or the effects of different instructional methods and curriculum content used by the technology and the comparison teacher. Further, Clark suggested that future research should focus on the instructional content and not the medium itself since it is the instructional methodology that is the important variable in determining the effectiveness of the instructional product.

Although the stated purpose of this evaluation was to determine the effectiveness of a videodisc program for teaching fractions, the media (i.e., videodisc) was not the primary target of the evaluation. Rather, the focus of the evaluation, as several researchers have suggested, was to determine the effectiveness of the underlying instructional methodology since the videodisc medium is simply the medium for transporting the instructional program. Thus, this evaluation was conducted in two parts. Part 1 was an experimental study that examined the effectiveness of the pedagogical methodology underlying the instructional program apart from the videodisc medium. Part 2 of the evaluation was a descriptive investigation of the effectiveness of the videodisc program when placed in a natural instructional setting. By combining the results from two parts of this evaluation, educators gain valuable insight into the effectiveness of the instructional methodology and how this methodology can be transported in the classroom through the use of technology.

Methods

In this section, a description of the materials and measures that were common to both parts of the evaluation will be described.

Mastering Fractions Program: A Description

Mastering Fractions is an interactive videodisc program that is a part of the Core Concepts videodisc series produced by Systems Impact, Inc. (1986). The scope and sequence of *Mastering Fractions* covers the following instructional objectives:

1. Discriminating whether fractions are more than, less than, or equal to one.
2. Decoding fractions so they are understandable on the number line or as diagrams.
3. Writing whole numbers and other values as fractions.
4. Generating equivalent fractions.
5. Ranking fractions by size.
6. Rewriting whole numbers on number lines as fractions.
7. Rewriting fractions as mixed numbers.
8. Simplifying fractions.
9. Multiplying fractions by fractions and whole numbers.
10. Adding and subtracting fractions with unlike denominators.
11. Rewriting mixed numbers as fractions.
12. Dividing fractions.

The *Mastering Fractions* package consists of three double-sided videodiscs, an *Instructor's Manual*, and *Student Response Booklets*. The three double-sided discs contain 35 lessons that include mastery tests, quizzes, reviews, and remedial exercises. The equipment needed to use *Mastering Fractions* includes a videodisc player (home or commercial model) with remote control unit, and at least one 19-inch color video monitor (25-inch monitors are preferable).

Instructor's Manual. The *Instructor's Manual* is divided into nine parts: an overview of *Mastering Fractions* and the equipment needed, a description of course content, instructions for using the videodisc equipment, teaching procedures, rationale and instructional features of the package, a glossary, index for disc lessons, placement tests, and answer keys.

Student Response Booklets. Student Response Booklets are consumable and are coordinated with each videodisc lesson. The daily worksheets typically present between 25 and 35 problems and can be completed in 15 to 20 minutes. Teachers are encouraged to grade each lesson's worksheets before moving on to new lessons and to give the students feedback on any mistakes. The worksheets also provide the teacher with information about misconceptions or errors the students may be exhibiting.

Placement tests. A ten-item placement test may be administered before the introduction of the program to identify students who should not be placed in the program or to provide baseline data for student improvements. The developers suggest that students missing no more than two items on the placement test do not need *Mastering Fractions*. Those missing three or more items are candidates for the program.

Computation skills. The Placement Test described above covers only fraction skills. If students have not mastered basic addition, subtraction, and multiplication skills they should not be placed in the program. If there are questions about a student's basic math skills, the 20-item multiplication quiz provided with the *Mastering Fractions Instructor's Manual* should be administered.

Continued on Page 8

Attack on DI Preschool

Continued from Page 5

The media, of course, picked up on the findings without the reservations occasionally expressed by the authors. Titles such as "Preschool Pressure, Later Difficulties Linked in Study" from the April 23, 1986 *Education Week* give a sense of the typical thrust of the media interpretations. The *New York Times'* reporting that "direct instruction in preschool leads to twice the amount of delinquency (Hechinger, 1986) is typical. The presentation style of the original article led to these misinterpretations. In fact, students from the three groups were not significantly different on more than five measures. Some of the areas of difference—sports participation, being appointed to a school office—were not of a dramatic social consequence. One group of 18 children seemed to get along more poorly with their families than the other two groups as evidenced by one of the interview items and self-reports of running away from home. Whether this is due to the academic emphasis of the preschool is dubious.

Finally, there is a need to point out that the situation is far less sanguine for these students—regardless of type of preschool program—than Schweinhart, et al., admit. The glaring omission of data on achievment and school attendance, and the failure to fully analyze the data on suspensions and arrest records are curious. All we know is that the students wer doing well in school at the end of the second grade. The meager evidence presented here suggests major problems by the ninth grade for all three groups of students.

It appears that something more than a special preschool program is needed to make a difference in these children's lives. Superior elementary school programs are a necessity. Here, the overwhelming consensus of multi-site, large scale independently conducted research studies is that approaches that use some form of direct instruction would lead to superior academic growth (Stallings, 1975; Stebbins, et al., 1977). In addition, some of our more recent large scale multi-site research, with samples of approximately 1000 (Becker & Gersten, 1982; Gersten, Carnine & Keating, 1984; Meyer, 1984), show enduring effects for this approach—including a reduction in dropout rate and increased college acceptance.

Author's Note

The author wishes to thank Thomas Keating and Gerald Tindal for their feedback on earlier drafts of this manuscript, and Sue Cox for her assistance in preparing the various drafts of the paper.

References

Becker, W.C., & Gersten, R., (1982) A follow-up of Follow Through: Meta-analysis of the later effects of the Direct Instruction Model. *American Educational Research Journal, 19,* 75-93.

Bereiter, C. (1986). "Mountains of evidence," said to contradict study on effects of preschool. *Education Week, 5* (37), 19.

Bereiter, C. & Engelmann, S. (1966). *Teaching the dis-advantaged child in the preschool.* Englewood Cliff, N.J.: Prentice-Hall.

Bialer, I. (1961) Conceptualization of success and failure in mentally retarded and normal children. *Journal on Personality, 29,* 301-333.

Gersten, R., Carnine, D., & Keating, T., (1984, April). The lasting impact of the Direct Instruction Follow Through Program: A Longitudinal study of 1500 students. Paper presented at American Educational Research Association, New Orleans, LA.

Hechinger, F.M. (1986, April, 22) Preschool programs. *New York Times.*

McCall, R.B., Appelbaum, M.I., & Hogarty, P.S., (1973). Developmental changes in mental performance. Monographs of the Society for Research in Child Development, 38 (3).

McClelland, D., Hiatt, L., Mainwaring, S., & Weathers, T., (1970). *The language training curriculum.* Ypsilanti, MI: High/Scope Educational Research Foundation.

Meyer, L. (1984). Long term academic effects of the Direct Instruction Project Follow Through. *Elementary School Journal, 84* 380-394.

Rosenberg, M. (1965). *Society and the adolescent self-image.* Princeton, N.J.: Princeton University Press.

Schweinhart, L.J., & Weikart, D.P., (1980). Young children grow up: The effects of the Perry Preschool program on youths through age 15 (Monograph of the High/Scope Educational Research Foundation, 7). Ypsilanti, MI: High/Scope Press.

Schweinhart, L.J., Weikart, D.P. & Larner, M.B. (1986). Consequences of three preschool curriculum models through age 15. *Early Childhood Research Quarterly, 1,* 15-45.

Seifert, K. (1969) Comparison of verbal interaction in two preschool programs. *Young Children, 24*(9), 350-355.

Stallings, J., (1975). Implementation and child effects of teaching practices in Follow Through classrooms. *Monographs of the Society for Research in Child Development, 40.*

Stebbins, L., St. Pierre, R.G., Proper, E.C., Anderson, R.B. & Cerva, T.R., (1977). *Education as experimentation: A Planned variation Model, Volumes IV A-D.* Cambridge, Mass: ABT Associates.

Weikart, D.P., Epstein, A.S., Schweinhart, L. & Bond, J.T. (1978). *The Ypsilanti preschool curriculum demonstration project: Preschool years and longitudinal results,* Ypsilanti, MI: High/Scope Educational Research Foundation.

Evaluation of *Mastering Fractions*

Instructional methodology. The instructional methodology underlying the *Mastering Fractions* program can be summarized by six fundamental instructional functions summarized by Rosenshine and Stevens (1986), these include:

1. Review (check previous day's work and reteach, if necessary)
2. Present new content/skills
3. Guided student practice (and check understanding)
4. Feedback and correctives (and reteach, if necessary)
5. Independent student practice
6. Weekly and monthly reviews. (p.379)

Each *Mastering Fractions* lesson follows these six fundamental instructional functions. The typical lesson begins with a paper and pencil quiz on the concepts presented the previous day. The quiz consists of a series of still frames shown on the video monitor. Five to ten problems are shown and at the end of the quiz the answers are given and the students check their work. The teacher then evaluates the class's performance on the quiz. If 80% of the class successfully answers the quiz questions then they move on in the lesson. If less than 80% were successful, then the teacher goes through a remediation sequence before proceeding through the lesson.

Each instructional sequence in *Mastering Fractions* is characterized by a lively presentation of a fractions concept by a narrator/actor. Pacing throughout all instructional lessons is brisk with ample opportunity for the students to respond to prompts by the narrator. Excellent graphics and sound are used to visually and auditorily present concepts being taught.

The instructional sequence of the lesson begins with a short review of previous concepts by a narrator. The students are asked to orally answer the questions posed by the narrator in the videodisc lesson. There is a pause in the program for responses. At any time the teacher may stop the video sequence to allow additional time for responding. At the end of the review the teacher may choose to remediate by taking the students through a remediation sequence on the videodisc that corresponds with the current concept, or if no remediation is needed, the teacher continues the videodisc lesson.

The students use paper and pencil thoughout the lesson for solving problems presented to them during the videodisc instruction. The students divide their paper into two equal halves by drawing a vertical line down the page. On the left side the student writes the problems and answers. The right side is used for correcting any errors. The students are encouraged to correct errors by recopying the missed problem and writing the correct answer. Dividing the paper with a vertical line makes it easier for the teacher to see which problems the students are having difficulty with and allows the teacher to do some monitoring of student progress. The paper and pencil activity is also used for all remediation sequences.

At the end of each lesson the students are assigned practice problems in the *Student Response Booklets*. The lessons in the booklet correspond to the lessons presented on videodisc. There are 25 to 35 questions per lesson. Teachers are encouraged to grade the practice problems before going onto the next videodisc lesson.

At the end of every four teaching lessons a Mastery Test is administered. Each test is divided into parts covering a specific skill. Test summary forms are provided to aid the teacher on where remediations are needed within each lesson. After all remediations have been administered, the teacher may move on to the next lesson.

Mastering Fractions contains a total of 35 lessons: twenty-eight instructional lessons and seven test lessons occurring after every fourth teaching lesson. The instructional lessons take between 30 and 50 minutes to complete without remediation. Presenting tests and remediations take between 15 and 40 minutes depending on the performance of the students. Ideally, the 35 lessons should be presented one per class period. Thus, if used consistently, the entire *Mastering Fractions* program can be completed easily in seven to nine weeks.

Dependent Measures

Pre-Posttest. The pre-posttest was developed from the *Mastering Fractions* objectives and a scope and sequence chart for fractions from a sixth grade math basal series. A 69-item test was developed that included test items measuring each of the 12 objectives covered in *Mastering Fractions* as well as those fraction skills listed in the basal scope and sequence chart. All students participating in the evaluation (Part 1 and 2) were tested prior to the beginning of the evaluation and again at the end of the study.

Mastery tests. The two-page mastery tests review information taught in the previous four lessons. Reliabilities were calculated for the pretest (.93) posttest (.93) and the seven mastery tests (.68-.90 average = .80). The Alpha coefficients indicate good internal consistency.

Teacher logs. Teachers kept daily logs on the use of *Mastering Fractions*. In these logs teachers recorded the number of minutes spent grading homework, the number of minutes to complete the lesson, and comments on the effectiveness of the lesson. These logs were mailed to the project coordinator on a weekly basis.

Teacher interviews. Following the evaluation, the teachers were given a structured interview to gain information that may have been omitted from the daily logs and to get an overall impression from the teachers concerning the program. Interviewers used a set of predetermined questions, however, both the teachers and interviewers were free to discuss any issue concerning the use of *Mastering Fractions*.

Student interviews. A randomly selected set of students was also interviewed. Four students were selected from each class participating in the evaluation. An equal number of males and females were interviewed. A set of questions was used to structure the interview, but the interviews were not constrained by the questions.

Part 1: Experimental Study

Part 1 of the evaluation was an experimental study that attempted to factor out any novelty effect attributed to the videodisc medium of *Mastering Fractions* before comparing its effectiveness to another instructional medium. In this study the content of *Mastering Fractions* was compared using two presentation formats: (a) videodisc, and (b) a teacher using overhead transparencies. In condition (b), a half-time aide was added to help monitor student performance. These two conditions were then compared to a third teacher-presented curriculum (part 2) that served as a control condition.

Subjects

The study was conducted in the Metropolitan Nashville Public School System. The Metro Nashville system represents an urban school setting serving approximately 55,000 students. The classes studied were four sixth-grade math classes from an intercity middle school. Two of the classes were classified as high-ability and two were classified as average-ability classes. A total of 83 students participated. The racial make-up of the students was 40% Caucasian and 60% Black.

Prodecures

The study compared the effectiveness of the *Mastering Fractions* videodisc program with two contrast conditions. In the first contrast condition, the teacher used all of the *Mastering Fractions* materials except the videodisc itself. The teacher attempted to emulate as closely as possible the instructional methodology presented by the disc. Thus, students in this treatment condition received the same instructional content as students in the videodisc condition, the only difference being that the *Mastering Fractions* content was presented totally by teachers using overhead transparencies and not by videodisc.

The second condition was also teacher presented. In this condition students received the fractions curriculum used by the Metro Nashville Public School System. The Metro fractions curriculum is a spiraling curriculum where the students receive fractions instruction several times throughout the year, with each spiral through the curriculum building on previous instruction.

Two of the four experimental classes, one high-ability and one average-ability, were randomly divided with half of each class being assigned to the *Mastering Fractions* Videodisc (MF-Video) condition and the other half being assigned to the teacher emulated *Mastering Fractions* (MF-Teacher) condition. Students were assigned to the *Mastering Fractions* conditions using a stratified-random-sampling procedure based upon pretest scores.

The students in the *Mastering Fractions* conditions received instruction for a total of 39 school days (8 weeks). Because instruction with the average-ability classes required additional time for remediations, *these students completed only 25 of the 35 lessons* before the end of the school year. The high-ability classes, however, completed all 35 lessons.

Analysis. A 3x2 analysis of covariance was used to determine if differences existed between the three treatment groups on the posttest. Analysis of covariance was selected as a means of testing for group differences in an effort to control for potential differences in pretest scores between groups. Additionally, by using predicted scores based on pretest, the procedure helps to mitigate against regression effects which frequently distort change score data. Finally, Scheffe's S Method was used to determine the source of the signigicant differences from the ANCOVA.

Results

Descriptive data describing the pretest and posttest results for the three treatment conditions are shown in Table 1. Students receiving the two *Mastering Fractions* treatments scored higher on the posttest than did the control students receiving the Metro fractions curriculum. Further, the overall gains from pretest to posttest were greater for the *Mastering Fractions* students.

The analysis of covariance (ANCOVA) indicated that a significant difference existed between the three treatment conditions, $F(2,82) = 31.62$, $p < .01$. No differences were found for the ability level or treatment x ability level.

A follow-up Scheffe test was conducted to determine the source of the significant difference from the ANCOVA. The results from the Scheffe indicated that the students receiving the *Mastering Fractions* treatments did not score significantly different from each other on the posttest.

Finally, data from the two *Mastering Fractions* treatments were analyzed in terms of the precent of problems solved correctly on the pretest, posttest, and seven mastery tests. On Mastery Tests 5 through 25, students in both treatment conditions scored over 80% correct with an average of 91.5%. There was an unexplained drop (to the low 70s) in the percent of correct problems on Test 35 for the high-ability groups. This drop in performance was not evident in the posttest where the high-ability groups

Table 1. Mean, Standard Deviation, and Percent Correct on the Pretest and Posttest for the Experimental and Control Classes

		MF-Video		MF-Teacher		Control	
		Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
High-Ability	Mean	43.40	61.80	43.60	58.90	51.70	53.90
	SD	10.43	4.52	9.34	8.25	8.68	6.07
	N	10	10	10	10	20	20
Average-Ability	Mean	26.83	52.92	26.91	52.00	30.75	39.65
	SD	6.24	5.12	6.95	8.02	8.77	10.31
	N	12	12	11	11	20	20

Continued from Page 7

averaged 87.5% correct. Although the average-ability groups scored below 80% on the posttest this should be expected since they did not complete the final 10 lessons.

The results of the data analysis form the basis for several conclusions. First, the achievement gains resulting from the use of *Mastering Fractions* can be attributed to instructional content and methodology. There appears to be little novelty effect as a result of the videodisc medium. Second, *Mastering Fractions* was more effective than the existing fractions curriculum used in the experimental school.

Part 2: Descriptive Study

The purpose of Part 2 of the evaluation was to examine the effect of *Mastering Fractions* videodisc program on student learning in a variety of *in situ* settings. There was no attempt in this part of the evaluation to compare *Mastering Fractions* against other programs.

Subjects

Three school systems were selected by the Tennessee Valley Authority as field sites for evaluating *Mastering Fractions*. These sites were chosen based on demographic characteristics that were representative of school systems served by TVA. Geographic location and size of the school systems were the two primary criteria for selection.

The three sites were: Ashville, North Carolina, Avery County, North Carolina, and Lauderdale County, Alabama.

In Avery County a class of 28 ninth graders enrolled in a general mathematics class participated in the program. In Ashville, four classes and three teachers participated in the evaluation. The Ashville classes included one fifth grade with 14 students, two academically advanced sixth grade classes totaling 26 students, and one ninth grade general math class with 28 students. In Lauderdale County, one class of 25 low average eighth graders in general math and one class of 22 ninth graders in general math participated.

Procedures

All teachers were first given a one-day training session on the use of *Mastering Fractions*. Following training, each field site received one set of *Mastering Fractions* discs, an *Instructor's Manual*, and enough *Student Response Booklets* for each participating student.

The 69-item pretest was given to each student. Following the pretest, teachers were instructed to use *Mastering Fractions* as described in the *Instructor's Manual*. All teachers kept a daily log that described the use of the program. The log was returned each week by mail to the project coordinator.

Consistency of implementation varied across the field sites. Some teachers used the program on a daily basis while others were much less consistent. Data showing the beginning and ending dates and the number of school days needed to complete the program are shown in Table 2.

As shown in Table 2, the teacher in Class 4 completed only 25 of the 35 lessons. The teacher reported that she elected not to complete all 35 lessons because the lessons were becoming too difficult for her class and that they were getting tired of the program.

Every five lessons, the teachers administered a Mastery Test to the students. These tests were graded by the teachers, shown to the students, then mailed to the research coordinator for scoring verification and analysis.

At the completion of *Mastering Fractions*, all students were posttested using the same test that was used for the pretest. In addition, four students were randomly selected from each class for follow-up interviews and all participating teachers were interviewed.

Table 2. Number of Days Required to Complete the Mastering Fractions Program in the Field Sites

Class	Beginning Date	Ending Date	Number of school days to complete 35 lessons
(1)	1/30/86	3/21/86	36 days
(2&3)	1/13/86	3/05/86	38 days
(4)	2/10/86	4/21/86	51 days (25 lessons)
(5&6)	1/14/86	3/21/86	48 days
(7)	1/9/86	4/22/86	73 days

Four of the seven classes averaged 80% correct or higher on the posttest. Of the three classes that scored below 80%, Class 4 completed only 25 lessons, and the teacher in Class 7 spread the instruction over 73 school days requiring almost twice as long as the more successful teachers to complete the instruction.

In order to determine if students made significant pretest to posttest gains a repeated-measures *t*-test was conducted on the pretest and posttest scores for each of the seven classes. The results of the analyses are shown in Table 3. The analyses revealed that all seven classes made significant pre- to posttest gains. Classes 1, 2, 3, 5, and 6 made gains that were significant at the .01 level of significance and classes 4 and 7 made gains that were significant at the .05 level.

In addition to the pre-post *t* -tests, An ANCOVA was conducted on the posttest scores for the seven field site classes with the pretest scores being used as a covariate. The results of the ANCOVA indicated a significant difference existed between the seven classes on the posttest, $F(6,129) = 21.27$, $p < .01$.

A follow-up Scheffe test was conducted to determine the source of the significant difference from the ANCOVA. Thirteen of the 21 possible comparisons were significant. Classes 2 and 3 form one group representing a high-achievement level. Classes 1, 5, 6, and 7 form a group representing medium achievement. Class 4 stands out as a lower-achieving class. Class 4 was lowest in pretest and taught fewer lessons. Whether this is a result of poorer teaching or the students lacking necessary preskills is unclear.

Discussion

The results of the two-part evaluation support several conclusions concerning student achievement outcomes. First, the use of *Mastering Fractions* resulted in statistically significant pretest to posttest gains in all classes participating in the study. However, the magnitude of the gains and the percent of correct responses on the posttest measure varied across classes. It should be noted that the largest pre-post gains and percent correct on the posttest were found in classes where all 35 of the *Mastering Fractions* lessons and tests were completed within an eight-week period. Several reasons could be posited for this finding. One is that the daily use of the program resulted in greater mastery of the concepts since the massed instruction allowed students to practice and use newly learned concepts before they were forgotten.

A second possible explanation for why the greatest gains were found in classes where *Mastering Fractions* was used consistently is that perhaps these teachers were simply more dedicated and better teachers. This would suggest that the *Mastering Fractions* program is not teacher-proof. Even though the instructional content of the program is held constant through the videodisc medium, if teachers fail to use the program in the prescribed manner, then the benefits of the program are weakened. It is possible that the relationship that we found between higher mastery scores and consistent use of the program is an artifact of good teaching. Since the research on effective teaching shows that good teachers are more organized, it is possible that consistency of use is simply a measure of organization and structure.

Although all classes receiving *Mastering Fractions* showed significant achievement gains, one rival hypothesis is that these gains were a result of a novelty effect produced by the videodisc medium. The results from Part 1 of this evaluation suggest that this rival hypothesis should be rejected. The posttest scores comparing *Mastering Fractions* Videodisc and Teacher conditions showed no significant differences between the two groups. Thus, the results suggest that student gains should be attributed to the instructional content and methodology of the instructional program and not to the medium itself.

Table 3. Comparison of Pretest and Posttest Gains for the Field Sites

		Pretest	Posttest	*t*
Class 1	Mean	42.76	55.28	9.15**
	SD	8.28	8.31	
	N	25	25	
Class 2	Mean	38.40	64.00	10.03**
	SD	9.17	2.36	
	N	10	10	
Class 3	Mean	26.93	59.93	13.52**
	SD	10.16	4.50	
	N	15	15	
Class 4	Mean	19.36	28.93	2.92*
	SD	3.18	13.30	
	N	14	14	
Class 5	Mean	28.28	47.40	10.40**
	SD	8.83	10.13	
	N	25	25	
Class 6	Mean	47.14	56.18	6.87**
	SD	10.70	7.44	
	N	22	22	
Class 7	Mean	30.63	37.58	2.68*
	SD	10.81	13.40	
	N	19	19	

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

It is important here, however, to point out that the discussion above does not suggest that the videodisc medium is not important to the *Mastering Fractions* program. One the contrary, it would be virtually impossible to produce across the board student gains without the use of the videodisc medium. The videodisc medium provides educators with the ability to capture high quality interactive instructional sequences that can be easily transported from classroom to classroom without a resultant degradation in the quality of instruction. Also, we had to use a half-time teacher aide in the *Mastering Fractions* Teacher condition. This is not an insignificant cost.

If teachers were to replicate the instruction used by the *Mastering Fractions* Teacher treatment, first they would have to be trained in the content and methodology of the *Mastering Fractions* program. Second, they would have to be extremely careful so as not to change the content and methodology from presentation to presentation and year to year. With *Mastering Fractions* this is not a problem since the instructional content and methodology is built into the videodisc and is unalterable. By combining the sound instructional content and methodology of *Mastering Fractions* with the videodisc medium the result is a robust instructional package that is transportable from classroom to classroom. If used as designed, *Mastering Fractions* provides teachers with an effective and motivating tool for presenting an extensive fractions curriculum.

Although data from this evaluation show that the use of results in statistically significant pre- to posttest gains, it could be hypothesized that these gains would have occurred without the use of *Mastering Fractions*. However, data from Part 1 of this evaluation cause this hypothesis to be rejected. The results indicated that students receiving the *Mastering Fractions* treatments (Video and Teacher) scored significantly higher on the posttest than did students receiving the alternate curriculum. The most significant aspect of the finding is that even though the average-ability groups receiving the *Mastering Fractions* treatments received only 25 of the 35 lessons, these students still scored significantly higher on the posttest than even the high-ability group that received the alternate fractions curriculum. This finding would suggest that when used correctly, even receiving a portion of the *Mastering Fractions* program could be more beneficial to students than existing fractions instruction.

Teacher and Student Perceptions

Teacher interviews. When asked about the difficulty in operating the videodisc player, all of the teachers in the study said that it was either "easy,"

Continued on Page 10

Mastering Fractions

Continued from Page 9

or "moderately easy" to operate. The only difficulty reported was that sometimes pressing the PLAY button instead of the STEP button on the remote control caused the program to fast forward which required a few extra minutes to find the appropriate place in the program again.

When asked how *Mastering Fractions* was useful as a teaching tool the responses included:

"It presented material in a way that was interesting to the students. It allowed the students to visualize the concepts they were learning."

"The videodisc presented material slowly and with reinforcement so it was easy for the children to learn."

"The sound effects and movement were always changing so it kept the students' attention."

"Almost all of the students did more work than normal. They responded well to the disc, and their grades improved considerably."

When questioned about any negative aspects of the program the teachers all agreed that there were only a few negative aspects. Some that were reported included:

"The program did not emphasize simplification nearly enough to satisfy CAT requirements."

"The students became bored with the copying of problems from the video screen."

"I would shorten some of the lessons that were more repetitive and sometimes present more that one per day."

"The students became frustrated with the darkened answer boxes and not enough room to do computations in the workbook."

When the teachers were questioned on how their students liked *Mastering Fractions*, the common response from all of the teachers was that the students liked the program more at the beginning than at the end. However, one teacher said:

"Now that the program is over they ask everyday when we will be able to use the disc player again."

One comment that seems to typify how the teachers felt about *Mastering Fractions* was:

"I loved being able to access a disc. The fractions program was well thought out and used sound teaching concepts. The problem is that we 'human-type teachers' like to do things our way and we are all different. I would prefer to integrate the use of the disc in with my regular program and not use it in a canned approach."

Student interviews. When asked what they liked most about *Mastering Fractions* the students gave a variety of answers. All had positive comments about the program. Some of the most common responses included:

"Starts easy and reviews then goes on to the harder lessons."

"The tests and reviews were easy."

"Explains the problems well and gives lots of practice."

"Received great grades."

"Made fractions much easier to understand."

"Talked about the problems and showed pictures of the fractions, didn't just give assignment with no instructions."

"The animation was very good."

"Easy to understand."

When asked what they liked least about the program, the most common response was that by lesson 25 or 30 they began getting tired of doing fractions. Some of the comments were:

"After a while there were too many reviews."

"The quizzes were long and we had to do them even if we were getting 100% correct each time.

"Didn't progress as fast as regular math, had too many quizzes."

Even though the students said that they tired of the program, when asked how much they learned about fractions, 90% of them responded with, "a lot," or "more than I expected." Thus, they felt that they were learning from the program.

Further, when asked if *Mastering Fractions* was a "good teacher," every student interviewed responded with a "yes." When asked why they felt that way, the general responses were:

"The program made it easy to pay attention, it was more interesting."

"The program taught with pictures and graphs which made it more interesting."

"Explained it more than the teacher does, easier to understand."

"It gave examples and showed you how to do the problems before giving you assignments."

"The program adds-on from past lessons."

When asked, "If you had a choice as to how you would learn fractions, what would it be?", three-fourths said that they would like to use the *Mastering Fractions* program and the remaining one-fourth said they would like to learn fractions on a computer. *None* of the students said that they would like to learn from a teacher.

When asked how they would make the program better, a variety of comments were given. They included:

"Cut out some of the reviews and introduce the short ways to do the problems."

"We already knew the short ways and to go back to the long ways was a pain."

These comments were especially interesting in that *Mastering Fractions* avoids teaching "short cuts" since it is often the short cuts that cause students the greatest difficulty when they move into algebra. Often the short cuts that they have learned are conceptually inaccurate and lead to misunderstanding in higher level math course.

Other comments on how to improve the program included:

"Make the questions harder."

"Would take out the reviews."

"Change the pace, make it go faster."

Finally, when asked what their feelings about this experience were, the general responses included:

"Would like to learn other subjects from the videodisc."

"Liked the disc, something new and different."

"Bored with the disc or the program, maybe another subject would be better."

"Looked forward to using the videodisc each day."

"The program was more fun than regular class."

"Left yawning."

"Liked it much better than regular books and class."

The overall response of the students who were interviewed was quite positive. In the interviews it was clear that the students felt that they had learned a great deal from the program. When asked how they knew they had learned something they usually responded with, "I did well on the quizzes and the tests." The only complaint from the students was that they grew tired of the program toward the end. However, a number of students stated that they would enjoy other subjects being presented on videodisc which would indicate that they were just tired of learning about fractions and not of the videodisc medium.

Summary

The results of this evaluation suggest that *Mastering Fractions*, when used as designed, is a powerful instructional tool for teaching fractions concepts and skills to students exhibiting a wide range of ages and abilities. It appears from this evaluation that the effectiveness of *Mastering Fractions*, like other instructional programs, is somewhat dependent upon the commitment and quality of the teacher using the materials. In other words, the program does not appear to be teacher-proof.

The results of the evaluation further suggest that the achievement gains attributed to the use of *Mastering Fractions* are a result of the instructional content and methodology underlying the program and are not attributed to a novelty effect of the videodisc medium. Thus, when used appropriately, one should expect for students to attain the instructional objectives as outlined in the *Mastering Fractions* program.

Finally, it would appear that *Mastering Fractions* is regarded highly by teachers and students. Teachers find the program easy to implement and the technology to be friendly and not difficult to operate. Further, they report that the program is instructionally sound and highly motivating to students. Similarly, students report that they enjoyed using the program, that they felt that they learned a great deal from the program, and that would recommend the use of *Mastering Fractions*with other students.

References

Clark, R.E. (1983). Reconsidering research on learning from media. *Review of Educational Research*, 53(4), 445-59.

Rosenshine, B., & Stevens, R. (1986). Teaching functions. In Wittrock, M.C. (Ed.), *Handbook of research on teaching (3rd ed.)*. NY: MacMillan Publishing Company.

Schramm, W. (1977). *Big media little media.* Beverly Hills, CA.: Sage.

Systems Impact, Inc. (1985). *Core Concepts in math and science: A series of educational videodiscs.* Washington, D.C.: Systems Impact, Inc., 4400 MacArthur Boulevard, N.W.

Is DI Only

by Edward Schaefer
Cape Henlopen School District
Nassau, Delaware

Direct Instruction, as a set of generic teaching strategies, has amassed a solid support base in the research literature over the past ten years (Cotton & Savard, 1982; Rosenshine & Stevens, 1981; Rosenshine, 1983). In the same manner, a variety of Direct Instruction curricula (such as the *Distar Reading, Language*, and *Arithmetic*) have proven remarkably effective in promoting student achievement in basic skills (Cotton & Savard, 1982; Fabre, 1983). Such curricula are based upon two premises: (1) that students' learning in the classroom is a function of environmental events, and (2) we, as educators, can increase the amount of students' learning by carefully engineering the details of students' interaction with the classroom environment. The curricula integrate those generic Direct Instruction teaching strategies with a set of curriculum design features drawn from empirical behavior theory (applied behavior analysis), the logical analysis of concepts and tasks, and the empirical analyses of classroom resources, especially the use of time and personnel (Becker, et al., 1981).

At times, however, one hears that Direct Instruction stategies and, especially, direct instruction programs are appropriate *only* for low achievers; and that such programs would have a debilitating effect on average and above-average students (Ogletree & Depasaligne, 1975). That such programs are appropriate for most low achievers would seem to be a matter of fact (Becker & Carnine, 1980). That they are appropriate only for low achievers would appear to represent a position based more upon assumptions, philosophies, and perceptions than upon empirical evidence.

It is our purpose here to present empirical evidence that would address the appropriateness of one such Direct Instruction program, *Reading Mastery* (Engelmann, et al., 1983), for average and above-average students in regular classroom settings.

Reading Mastery is a direct instruction basal reading program for grades K-6. The programs for grades K-2 are revisions of the *Distar Reading* Series (1974 & 1975 editions). As such they emphasize decoding accuracy and fluency for the beginning reader, and the development of literal and inferential comprehension skills.

Reading Mastery program for grade 3 is also a revision of a previous edition of *Distar Reading. Reading Mastery* Level III emphasizes reasoning and reference skills; comprehension of new vocabulary and complex sentence forms; the interpretation of maps, graphs, and timelines; and the application of facts, rules, and schema to a wide variety of contexts. Levels IV-VI are entirely new. Level IV emphasizes problem-solving skills and reading in the content areas. Students are taught to comprehend new vocabulary and sentence forms, acquire information about the world, evaluate problems and solutions, and complete research projects.

Continued on Page 11

for Low Achievers?

Levels V & VI emphasize literary and writing skills. Students are taught to comprehend figurative language and predict vocabulary from context; to analyze characters, settings, plots, themes, and arguments; to infer the main idea; to create outlines and complete writing assignments; and to apply these skills to the classic novels (e.g., *Tom Sawyer*), short stories (e.g., *The Necklace*), biographies (e.g., *Harriet Tubman*), poems (e.g., *Casey at the Bat*), and expository articles (e.g., *Schools in the 1840's*) provided in the program, *and* to any such material encountered outside their formal reading program.

Engelmann & Carnine (1982) report a study in which the previous edition of the *Distar Reading* program was used by a class of 30 average and above-average second graders. End-of-year assessment on the primary battery of the Stanford Achievement Test showed a mean reading grade level of 4.6 for the 30 students. The difference between the distribution of scores and the expected distribution was significant at the .001 level. No student in the group achieved a Stanford Reading Score less than 2.6 grade level.

Pre-publication validation studies (SRA, 1983) by the program authors of the revised (Levels I-III) and new levels (IV-VI) of the *Reading Mastery* program were conducted with a full-range of below-average, average, and above-average students. Daily student success rates on all decoding and comprehension tasks presented in the program were the primary data source. Allocated and engaged time data were also collected, as was information from teacher and student interviews. Data were collected using "permanent products" of student work and weekly observations in the classroom by outside observers, who also assessed each teacher's fidelity to the program as stipulated in the teacher's manual for each level. During and immediately after the first phase of study, those parts of the program that failed to produce consistent student success rates of at least 85% were re-designed or re-written. Following these revisions and during the second phase of classroom tryout the authors indicate that daily success rates were consistently at or above criterion across the validation classes, and that only relatively minor revisions were necessary. The use of actual time and daily student success rate measures, in combination with a two-phase revision process, represents an approach to effective teaching that is quite consistent with the often demonstrated, process-product relationship between student achievement and "academic learning time" (the amount of time students are *successfully* engaged in task-related activities). Each level (I-VI) of the *Reading Mastery* program was put through this two-phase process separately, with 2-3 years of classroom data collected during the two try-out and revision cycles for each level of the program.

During the 1984-85 school year the writer coordinated a "pilot study" of *Reading Mastery* in one regular fourth grade and three regular fifth grade classrooms in an intermediate school of about 300 students. The school is located on Delaware's Atlantic seaboard and serves a predominantly middle-class population. Minority students represent about 25% percent of the student body. The school contained 4 classes each of grades 4, 5, & 6; average class size was 25 students of mixed ability and achievement levels. Students were placed in classes by the building principal so as to create a heterogeneous balance using achievement, gender, and race as primary criteria; and individual student maturation and learning style as secondary criteria. Prior to the 1984-85 school year *Reading Mastery* had been used only for special education and basic skills students, with very good results. Students in regular classrooms used *Keys to Reading* (The Economy Company, 1980). The school had been using *Keys to Reading* for five years.

In the fourth grade each of the four teachers taught reading to their own class. One teacher used *Reading Mastery* and the remaining three teachers continued to use *Keys to Reading*.

In the fifth grade reading was taught by only 2 of the 4 teachers; each "reading" teacher was responsible for her own class and one other. One of the fifth grade teachers used *Reading Mastery* for both of her reading classes, while the second fifth grade teacher used *Reading Mastery* for one class and *Keys to Reading* for the other.

All six teachers involved in this study had at least 10 years of teaching experience and were highly rated by administrative staff. All six teachers had taught at the school for at least five consecutive years and had used *Keys to Reading* throughout that time. Consequently the teachers using *Keys to Reading*, and their students, were very experienced with the program and had demonstrated their competence in using it. The three teachers who had volunteered to use *Reading Mastery* were using the program for the first time, as were their students. These three teachers did receive 6 hours of training in *Reading Mastery* prior to the school year, and were visited once in the classroom during the school year by a trainer/consultant .

As a matter of State mandate in Delaware, all students in grades 1-8, and 11 are tested annually using a standardized, norm-referenced achievement test. Students are tested according to their assigned grade level regardless of their current levels of academic achievement. In March of 1984 and again in March of 1985, the Comprehensive Test of Basic Skills (CTBS) was administered to all students using the level of test assigned to their respective grade levels (i.e., Level "E" in third grade, "F" in fourth grade, and "G" in fifth grade).

Table 1 shows the mean NCE (normal curve equivalent) scores for the 4 fourth grade classes. An NCE score of 50 represents the national average; the standard deviation is 21. In addition to the 2 reading subtests (Vocabulary and Comprehension) and the composite Total Reading score, Table 1 also shows the results for the CTBS spelling subtest. The same fourth grade teacher who was using *Reading Mastery* also was piloting a Direct Instruction spelling program —*Spelling Mastery* (SRA, 1980). The other fourth grade teachers continued to use *Keys to Spelling* (The Economy Company, 1981).

All of the fourth grade classes were above or well above the national average according to their 1984 scores. Of the 12 possible comparisons between *Reading Mastery* and *Keys to Reading*, based on the "gains" from 1984 to 1985, all 12 favored the *Reading Mastery* program. All 4 spelling comparisons favored *Spelling Mastery*.

Table 2 shows the CTBS scores for the fifth grade. The Economy 1 class and the Reading Mastery 1 class were both taught by another fifth grade reading teacher. Based upon the 1984 scores, all 4 classes were above average, with the Ecomony 1 and Reading Mastery 3 classes scoring 1 standard deviation and 1⅓ standard deviations above the national average respectively. As with the fourth grade, all 12 comparisons, based on '84-85 gain scores, favored *Reading Mastery*. Especially noteworthy is the comparison between the Economy 1 and Reading Mastery 1 classes, since these 2 classes were taught by the same teacher. The difference in gain scores on the comprehension sub-test totals 7.1 points or ⅓ of a standard deviation. This is an educationally significant difference favoring the *Reading Mastery* class.

Additionally, each *Reading Mastery* teacher was interviewed and submitted written feedback concerning the effectiveness of *Reading Mastery* in a regular classroom. Each of these teachers indicated a decided preference for *Reading Mastery*, and wished to use it again during the '85-86 school year. The fifth grade teacher who used *Keys to Reading* for one of her classes stated that she wished to use *Reading Mastery* exclusively during the next school year.

All 28 comparisons of gain scores from the CTBS favored the Direct Instruction programs (i.e., *Reading Mastery* and *Spelling Mastery*). All the teachers who used these programs thought them most effective and requested to use them again the following year. Likewise student reactions to the Direct Instruction programs were enthusiastic. Such results with average and above-average students are quite consistent with those of many previous studies demonstrating the effectiveness of Direct Instruction with low-achieving students.

Now what of our original question: "Is Direct Instruction only for the low-achiever?" Apparently not. Considering all of the information presented here, the pattern seems quite clear: Good teaching profits everyone!

Editor's note: In interpreting Table 2 gain scores, be careful not to think in terms of Grade Equivalent Scores. These are standard scores where "no gain" means the students progressed a year in reading for a year in school. The negative scores in Table 2 indicate that some groups did not quite progress a year. If you divide the gain by 21 (e.g., 7.5/21 = .357) you will have the gain against the norm group in standard deviation units. The gains shown are consistently in favor of Reading Mastery, *but the differences between* Reading Mastery *and* Economy *are not great, ranging from .10 to .33 standard deviation units. One would have to conclude that, as used by these teachers with these students,* Economy *is also an effective program.*

Table 1. CTBS Results
Reading Mastery Pilot

Grade 4	Vocabulary			Comprehension			Total Reading			Spelling		
	'84	'85	Gain	'84	'85	Gain	'84	'85	Gain	'84	'85	Gain
Economy 1	66.7	72.4	5.7	63.5	68.1	4.6	65.6	70.8	5.2	64.3	67.6	3.3
Economy 2	65.5	69.5	4.0	56.4	66.0	9.6	61.3	68.0	6.7	67.6	71.0	3.4
Economy 3	58.6	65.0	6.4	58.0	68.0	10.0	58.6	66.2	7.6	66.9	71.2	4.3
Economy Average	63.6	68.9	5.3	59.3	67.3	8.0	61.8	68.3	6.5	66.3	69.9	3.6
Reading Mastery 1	58.0	65.5	7.5	56.7	66.8	10.1	57.6	66.3	8.7	58.0	62.6	4.6

Table 2. CTBS Results
Reading Mastery Pilot

Grade 5	Vocabulary			Comprehension			Total Reading		
	'84	'85	Gain	'84	'85	Gain	'84	'85	Gain
Economy 1	71	69	−2.0	69.7	65.7	−4.0	70.4	67.6	−2.8
Reading Mastery 1	61.0	63.5	2.5	64.6	67.7	3.1	63.0	65.3	2.3
Reading Mastery 2	68.1	69.3	1.2	66.8	69.9	3.1	67.2	69.5	2.3
Reading Mastery 3	77.4	77.0	−.4	71.2	74.0	2.8	74.5	75.7	1.2
Reading Mastery Avg.	68.8	69.9	1.1	67.5	70.5	3.0	68.2	70.2	2.0

References

Becker, W.C., Engelmann, S., Carnine, D., & Rhine, W. The Direct Instruction Model. In Rhine, W. (Ed.) *Making Schools More Effective: New Directions from Follow-Through.* New York, N.Y.: Acamdemic Press Inc., 1981.

Becker, W. & Carnine, D. Direct Instruction: An effective approach to educational intervention with disadvantaged and low performers. In Tabey, B. and Kazdin, A. (Eds.) *Advances in Clinical Child Psychology.* New York, N.Y.: Plenum Publishing Corporation, 1980.

Cotton, K. & Savard, W.G. *Direct Instruction: Topic Summary Report,* Northwest Regional Educational Laboratory: Portland, Oregon, 1982.

Engelmann, S. & Carnine, D. *A Structured Program's Effect on the Attitudes and Achievement of Average & Above-Average Second Graders,* University of Oregon: Eugene, Oregon, 1980.

Fabre, T. *Application of Direct Instruction in Special Education: An Annotated Bibliography,* University of Oregon: Eugene, Oregon, 1983.

Ogletree, E. & Depasalegne, R. Intercity Teachers Evaluate Distar, *Reading Teacher,* April 1975, 634-637.

Rosenshine, B. Teaching Functions in Instructional Programs, *Elementary School Journal* (March 1983), 335-351.

Science Research Associates, Inc. *Field Testing the Reading Mastery Program,* Chicago, Illinois: 1983.

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

Two Case Studies of Instructional Management in

by William Green
Andrew College
Russell Gersten
Bruce Miller
Martha Morvant
University of Oregon

This research was supported by the National Institute of Education (NIE) but does not necessarily reflect the views of that agency.

An earlier version of this paper was presented at the annual conference of the American Educational Research Association, Chicago, Illinois, March, 1985. The authors wish to acknowledge the contributions of Douglas Carnine, Adrienne Allen, Craig Darch, Anita Archer, Margie Tomsic, and Margie Mysko to the conceptualization and implementation of the research. The authors wish to thank Phil Runkel for his invaluable feedback on earlier versions of this paper.

In 1983, Ron Edmonds concluded that "we know far more about the characteristics of effective schools than about how they [schools] become more effective." That assertion is still true today. The purpose of this study was to document two schools involved in the process of school improvement, two schools attempting to become more effective. In particular, we were interested in the role of the principal. Studies have consistently shown that, in schools that are unusually effective in serving low-achieving, low-income students, typically the principal is perceived as an instructional leader. Many—from state legislators to educational researchers—have made the seemingly reasonable inference that the principal must take a strong role in instructional management if a low-achieving school is to improve its academic performance. Yet, as we pointed out four years ago (Gersten, Carnine & Green, 1982), it is unclear from the research just what the role should look like, which specific activities on the part of the principal lead to improvement in the quality of classroom instruction. Most of the studies relied on teachers' reports of the principal's behavior (e.g., Andrews, Soder, & Jacoby, 1986) or brief visits to the school (e.g., Edmonds, 1979). A major goal of this study was to flesh out—with detailed naturalistic observation—exactly what principals do in schools undergoing school improvement. Unlike previous studies of this nature (e.g., Bossert, Dwyer, Rowan & Lee, 1982; Morris, 1981) we examined schools in the throes of improvement activities, rather than schools that already were deemed effective. An important secondary theme in the research was the role of the instructional supervisor in the process. Many researchers (Hall, 1986; Cox and Loucks, 1986) have discovered that change in schools often requires the efforts of two individuals—the principal and an instructional supervisor/consulting teacher. Each of the schools in the study had a consulting teacher on the staff. The main role of the consulting teacher was to support ASAP, the All Schools Achievement Program, our pseudonym for the district's school improvement program. We attempted to describe the role of these individuals, their working relationship with the principal, and the impact they had on teachers. For reasons that will become clear as one reads this report, due to circumstances beyond our control, this aspect of the study was not very successful. One of the consulting teachers was promoted right in the middle of the study; another was recently hired and did not seem representative of those in similar positions. In fact, the role of the consulting teacher became the major imphasis of a subsequent study conducted in the same district (Gersten, Green & Davis, 1986). In the present report, we merely share our observations of what we saw, and what teachers told us about the two consulting teachers.

The case study involved 29 days of observation at each school. The principal was observed for 14 days and the instructional supervisors (alled consulting teachers) for 5 days. In addition, 6 days were spent interviewing teachers at each school. Interviews probed teachers' perceptions about what the instructional management team actually does, and their assessment of its usefulness. The result is a detailed account of the actual instructional management activities conducted in two inner-city elementary schools undergoing the fourth year of a school improvement program. Both schools served primarily minority, low-income students, and showed growth in achievement over the past four years, although one appeared to be more successful than the other.

A conceptual framework based on research conducted by Gersten and Carnine (1981) on instructional leadership guided analysis of instructional management in each school. This framework consists of six instructional management functions derived from an extensive review of the research literature on school improvement and successful educational innovation. Essentially, for a school improvement effort to be reasonably well-implemented, these six functions must be performed either by the instructional supervisor or the principal. (Gersten & Carnine, 1981, 1983; Gersten, Carnine & Green, 1982; Green, 1985).

These functions are listed in Table 1. As can be seen, the first four are directly observable. The latter two require a greater degree of inference from the observer.

Setting

The study took place in a large urban school system implementing a school improvement program in 35 elementary schools. In 1987, the school district was directed by the court to improve the reading, math, and language scores of its inner-city students within the next five years or face mandatory busing of students.

Since 1978, all 35 schools had been engaged in a school improvement program called the All Students Achievement Program (ASAP). The purpose of ASAP is to increase the quantity and quality of reading, math, and language in the elementary grades and, as a result, to raise achievement test scores. ASAP was developed entirely by the district and incorporates effective teaching practices including: mastery learning, time on task, and minimizing classroom disruption. It borrows, as well, certain components from the Direct Instruction (DI) model (Becker, Engelmann, & Carnine, 1981). Some of the 20 schools also use Direct Instruction in some primary grade classes instead of the ASAP program. This study examines the dynamics of instructional management in two of the 35 schools. A subsequent study examined instructional management in four additional schools (Gersten, Green & Davis, 1986).

To be included in this study, achievement test scores at the school had to show improvement over the past three

Continued on Page 13

Table 1. Instructional Management Functions

Activities and Behaviors of Instructional Managers
1. Provide supplies and curriculum materials.
2. Actively monitor student progress (using curriculum—or—criterion-referenced tests).
3. Monitor teacher performance in terms of instructional issues.
4. Provide specific, concrete, technical assistance to teachers (includes interpretation of test results, specific feedback based on observations, and interpretations of curriculum).
Climate Variables
5. Visible commitment to the instructional program (symbolic actions and statements).
6. Norms of collegiality, providing a climate of improvement, emotional support of teacher.

Schools with Low-Achieving Students

years. In addition, the principal had to be willing to participate in the study.

The two schools serve large student populations. Monroe Elementary, located in a racially mixed area, enrolls about 600 students. The ethnic mix in the year of the study was 70% minority (21 percent Black, 23 percent Hispanic, 26 percent Asian) and 30 percent Caucasian. All classrooms use the ASAP program. Haskell Hills Elementary is one of the larger elementary schools in the district with an enrollment of just over 1000 students. Seventy-eight percent of the students are classified as minority, with the Asian population (41 percent) being the largest. Blacks and Hispanics make up the remainder. Most classrooms use the district-developed ASAP program in reading and language arts; six primary teachers use Direct Instruction.

Methodology

Yin (1981, p.2) stated that the need to use case studies arises whenever: ". . . an empirical inquiry must examine a contemporary phenomenon in its real-life context, especially when the boundaries between phenomenon and context are not clearly evident." The study examines administrative leadership in its natural setting and aims to describe the working relationship between members of the instructional management staff (usually the principal and the consulting teacher) and the impact of the relationship on the teaching staff.

This study merged qualitative case study observational methodology with semi-structured interview techniques. At the core of the study were the observations of the principals and supervisors. In addition, 67 percent of the teachers in each school (randomly selected) were interviewed to obtain a detailed view of their perceptions of instructional management at the school. The data from these interviews were analyzed with quantitative techniques to ascertain commonalities and differences between the schools.

Observations of Prinicpals and Supervisors

Before the observations, the principals and supervisors were interviewed for approximately two hours, using two lines of questions. The questions dealt with the administrators' and supervisors' goals for instructional management and staff development for the school year. In addition, questions about the current status of the ASAP programs and any other administrative problems were asked. All of these orientation interviews were conducted by the senior author.

The method of observation was explained to each member of the management team individually. They were told that they would be shadowed or followed for a specified period, usually a day at a time. We asked to be involved in everything that went on during the day—parent and teacher conferences, classroom visits, and any meetings they would attend. Subjects were assured that what was seen and heard would be treated confidentially. Because the intent was not to disrupt the day-to-day management of the school, the members of the management team were told to signal if a particularly sensitive situation came up and we would leave. We tried to be unobtrusive, but asked clarifying or probing questions when appropriate.

Extensive field notes were gathered during the observation of the management teams. When a particular activity took place the time was written. Each time the activity changed the time was again written. The result was a running account of what happened during the observation with the amount of time devoted to each activity.

The observation data were assembled into chronological, narrative records that included interview notes, observation field notes, documents, and interpretive asides recorded by the field researchers in each setting. Analysis included a variation of Glaser and Strauss' (1967) "comparative method" framework. Categories from records, interviews, and observations were guided primarily by the concept of the six instructional management functions specified in Table 1. Patterns, repetitions, and contradicions with each category were noted and compared across the two schools.

"Typical days" for each administrator and supervisor were then written (Green, 1985). Excerpts from these typical days are presented in this report. Finally, the behavior of the administrators was analyzed according to the six instructional management functions (Gersten & Carnine, 1981).

Teacher Interviews

The interviews included an account of what teachers reported about the use of the Administrative Support Functions in their schools and their perceptions of the instructional program used in their school. Data were gathered from the interviews and organized around the six instructional management functions.

Between four and eight questions were written about each of the six support functions. Additional questions were generated to assess teachers' attitudes towards the ASAP program, and their views on whether ASAP enhanced achievement. The final instrument contained 48 questions, and took about 45 minutes to administer.

The semi-structured format was selected because it provided quantifiable categories of responses to questions, yet also allowed the gathering of rich anecdotal information.

The response to 38 of the items fit into easily quantifiable possible responses. In these cases, the interviewer checked the category under which the response fell. Ten of the remaining questions were open-ended, and detailed notes on the teacher's response were recorded by the interviewer. The two categories of questions are illustrated in items 21-22 below:

21. How do you think the principal feels about the ASAP or DI program?
    1. Very positive
    2. Positive but disagrees with some aspects
    3. Neutral
    4. Negative but agrees with some aspects
    5. Very negative
22. How was it shown?
23. Has the principal helped you in any way to implement the ASAP or the DI program?
    1. Yes 2. No

    If yes, in what ways?

Interviews were administered by two individuals with extensive experience in teacher training. One was an advanced graduate student, the other a consultant for the school district. The senior author also conducted several of the interviews. Interviewers were trained by the authors and reliability checks were administered.

Since three interviewers coded the responses independently, it was essential that inter-rater reliabaility be established. During three of the interviews, two interviewers were present, and each coded the data independently. The reliability coefficient of the coding was 94 percent agreement.

Results of the Case Study Observation of Administrators

The purpose of this section is to describe the dynamics of instructional management in two inner-city elementary schools. The reports of "typical days" in the lives of the management teams provide detailed, specific accounts of what management looks like in practice. The focus is on the working relationships between the members of the instructional management staff, as well as the attributes, beliefs, and philosophy of management personnel.

Monroe Meadows School

Excerpts from a typical day: The principal, Kim Smith. Kim arrives at school shortly before 8:00 and goes to her desk. She looks at the mail on her desk. At 8:12 the nurse comes in to talk about a possible placement of students in special education classes. They discuss each student and make decisions about testing, whether the psychologist or nurse needs to see the child or whether the case should be held over until the next year. A teacher comes in to see Kim at 8:20. This teacher had referred a child for counseling and the psychologist had given her a form to fill out. She is not sure how to answer some of the questions, and asks Kim for help. They discuss what needs to be written.

At 8:26 Kim is on her way to the yard. She tells several students who are sweeping the sidewalks they are doing a good job. The students put the grounds in shape each day before school.

At 8:31 Kim goes into the career education lab. The teacher tells her she has organized a number of lessons so teachers can borrow them. The lessons can be taken to the office and duplicated. She tells Kim 12 teachers from other schools have visited her, and she has spent about three hours helping each teacher. Kim tells her she should apply for one of the "mentor teacher" positions that are being developed by the district and funded by the state.

A teacher approaches Kim about a writing class she wants to take at one of the local universities. She has applied for a scholarship. She teaches a gifted cluster that emphasizes writing. Kim encourages her to apply and they discuss possible inservice activities for the staff if she participates in the class.

At 9:16 Kim visits both career education classes. In one room she watches students conducting an experiment. The students are very orderly. A point system is operating in the classroom and the students seem interested in what they are doing.

By 9:22 Kim is in the computer lab. She watches the students work. The teacher explains the assignment. Kim explains to me that each student is scheduled into the computer lab for about one hour per week. There are 90 students who belong to a computer club and use the lab any other time it is not scheduled.

At 9:29 Kim goes to another classroom. She visits seven classrooms in all, going from one to another. Her pattern is to enter the classroom quietly so as not to interrupt the teacher, to watch what is going on for a few seconds, then to go over to look at the ASAP charts that each teacher is required to have posted. These charts show curriculum progress and scores on mastery tests. Occasionally she asks a student about his or her seatwork.

At 9:47 Kim goes to the counseling center and talks to the couselors about students who have been having difficulties. Donna, the consulting teacher, comes in to talk to her about the ASAP book orders for the following year and is particularly concerned about the number of books needed written in Spanish. Kim comments that she noticed a student in one second grade classroom who is marked as one (fluent in English), yet cannot speak English at all. She feels that the teacher has turned the scale around, marking the limited English speaking students with a one instead of a four. This was found to be true later.

Back in her office, the telephone rings at 10:35. Kim discusses Monroe Meadows being chosen as an outstanding school by the state department of education. She talks about how it was chosen and about going to the state capitol to be given an award by the state superintendent of schools.

At 11:45 Donna comes in to see Kim about a teacher who did not have his ASAP progress charts posted in his room as required. They discuss what to do and Kim reminds Donna that the teacher's father was critically ill at the time.

At 12:00 Kim goes to the cafeteria area to check on who is on duty and to see how things are going. She then returns to her office, eats a sandwich and goes back to the yard by 12:28. She wanders around the yard area talking with a number of students for a minute or two.

The role of the principal. Kim Smith provided most of the direction for instructional management. A few of the day-to-day details of ASAP implementation (supplies, arranging for tutoring, collecting test scores) were delegated to the ASAP consulting teacher, Donna Felkey and her aide. The third critical individual in the school is the nurse, Darla Burch, who played an atypical role at Monroe. She coordinated special education testing and placement, and worked closely with the teachers on behavior problems and academic problems. By dealing with many of the problems a principal typically deals with, Darla freed up much of Kim's time for instructional issues. In this way, Kim was able to set her role priorities to focus on the instructional program.

Kim was actively involved in the development of the district's All Students Achievement Program (ASAP) and provided inservice training on the program, not only to her staff, but to other schools as well. She had been involved in a University of Texas study of

Continued on Page 14

an inservice teacher training program based on the teacher effectiveness research and had served as a trainer and dissemination speaker for both the Texas project and ASAP. Kim seemed to really believe in the concepts underlying ASAP (mastery learning, active teaching, and time-on-task).

Kim could be described as a "doer." She frequently stopped rather lengthy explanations that seemed somewhat off the subject by saying, "Yes, but what do you want me to do? Can we decide what needs to be done?" In reading the field notes, we found few statements that could be classified as philosophical. Kim usually told *how* she accomplished something, not *why* she did it. Her attitudes and beliefs were integrated into her actions. Because she delegated other responsibilities (such as lunch duty or handling of behavior problems), she was able to make classroom visits on a regular basis, (unlike most other principals in the district.) Kim often visited classrooms twice a week. Through her actions, she communicated clearly that her priorities were the instructional program.

Kim appeared to view herself as an instructional leader. She was able to, and in fact did, discuss instructional matters with her teachers on a regular and ongoing basis. When we discussed working with the staff in changing their teaching behaviors, Kim said she believed that the staff should come to her. Her usual pattern was to give a series of suggestions and not to tell them, "Now you have to change this." Rather, "What would you think about trying this? Maybe we can figure out how to make your life easier."

Part of the ability to build a strong instructional staff is in being able to hire competent teachers who are compatible with the program and philosophy of the school. Kim was able to do this. She knew the rules and regulations and found ways to use them to her advantage. Also, Kim protected the new teachers she hired. Often, new staff are transferred from school to school as population shifts. Kim has been able to build (and protect from transfer) an excellent staff.

Excerpts from a typical day: The ASAP consulting teacher, Donna Felkey. Donna arrives at school at 8:25 with a large bouquet of flowers. She goes to the staff lounge and arranges the flowers in vases in each table in the room. She washes some ashtrays and cleans up the area. The room looks pleasant.

At 8:41 Donna goes to her office. A teacher comes in to thank Donna for the note she had written. Donna had written her a note thanking her for taking the time to talk to a visitor from the Rockefeller Foundation who was studying women in computer and other science related careers. She explains to me that she tries to write notes every day to teachers who do positive things.

A few minutes later a teacher comes in asking for materials Donna doesn't have. She makes a phone call regarding the materials. Donna tells me she is following up on the competency testing program for sixth grade students. If the tests are not completed by the teachers she will do the testing.

At 8:51 a teacher comes in to ask for competency test materials. They discuss the process of testing. Next, a teacher comes in to talk about a student who needs reading help. Donna suggests that the Chapter teacher could tutor the boy. Donna then takes a break and eats a pastry.

At 9:25 Donna goes to the computer lab. She then goes back to her office for the School Advisory Council (SAC) meeting. Donna reads the minutes; Kim leads the discussion about the items on the agenda. The meeting lasts until 10:52. Donna takes notes of the meeting and tells Kim she will get her a copy.

Donna spends the remainder of the day in her office area. She tests some students, gets materials for teachers, and workes at various tasks at her desk.

The role of the ASAP consulting teacher. This was Donna's first full year as a consulting teacher. Most of her previous experience had been as a teacher in middle income schools not using ASAP. Prior to the position at Monroe, she had been a teacher of the gifted. Many of the teachers at Monroe Meadows knew the ASAP instructional program better than Donna did. She had done little to learn about the program over the course of the year. In fact, up until the final observations, she was unable to read or interpret the curriculum charts, although this was considered one of her primary job responsibilities. By June, she could read the charts and compare each classroom's progress to district projections, following the standard ASAP formula. This change could have been due to the presence of the observers in the school.

Her typical mode of working with the teaching faculty was an indirect one. She preferred teachers to come to her and worked with them in casual, informal ways. For example, when she arranged for teachers to observe each other as part of a peer coaching project, she provided no structure or criteria for the observations, attended none of the observations, and never spoke to the teachers about the project.

Donna also did not believe in actively intervening in instructional matters. Rather she was available to listen. She noted that, about 90 percent of the time, teachers just need someone who will listen and that she performs the role of the "resident psychiatrist."

Her aide, who appeared rather competent, handled all requests for matierals and supplies, as well as tutoring some of the weaker students. Donna emphasized everything but instruction. In subsequent research, we found few individuals who totally disregarded the mandates of their jobs so blatantly. She told us she aspired to create a physical environment that is comfortable and supportive for both students and teachers.

In sum, Donna typically left the teachers alone, but did help them out with minor matters. She went out of her way to offend as few people as possible and appeared lacking in knowledge of terms of the ASAP program. In the course of this study, we were seldom aware of Donna setting foot in a classroom. If she did, she appeared uncomfortable and unfamiliar with the reading series used or with the ASAP procedures.

Haskell Hills

Excerpt from a typical day: The principal, Tim Green. Tim goes out to the ramp area where all students arrive. He wanders around the area greeting students, hugging many. He is heard communicating, "How is your day going? Hey, that's sure a neat hat. Are you OK?" Many students come to him and hug him. Tim also talks to the teachers on ramp duty and hugs them.

Mildred, the ASAP consulting teacher, comes up to Tim in the ramp area. She says that teachers are getting later and later in picking up students. Mildred: "They will truly do anything for you, Tim. You need to be clear to them." Tim: "Yes, I agree, I'm getting angry about it." Several other topics are briefly discussed—a teacher who is not doing well, candy at school, and the growing student population. The meeting is informal and brief, about four minutes. This is a typical pattern for these two.

At 10:00 Tim starts to make his way to the classrooms. Anthony, a special education child, comes running down the hall—"He's after me! He's after me!" Another boy is following right behind. Tim tells both boys to come over and talk to him. He talks quietly to both, and hugs both.

At 10:07 Tim enters the first room. He goes over to the teacher, hugs her, finds the instructional aide and hugs her. He wanders around the room putting his hands on shoulders, touseling hair, and then walks out. This is the typical pattern of classroom visitation. He visits 30 classrooms in the course of an hour. In one room, the teacher asks him to stay and listen to the students read. He sits for awhile, then asks the children to give themselves a hand. Some students hug and kiss him.

In one class he stops the math lesson, has the students give themselves a hand, then walks out. The students apparently are used to this and get right back to work. When Tim enters the room, he always interrupts the class. He often hugs the teachers in the middle of a lesson presentation. Yet teachers seem to enjoy his visits.

The role of the principal. Instructional management at Haskell Hills was informally organized. Meetings between the principal and consulting teacher were informal and brief. Tim Green did *not* view himself as instructionally knowledgeable. However, he did take an active role in setting the social climate.

Unlike Kim, Tim was always ready to explain and philosophize. Because of these extensive monologues, it was fairly easy to piece together a colorful mosaic of his attitudes and beliefs about leadership in an ethnically mixed, inner-city school. He told us he likes it when others remember his name and touch or hug him. "So I try to touch or hug others whenever I can—teachers, aides, male, female, young, or old." In fact, we observed more touching and hugging by the principal in this school than in any elementary school we had ever seen. He hugged not only all teachers and aides, most students, but the entire research staff and a policeman who visited the school on a business matter. He interrupted a lesson to do so. He explained his behavior once by saying, "When you put out, it is like money in the bank, you can draw on it."

Tim tried to show that each teacher is important. He attempted to see every teacher every day. In practice, he did not visit each classroom daily because of the press of other duties in his large school, but he did go to each of the 36 classrooms two or three times a week. He said his visits ". . . are a very important part of my day. This probably did more than anything to turn the school around."

When Tim visited a classroom, he usually was not looking at instructional issues. Rather, by his own report, he focused on the general feeling or tone in the classroom. Based on a belief was that teachers are the experts in teaching, so he left curriculum and instruction up to them.

He reported that he never initiated the problem-solving process. "I always let people come to me. That way, the problem always belongs to them and not to me."

He professed a simple philosophy, based on his interpretation of Alfred Adler. He believes that "if students feel good, they will do well academically." He noted that both students and teachers have a deep, important need to belong to a group. We once asked Tim if he felt his philosophy had transferred to his staff. He said he thought some of his actions had been transferred to others, but that he was not sure his philosophy had.

In addition to the regular academic program, Haskell Hills carried out a number of special programs and activities. "Spirit" activities designed to increase positive feelings for the students about themselves and their school were much in evidence. The school had an official logo found on papers, posters, stickers, badges, T-shirts—seemingly everywhere you look. The school slogan, "Pride in Haskell Hills" was seen all around the school.

When asked by a student what his job was, Tim replied, "To play with the kids and to help the teachers." This sums up his attitude and beliefs simply and powerfully.

The role of the consulting teacher. The principal delegated the bulk of instructional supervision in the school to the ASAP consulting teacher, Mildred Pierce. However, six weeks after the start of the study she took an administrative position in another building, therefore no typical day has been reported. In the time we observed her though, we were able to discern certain patterns in her behavior.

Mildred told us that one of her strengths was frankness; she was direct and action-oriented. She got things done but not without creating some dissonance. Her tone in talking to teachers during inservice meetings tended to be rather officious and patronizing, almost hostile. Some acrimonious relations had developed between Mildred and the teaching staff because of this. While claiming to believe in the instructional philosophy of the ASAP program, she did not support the use of mastery learning, the curriculum pacing charts or the use of the unit mastery tests. It seemed that her attitude was ambivalent and confused. She did not believe in carrying out the important details in the program as specified in the job description. In fact, her implementation was cursory.

Continued from Page 13

Results of Teacher Interviews

The semi-structured teacher interview consisted of 38 questions. The questions were grouped according to instructional management functions in Table 1, thus facilitating a focus both on specific administrative and teacher behaviors and on feelings regarding the ASAP program. From these interview questions, data has been generated that highlights teachers' perceptions of administrator's instructional management skills and the level of commitment toward the ASAP program in each school.

The interview questions used several separate scoring formats. The majority of the questions required a simple yes or no response. The remainder of questions used a 5-point scale, where the higher the number, the more positive the response.

Table 2 presents a comparative profile of each school on items from six areas relating to successful program implementation as discussed in the instructional management function.

Data from the interviews reveal that administrative behavior was highly related to the level of commitment to the ASAP program. By comparing the data between the two schools, the impact of administrative behaviors on the level of commitment may be seen.

In terms of the details of ASAP monitoring, Monroe teachers consistently find the testing more useful that the Haskell teachers. We can infer that the erratic monitoring at Haskell led teachers to put less value on these tests. However, even at Haskell Hills, 83 percent of the teachers found the curriculum-referenced assessment system useful.

Comparative data indicates that the teachers at Monroe School perceived the principal as more committed to the ASAP program than the principal in Haskell Hills. Teachers at Monroe were unanimous in their agreement that their principal was strongly committed to the ASAP program. The mean for Monroe teachers was 5.0 on a 5-point scale, significantly higher than the 4.13 at Haskell. However, Haskell teachers did find the principal somewhat committed to ASAP, despite his lack of any overt statements or behavior in support of the program. It is plausible that this may be related to the court-mandated status of the program.

All Monroe teachers agreed there was a strong commitment throughout the school to the ASAP program, probably based on their firmly held beliefs in the efficiency of ASAP. In contrast, teachers at Haskell Hills perceived a significantly weaker support for the ASAP program. Respective means were 4.63 versus 3.17. The mean score at Haskell essentially represents a neutral or highly ambivalent feeling towards the program.

Individual teachers at Haskell Hills held significantly more negative feelings toward ASAP than did teachers at Monroe. This is supported in several interview questions. For example, teachers at Monroe saw their fellow teachers as providing high levels of help and communication about the ASAP program, $M = 3.88$. This was not true at Haskell Hills, with a mean of 2.66, below the neutral scale. When asked whether unit mastery tests should be continued, all Monroe teachers were all in favor of continuation while a significant proportion (25%) at Haskell Hills were not. This is ironic when considering the fact that most Haskell Hills' teachers felt the unit tests were accurate in determining mastery. One possible explanation is that neither the principal nor the consulting teacher at Haskell Hills ever worked with the teachers in showing them how to use the tests to improve instruction.

The Technical Assistance items help flesh out the picture. All teachers at both schools felt the consulting teacher had been of some help to them—though we believe, based on our observations, the help *may* have only been in the area of supplies and materials and arranging for help. A review of their job descriptions indicates an emphasis in these areas. We also learned that Donna Felkey replaced a consulting teacher who had developed a high degree of credibility for technical assistance. Teacher perceptions of Donna may have been influenced by the context created by the previous consulting teacher.

Most teachers reported receiving some type of feedback after formal observation by the principal. Although, interestingly, 18 percent of the teachers at Monroe indicated Kim did not supply them with feedback. The picture shifts dramatically when teachers were asked whether the feedback was specific enough to help them make changes in their classrooms. While 71% of the Monroe teachers responded affirmatively, only 47% of the Haskell teachers did so. Further, only ⅓ of the teachers in either school reported actually making changes as a result of formal observations and feedback. This may be related to the low level of follow-up reported by both faculties.

Continued on Page 16

Table 2. Comparison of Teacher Perceptions Relating to the Level of Commitment to the ASAP Program at Haskell Hills and Monroe Elementary Schools

	Monroe	Haskell
N	18	11
	Percentage Responding in the Affirmative	
Monitoring Teacher Performance		
1. Monitoring ASAP by Consulting Teacher	0	6
2. Monitoring ASAP by the Principal	100**	31
Monitor Student Progress		
3. Are unit tests accurate in determining mastery?	100[a]	83
4. Should unit test be continued?	100*	75
5. Is cumulative test useful to the principal?	82[a]	63
Technical Assistance to Teachers		
6. Have you been given feedback after an observation by the principal?	82	100
7. Was the feedback specific enough to help you make the changes?	71	42
8. Have you made the suggested changes?	36	33
9. Did the principal or other personnel follow up on the suggestions in any way?	27	28
Mean Ratings on Climate of Improvement Items		
1. Principal's feelings about ASAP[b]	5**	4.13
2. Strong commitment to ASAP throughout the school	5**	4.13
3. Teacher's individual feelings about ASAP[b]	4.63**	3.17
4. Help by fellow teacher in implementing ASAP	3.88[a]	2.66
5. Have consulting teachers been helpful?	5.00	5.00

* $p<.05$
** $p<.01$
a $p<.10$
b 1 to 5; where 5 was very positive and 1 was negative

Management Case Studies Continued from Page 15

Instructional Management Functions at Each School

Monroe School

At Monroe, we found evidence of five of the six instructional management functions discussed previously. There was no evidence, however, of any type of technical assistance or technical feedback to the teachers on any instructional issues or problems. The one effort at staff development attempted that year, a series of peer classroom observations, was disorganized and nonproductive.

Visible commitment to ASAP by the principal was extremely high at the school. The principal made numerous statements supporting the program, actually read articles dealing with components of ASAP (such as mastery learning, classroom management, and effective teaching) and spoke at other districts on ASAP.

Kim monitored classes more often than is typically expected of a principal. She spent a good deal of time in classrooms observing instruction. Occasionally she reviewed the student progress charts, though not in the systematic fashion that a good consulting teacher would. Kim's monitoring, however, carried a symbolic value, and appeared to have a positive impact on the teachers. Teachers were highly committed to ASAP and perceived their principal as highly committed as well.

Kim made deliberate decisions that conveyed her priorities to be instructionally related. She used what Morris, Crowson, Porter-Gehrie, and Hurwitz (1981) would call discretionary power to delegate responsibilities to other management staff (especially the remarkably talented school nurse) in order to free up time to visit classrooms. Kim was highly visible throughout the school. She appeared to have a thorough understanding of ASAP, and was well read on the topics of classroom management.

The consulting teacher, on the other hand, did not demonstrate either knowledge or commitment. We did not observe Donna taking the lead in any instructional support activities. She rarely monitored classrooms, but the fact that the principal did this seemed to mitigate against any serious negative effects. We also noticed during discussions that she did not seem to know basic definitions and procedures in the ASAP program. Her ignorance was particularly striking in a school with so many knowledgeable, committed teachers. She did, however, make sure teachers had needed materials (often requesting her aide deliver the materials), and she provided some level of vague emotional support to the teachers.

The majority of the teachers at Monroe believed in ASAP and were supported in their beliefs by the principal, whose words and behavior conveyed symbolic and active support to the instructional staff. The meaning of Kim's actions seemed to be translated into a web of collegial support focused on instructional improvement.

Haskell Hills

The instructional management functions were carried out at Haskell Hills to a much lesser degree than at Monroe. Neither the principal nor the consulting teacher lent support to ASAP by their words or actions. Though the principal visited classrooms frequently and was highly visible, he focused on providing support and emotional recognition to students and teachers (and himself), rather than on the quality of teaching. Tim was enthusiastic about people, but did not demonstrate any enthusiasm for the main job of teachers—instruction in reading, math, and language. He was detached from instructional issues. During the orientation interview, Tim said he delegated many of the instructional management activities to the ASAP consulting teacher.

The consulting teacher seldom visited classrooms and said she did not complete district Technical Assistance forms when she did visit. She didn't believe in the data from the ASAP mastery learning charts. Though an articulate, energetic and sensitive person with interesting ideas about education, her failure to "play by the rules" and follow ASAP protocol and procedures led to confusion and a certain amount of goofing off by the teaching faculty. Her failure to mask either her ambitiousness or her frustration at not being promoted created a bit of tension between her and the staff. Since Tim detached himself from ASAP instructional issues, he did not monitor the consulting teacher's role. In fact, the consulting teacher had taken on many administrative responsibilities usually associated with a vice principal (such as scheduling, reorganizing classrooms to deal with increased enrollment, supervising substitute teachers and budgetary matters). Neither the consulting teacher's training nor her attitude toward ASAP lent themselves toward the type of behaviors necessary to carrying out many of the instructional management functions. She mainly served as a "power behind the throne at the school," offering only procedural guidelines and materials for the ASAP teachers.

Conclusions

The material gathered in these two cases would appear to demonstrate pretty clearly that principals' philosophies and actions have an impact on how teachers behave and on what teachers value. At Monroe, the principal clearly emphasized instructional issues and strongly advocated ASAP. When the Monroe principal visited rooms, she actually watched the lessons and checked the curriculum, pacing and mastery learning charts. Her frequent visits to classrooms with an instructional emphasis tended to keep teachers "on their toes" and to visibly reinforce the districts' focus on high academic engaged time.

Haskell Hills' principal showed little interest in ASAP or any issue related to curriculum or instruction. In fact, we observed him walking out of faculty meetings as soon as a curriculum issue was discussed. He asserted that the teachers were instructional experts in the school and he was merely there to support the teachers. For whatever reason, he provided absolutely no instructional leadership, and the extremely mixed feelings of the Haskell Hills teachers about ASAP and the very modest growth in achievement (see Prolog) at that school can at least partially be attributed to his lack of instructional leadership.

There seemed to be more variability in the quality of teaching at Haskell Hills than Monroe. The primary reason for this difference, we believe, was the failure of both the consulting teacher and the principal at Haskell to monitor implementation of ASAP. Their ambivalent attitudes toward ASAP seemed to influence the teachers. The consulting teacher dealt primarily with supplies and administrative issues. If a teacher had a problem with a difficult-to-teach student, or a difficult unit, there was no one to turn to except fellow teachers. No norms were established for teachers to consult with each other.

At Monroe, in contrast, there was a consistent instructional emphasis. Teachers felt they could discuss instructional issues with the principal. It is interesting to note that Kim seldom gave teachers much feedback after visits, and she was never observed dealing with a specific instructional problem. Much of what she conveyed was in the area of creating an "ethos of instruction" of the school. The effects of this were quite powerful. It did appear, however, that had she or the consulting teacher at the school actually dealt with concrete solutions to specific instructional problems, or had they carefully monitored the progress of the low-achieving students, academic growth might have been much higher.

As this study evolved, we became aware of one component of effective instructional management that the literature often overlooks, but folk wisdom often mentions: the principal's skill at hiring—and keeping—superior teachers. Monroe had several superb teachers on the staff. The principal spent a lot of time recruiting these teachers and working with the central administration to insure that these teachers remained at Monroe. Granted, she was helped by the fact that redistricting created a racially mixed school, with a small but growing proportion of majority (Caucasian) students from a middle income neighborhood. However, this principal began a special program for gifted students and organized a small computer "magnet" program to insure that these students remained at the school. (These programs also provided excellent services for the bright minority students at the school.) Further, she insisted that all classrooms, even those with gifted students, follow the ASAP program guidelines. The mixture of active recruitment of superior teachers, development of special programs to insure the teachers remained at the school, and a strong focus on the importance of academic instruction resulted in an almost uniformly high level of teaching.

It is important to note that the modus operandi of Tim Green, Haskell Hills' principal, did have some definite positive effects. At Haskell, children seemed very comfortable with one another and with adults. In a large urban, multi-ethnic school, a comfortable, supportive atmosphere is difficult to achieve and therefore is particularly striking. Activities designed to boost morale and school spirit abounded. Extraordinary effort in this direction was in evidence. It was apparent that the teaching staff put much time and thought into building good relationships and that the principal was the catalyst. However, by not emphasizing academic issues Tim did his students a disservice. Academic growth from the minority students at the school was modest.

We had originally hoped to examine the dynamics of the entire management team, including the role of the consulting teacher in some detail, but found we were unable to do so. Neither seemed to fill the role in the way the district intended it to be filled.

Donna Felkey seemed to be fairly incompetent, by any standard, with little comprehension of the issues involved in educating low-achieving students. By being pleasant to the teachers, she reduced the liklihood of being criticized. The fact that the principal was strong, as was the teaching faculty, made her role perhaps unnecessary. In the case of Mildred Pierce, we were unable to collect enough observational data to create a full picture of her activities, due to her promotion and transfer in the middle of the study. We did gather enough material to ascertain that she served in many ways as a *de facto* vice-principal, assisting the principal in a range of administrative responsibilities. This was good training for her future career, but left a void in the school. It was difficult to determine exactly why she felt so negatively towards ASAP, or why she had a rancourous (or, at best, distant) relationship with many teachers.

She did share with us some of the frustrations inherent in the consultant teacher position. These views are consonant with those expressed by the consulting teachers involved in the subsequent study.

According to Mildred, consulting teachers were in a limbo state. They were neither classroom teachers nor administrators, though, many had aspirations towards being administrators. In the case of these two consulting teachers, their feelings of frustration may have come from their lack of training for their position. All they knew came from their early training and their own classroom experience, rather than any training in either supervision or interpersonal skills.

Looking back at the case studies of these two schools, after having analyzed four other inner city schools in even more detail, we became aware that the degree of instructional leadership demonstrated by the principal at Monroe—and the values and background she possessed—were exceptional and not what one can typically expect. The district recognized this by appointing her to a senior administrative position.

Rather than serving as an example of a typical elementary principal, Kim serves as a model of what a principal can be. Tim Green, however, was also exceptional—exceptional in the energy and spirit he brought to the school, exceptional in the high level of teacher and student satisfaction he fostered. In a sense, his failure to fully satisfy the needs of the students is tragic.

Prolog

Overview of Trends in Achievement at the Schools Since ASAP

The trends in achievement are presented here as an adjunct to the other data collected and as a crude gauge of improved student growth. As Rowan, et al. (1983) and Walberg (1985) have indicated, there are real problems in using the school as a unit of analysis in measuring achievement. This is particularly true in schools with mobility rates as high as Monroe and Haskell Hills. Furthermore, since only fifth

Continued on Page 17

An Empirical Evaluation of the Field Test/Revision Process

by Maria Collins
Northern Illinois University

Douglas Carnine
University of Oregon

A commonly recommended practice in education is the further development of instructional materials after field testing. Analyzing errors made during field testing yields information about frequent and significant learner problems. Based on the field test results, the material is then revised. Revisions follow the theoretical model that guided the development of the material in the first place. The assumption is that the revisions will solve some of the problems identified in the field testing, and consequently, the revised version of the material will lead to more effective and/or more efficient learning. This assumption is particularly crucial in special education, where inadequacies in instructional material can be magnified in the learning of low performing and mildly-handicapped students (Darch, Carnine, & Gersten, 1985; Darch & Carnine, in press; Carnine, Engelmann, Hofmeister, & Kelly, in press).

The purpose of the present study was to empirically investigate the field test and revision process by randomly assigning mildly-handicapped students to the original and revised versions of a computer-assisted instruction (CAI) program based on Engelmann's and Carnine's *Theory of Instruction* (1982). Because of the relative ease of controlling the implementation of CAI programs, results of a comparison between two versions of a CAI program can more confidently be ascribed to differences in instructional design rather than to unintended variations in implementationof the programs.

The Original CAI Program

The Reasoning Skills Program (Engelmann, Carnine & Collins, 1983) taught students about overlapping, inclusive, and exclusive classes, and the words associated with the relationships among classes (some, all, no). Using this information and a series of rules, students drew conclusions based on evidence. The other major objective of the program was to teach students to identify logically unsound arguments. For when an argument was unsound, students were taught to specify one of three reasons why it was unsound.

Data from previous research with the original CAI program (Collins, Carnine, & Gersten, in press) indicated that students were able to draw conclusions when presented with two acceptable statements of evidence. However, mildly-handicapped secondary students had difficulty with the second major objective of the program: identifying sound and unsound arguments. In identifying unsound arguments and giving the reason why an argument was unsound, students responded correctly to less than 50% of the items. An analysis of the students' errors indicated that the students had not carefully attended to the evidence and were not clear about how to decide whether the evidence could be used to draw a conclusion.

The CAI Reasoning Skills Program was revised to more clearly teach students to evaluate evidence in an argument. The following section describes the similarities and differences between the original and revised versions of the Reasoning Skills Program.

Similarities Between the Original and Revised Programs

Six features were held constant across both versions to ensure (as much as possible) that only the instructional design of the revision would be responsible for any differences in performance between the two treatments. The original and revised version were the same in these respects:

1. Each version included 10 lessons.
2. Lessons in each program incorporated an average of 32 questions.
3. Each program contained the same approximate amount of text.
4. Each error was followed by a correction tailored to the error.
5. Missed items were presented later in the program to provide extra practice on those difficult items.
6. Explicit strategies were modeled. Guidance was systematically faded until students were working independently.

Differences Between the Original and Revised Programs

The instructional design of the original version was changed in four major ways. All of these changes were intended to better teach students to evaluate the validity of evidence.

Introduce invalid evidence earlier. The original CAI program presented only *valid* evidence when students learned to draw conclusions. Because students in the previous research had such difficulty analyzing arguments with *invlaid* evidence, invalid evidence was introduced earlier in the revised program. Students evaluated the validity of two statements of evidence before they drew a conclusion. These tasks focused student attention on the validity of evidence with the intent of reducing later problems in critiquing entire arguments.

Delay drawing-conclusions tasks. The original version introduced entire arguments with illustrative diagrams in early lessons. Though students did not seem to use the diagrams, students did practice drawing conclusions for arguments. In those tasks students did not need to evaluate the evidence. The revised version delayed drawing-conclusion tasks until after students practiced evaluating evidence.

Focus on evidence when critiquing arguments. In the original version, students criticized arguments by answering a series of questions. The first step in critiquing an argument was deciding if the order of the classes in the conclusion was acceptable. Then students analyzed the evidence by deciding if the appropriate classes (from the evidence) were named in the conclusion. This acted as an indirect means of evaluating evidence. Next students decided whether the first work in the conclusion (all, some, or no) was correct. Finally, students evaluated the order of the classes in the conclusion.

The revised version asked students to first analyze the evidence. Then students looked for the correct first word in the conclusion and finally decided if the classes were named in the correct order. In the revised program, evaluating evidence was the first and most prominent step in critiquing arguments.

Delete non-essential vocabulary. In the original version students had to learn to identify classes by size: smallest, middle-sized, or largest. Students had to look at the placement of the classes in the evidence to be able to label the classes. Later students decided whether evidence was acceptable based on a strategy that relied on the class-size labels.

In the revision class-size labels were dropped, which lead to a simpler strategy and fewer teaching/learning requirements. Students only had to look at the position of the classes in the evidence to apply the strategy. The students did not need to label classes by size.

Research Questions

The present study was designed to answer the following questions:

1. Would scores on the criterion-referenced argument-analysis measure be significantly higher for the revised CAI treatment in comparison to the original CAI treatment? (Since students in the original version performed well on the drawing-conclusions part of the test, a nonsignificant difference was predicted for that part of the test.)

Continued on Page 18

Management Case Studies

Continued from Page 16

graders were tested, the progress in reading and math for the early grades does not appear in these results. Nonetheless with all these caveats, the achievement data are presented, by ethnic group, in Table 3. Table 3 presents fifth grade CTBS test results from 1980, 1983, and 1984 by ethnic group at both schools. The table reports the percent scoring at or above grade level on each subtest of the CTBS.

The pattern of growth among the minority students is erratic at Haskell Hills. At Monroe, the reader can note rather dramatic increases for the Asian and Black students in math and reading, but weaker growth for the Hispanics. Overall, Haskell seems to show some improvement for the minority students, and slight non-significant drops in reading. In math, the pattern is erratic—the scores of the Hispanics rise, those of the Blacks drop.

In sum, there is some evidence of growth for the minority students at both schools. The trend appears a bit stronger at Monroe. In both schools, there is much room for improvement in the area of academic growth.

References

Edmonds, R. (1982). Programs of school improvement: An overview. *Educational Leadership*, 40, 4-11.

Gersten, R. & Carnine, D. (1983) *A study of administrative support of school improvement*. Eugene, OR: Center for Educational Policy and Management, University of Oregon.

Gersten, R. & Carnine, E. (1981). *Administrative and supervisory support functions for the implementation of effective educational programs for low income students*. Eugene, OR: Center for Educational Policy and Management, University of Oregon.

Gersten, R., Carnine, D., & Green, S. (1982). The principal as instructional leader: A second look. *Educational Leadership*, 40, 47-50.

Gersten, R., Green, W., & Davis, G. (1986). The realities of instructional management. *ADI News*, Vol. 5, No. 3, p. 1, 11-14.

Joyce, B.R., & Showers, B. (1980). Improving in-service training: The message of research. *Educational Leadership*, 37, 379-385.

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

A complete set of references can be obtained from Wes Becker, *ADI News*.

Table 3. CTBS Results by Ethnicity Group
Percent at or Above Grade Level on the CTBS in the Fifth Grade

		Monroe Hispanic N	Monroe Hispanic %	Monroe Black N	Monroe Black %	Monroe Total N	Monroe Total %
April, 1980 (prior to ASAP)	Reading	30	7	24	17	64	13
	Language	30	3	23	39	62	19
	Math	29	28	24	33	63	32
April, 1983	Reading	23	17	23	17	74	38
	Language	23	35	23	17	74	45
	Math	23	39	23	26	74	54
April, 1984	Reading	24	13	16	38	92	51
	Language	25	8	16	25	93	51
	Math	25	36	17	53	95	65

		Haskell Hills Hispanic N	Haskell Hills Hispanic %	Haskell Hills Black N	Haskell Hills Black %	Haskell Hills Total N	Haskell Hills Total %
April, 1980	Reading	20	40	21	33	80	48
	Language	20	40	21	19	80	43
	Math	19	37	20	30	78	42
April, 1983	Reading	34	38	18	17	108	39
	Language	34	41	18	28	108	43
	Math	34	44	18	33	109	50
April, 1984	Reading	18	33	19	26	98	44
	Language	18	56	19	32	99	60
	Math	18	56	19	16	99	54

Field Test/Revision Process

Continued from Page 17

2. Would students assigned to the revised CAI program make significantly fewer errors per lesson than students assigned to the original CAI program?
3. Would students assigned to the revised CAI program take significantly less time than students assigned to the original CAI program?

Method

Subjects

Twenty-six secondary resource room students in a metropolitan high school setting in a western state were selected for the study. Nineteen of the subjects were certified as "learning disabled" according to local school district criterion for special education placement. Seven of the subjects were labeled "remedial" as determined by school personnel; these subjects did not qualify for special education, but were considered "at risk" by school personnel because they were failing high school academic subjects and scored significantly below their peers on district-administered standardized achievement tests. These twenty-six subjects were chosen from 34 students who passed a screening measure; that is, they could discriminate small and large classes, a necessary preskill for the original version of the CAI program.

The twenty-six subjects were randomly assigned to one of two treatments: (a) the original CAI program, or (b) the revised CAI program. One of the subjects assigned to the original program and two assigned to the revised version were eventually dropped from the study because of either: (a) excessive absenteeism, or (b) inattentiveness, defined as rapidly pressing many keys in responding to questions.

Measures

The Reasoning Skills Test (Collins, 1985) was designed to test students' ability to draw conclusions and analyze syllogistic arguments. This test instrument consisted of two parts: (a) 12 items in which students were to draw conclusions from two statements of evidence; and (b) 16 items consisting of three-statement arguments, in which students were to determine whether each argument was sound or unsound, and if unsound, the reason why.

The test instrument was given to five college professors who were interested in using the program material and evaluated the test for content validity. Based on their feedback, items were deleted or changed. The alpha coefficient of the instrument was .90 for part I and .96 for part II. Total reliability was .95.

Procedure

Subjects in the study completed 10 lessons of their respective CAI program over a 12-day school period in April and May. Data collectors set students up on the appropriate program and carefully watched each student's response for 8 out of 10 lessons. The computer also kept track of errors.

Subjects finished the lessons during their regularly scheduled period in the learning resource center setting. Data collectors were carefully instructed to only answer questions that pertained to "how to touch the keys" and not to respond to any questions about specific items. Subjects had a three-minute introduction to the computer prior to the implementation of the program.

Subjects who were absent completed two lessons on the next day during the class period. Subjects were dropped if they missed two or more consecutive classes.

The criterion referenced test was administered to all subjects the day prior to the first lesson. Subjects were given no feedback about their performance. The test was presented again immediately following the last lesson of the CAI program. Students were told the results of their posttest after it was scored.

Results

Pretest scores comparing the two groups indicated no significant difference. The means for these groups were 9.83 (original group) and 9.82 (revised group). Standard deviations were 4.04 (original) and 2.92 (revised).

The mean posttest scores were 16.50 (original) and 22.00 (revised). Standard deviations were 2.47 (original) and 3.33 (revise). Posttest differences were evaluated with a t-test (21) = 4.46, p <.001.

Table 1 gives the means, standard deviations and t-test results for the two parts of the posttest. Part I required students to draw conclusions from two acceptable statements of evidence. Differences between the two groups were not significant. Differences between the two groups on Part II were significant, t (21) = 4.19, p <.001. This part required students to analyze an argument and determine if the argument was sound or unsound; and, if unsound, identify the reason. The mean score of the revised group (10.36) was almost twice the mean of the original group (5.92). Standard deviations were 3.26 (revised) and 1.62 (original).

The number of errors per lesson made by the two treatments was compared using t-tests. The means were 8.97 (original) and 4.55 (revised). Standard deviations were 3.80 (original) and 2.20 (revised). Students receiving instruction with the revised version made significantly fewer errors than the students instructed on the original version of the reasoning skils program, t (21) = 3.40, p <.01.

Treatments were also compared for the amount of time they took to complete the lessons. The mean number of minutes per lesson was 26.82 (original) and 22.45 (revised). Standard deviations were 5.40 (original) and 2.60 (revised). Students receiving instruction with the revised version took significantly less time than the students instructed with the original version of the program, t (21) = 2.44, p <.02.

Discussion

The results from the present study demonstrated no difference between treatments in performance on drawing conclusions. These results coincide with the similarities in instructional design of the two versions. The original version of the program demonstrated success in teaching mildly-handicapped students to draw conclusions. Therefore, the instructional design for teaching this skill was largely retained in the revised version of the program.

Table 1. Mean and Standard Deviations for the Original and Revised Version Groups on Parts I and II of the Test of Formal Logic

Test Part	Comparison Groups Original (N = 12)	Revised (N = 11)
Part I		
Mean	10.58	11.64
Standard Deviation	1.50	1.21
Part II		
Mean*	5.92	10.36
Standard Deviation	1.62	3.26

p = <.001

Scores on the argument-critiquing section of the posttest were significantly higher for the revised version treatment. These results also support the instructional design changes made to teach students to critique arguments: (a) introduce invalid evidence earlier, (b) delay drawing conclusions until students learn to evaluate evidence, (c) focus on the evidence when critiquing arguments, and (d) delete non-essential vocabulary relating to the evidence. The results do not allow interpretations concerning the relative importance of the various changes.

Students assigned to the revised CAI program made fewer errors per lesson than students assigned to the original CAI program and also took significantly less time to complete the lessons. The fewer number of errors for students in the revised-version treatment is consistent with the posttest results; an earlier introduction and clearer explanations for evaluating evidence resulted in fewer errors. The time differences are probably the result of the fewer errors made by the revised-version group. Because students made fewer errors, fewer items were repeated, decreasing the time required to complete the lessons.

The findings have several implications for special education. First, the data support the field test and revision process prior to publication or implementation of instrtuctional material with handicapped students. Using field test results, the instructional designer can make program revisions that will increase the scores of handicappped students on tests or objectives targeted by the material.

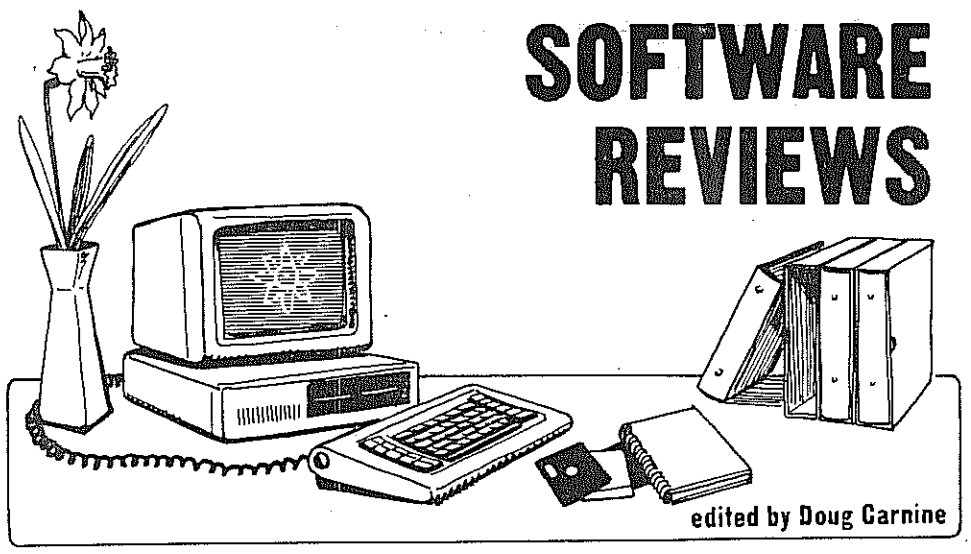
Second, a model of instruction design is needed to determine the nature of the revision. As described earlier, the changes that were made during the revision of the Reasoning Skills Program were fairly complex. The decision to focus on evaluating evidence in the revised version of the program grew out of the application of a model for instructional design articulated by Engelmann and Carnine (1982). These guidelines do not derive from the conventional wisdom of instructional design. For example, a common principle of conventional instructional design is to sequence tasks from easy to difficult. Drawing conclusions is easier than evaluating evidence. Yet in the revision, the harder task was sequenced before the easier task. The harder-to-easier sequence was needed to prevent students from learning to not attend carefully to statements of evidence, a problem that appears only when students critique arguments.

Third, an acceptable level of mastery must be defined. Additional comparative data presented in Table 2 indicates that the revised program produced learning at an acceptable level for the mildly-handicapped students. We compared the mildly-handicapped secondary students with their non-handicapped peers as well as college students in an introductory logic course and preservice teachers in a certification course. A one-way ANOVA showed a significant difference among the groups, F(3) = 15.5, p <.001. A Tukey post hoc comparison showed a significant difference, p <.05, between the preservice education students and the handicapped, secondary non-handicapped and logic students on Part I of the posttest (drawing conclusions). A significant difference was also found on Part II of the post-test on critiquing arguments, F (3) = 4.5, p <.05. According to a Tukey post hoc comparison, p <.05, logic students scored significantly higher than the handicapped, secondary non-

Continued on Page 20

Table 2. Means for Parts I and II and Total Score (with Standard Deviations) for Handicapped Students, Nonhandicapped Peers, College Logic Students, and College Preservice Education Students

Group	N	Part 1 Mean	Part 2 Mean	Total Test Mean	Total Test Standard Deviation
Handicapped	23	11.09	7.96	19.00	4.11
Nonhandicapped	53	10.94	6.42	17.36	3.74
College Logic	30	11.33	8.73	20.07	3.10
Teacher Ed S's	41	8.15	7.29	15.44	5.11



SOFTWARE REVIEWS

edited by Doug Carnine

FACT MASTER

MORNING STAR Software, Inc.
P.O. Box 5364
Madison, WI 53705

Reviewed by Billie Overholser, teacher, Whiteaker Elementary School, Eugene, OR.

Grade/Target Group: First through Sixth, or Remedial.

Subject: Math facts (Addition, Subtraction, Multiplication, Division)

Cost: $85 for the set of four disks. Additional sets available for $45/set (must have purchased full set previously).

Hardware Required: Apple II series or compatible/one drive and a printer.

Fact Master is designed to provide instruction on the basic math facts by providing three basic components: (1) an instructional sequence, (2) repetition and practice, and (3) immediate correction and monitoring of errors.

A closer look at the programs shows them to follow a sequence of fact introduction consistent with *DISTAR Arithmetic*. These facts are presented in horizontal formats and tested in both horizontal and vertical formats.

The programs introduce only four facts at a time following the model, lead, and test format. Then, the student types each equation (from memory) in the order learned; this is followed by a series of facts presented in random order for which the student is expected to know the answer. Systematic practice on previously learned facts is maintained as the student progresses through the program.

Strengths

Student errors are treated matter-of-factly with a simple "try again" appearing on the screen followed by the correct answer presented in the M-L-T sequence. I feel this is a strong *plus* for the programs as the student is not reinforced for getting a wrong answer as is the case with many arcade-type drill and practice programs.

A student is required to answer 94% of the facts on a mastery test before advancing to the next level. The program stores the student's twelve most recent errors for later remediation.

A student does not have to progress in lock-step sequential levels as there is provision for skipping a level if the student can perform at mastery level on a pre-test. These programs contain a Teacher Utility Program where the teacher can individualize each student's instruction as needed.

The speed of the programs can be modified to fit the skill of *each* student (slow, normal, fast), which ranges from 7 seconds to 3.5 seconds.

The teacher can check progress for an entire class, or for an individual student either on the screen or with a printed hard copy.

The teacher can also provide additional practice on appropriate facts for each student by computer-generated printed tests.

The documentation which comes with the program is not extensive, but adequate.

The teacher is given the option of using or deleting the graphics within the program.

The programs are not noisy. This is a positive feature when they are being used in a room where instruction is taking place concurrently with computer time.

Weaknesses

The only thing I found to be a problem for my students (first and second graders) was the need to use the spacebar (rather than RETURN key) after making a response. This is so unlike the programs with which they are familiar, it caused them to unduly attend to the mechanics of the program rather than to learning the "facts." I would prefer that the authors alter this feature; but I would still recommend the use of the programs as they are.

My students found the graphics to be only minimally reinforcing; this is not to be construed as a criticism, only a comment.

Recommendations

I highly recommend the purchase of the complete program for an elementary school, special education class, or Chapter I program. I feel the price is reasonable, with back-up policy fair, and the format to be in keeping with sound instructional practices.

A Questionnaire for Teachers of Students with Behavior Disorders

ADI is conducting surveys to determine the adequacy of support services provided by school districts and the extent to which teachers perceive a need for training in specific skills. The questionnaire below is the first assessment instrument that ADI will be using.

If you are a teacher of students who have behavior disorders, we'd appreciate your input. Please fill out the questionnaire, add any comments you feel are relevant and return to:
Ann Arbogast, c/o ADI, PO Box 10252, Eugene, OR 97440

How successfully do you feel you handle the following behavior problems?	Very Competent	Adequate	Need Help	Have you received technical assistance or training to handle the problem behavior? Yes	No	How effective was the training? Very	Moderately	Not
1. Explosive, "blow-up" students	☐	☐	☐	☐	☐	☐	☐	☐
2. Withdrawn students (those who do not respond to tasks presented)	☐	☐	☐	☐	☐	☐	☐	☐
3. Students with short attention span (work with you a short period of time before becoming off-task)	☐	☐	☐	☐	☐	☐	☐	☐
4. Students who actively try to escape when demands are placed on them	☐	☐	☐	☐	☐	☐	☐	☐
5. Students who become physically aggressive when frustrated	☐	☐	☐	☐	☐	☐	☐	☐
6. Students who become verbally abusive when frustrated	☐	☐	☐	☐	☐	☐	☐	☐
7. Students who kick, throw, cry or scream	☐	☐	☐	☐	☐	☐	☐	☐
8. Students who exhibit inappropriate behavior, such as thumbsucking, rumination, masturbation	☐	☐	☐	☐	☐	☐	☐	☐
9. Students who are alcoholic	☐	☐	☐	☐	☐	☐	☐	☐

Check each of the training services provided by your district:	Rate the value of the services provided by your district (4=extremely valuable)					
1. ___Regular inservice sessions that focus on specific teaching behaviors and that provide task practice.	4	3	2	1	0	not applicable
2. ___Regular inservice sessions that do not provide practice on specific behaviors.	4	3	2	1	0	not applicable
3. ___Regular monitoring of your teaching in the classroom with coaching and assignments for specfiic things in which you need help.	4	3	2	1	0	not applicable
4. ___In-Classroom demonstration with students on how to use specific teaching or management techniques.	4	3	2	1	0	not applicable
5. ___Hot-line service (There is somebody in the district you call when a problem occurs and that person shows you how to solve the problem and provides specific training in how to do it).	4	3	2	1	0	not applicable

Field Test Revision Process

Continued from Page 18

handicapped, and preservice education students.

The drawing-conclusion results indicate that the handicapped students performed comparably to their non-handicapped peers, who in turn out performed teacher-education students. College logic students out performed all groups in critiquing arguments. These results suggest that the field test and revision process is complete. Handicapped students who received instruction with the revised CAI program scored as high as their non-handicapped peers, who could be considered to represent a criterion standard. While this quasi-experimental comparison suffers from various experimental design considerations, it provides at least some indication of the ultimate adequacy of instructional material designed for handicapped students.

In summary, the following ingredients seem beneficial in designing instructional material for handicapped students:

1. A model of instructional design with principles that can generate detailed specifications for instruction and for revising instructional material.
2. Field testing that observes and notes learner responses.
3. Revision of the instructional material, if errors are frequent.
4. Repetition of steps 2 and 3 until error rates reach an acceptable level.
5. If possible, comparison of performance with a criterion group to provide a measure of acceptability.

References

Carnine, D., Engelmann, S., Hofmeister, A. & Kelly, B. (in press). Videodisc instruction in fractions. *Focus on Learning Problems in Mathematics.*

Collins, M. (1986). *The Effectiveness of Computer-Delivered Correction Procedures on Low-Performance Secondary Student's Reasoning Skills.* Unpublished Doctoral Dissertation, University of Oregon, Eugene, Oregon.

Collins, M., Carnine, D. & Gersten, R. (in press). Elaborated corrected feedback and the acquisitions of reasoning skills: A study of computer-assisted instruction. *Exceptional Children.*

Darch, C., & Carnine, D. (in press). Approaches to teaching learning disabled students literal comprehension during content area instruction. *Exceptional Children.*

Darch, C., Carnine, D., & Gersten, R. (1984). Explicit instruction in mathematics problem solving. *Journal of Education Research, 77*(6), 350-359.

Engelmann, S. & Carnine, D. (1982). *Theory of instruction.* New York: Irvington.

Engelmann, S., Carnine, D., & Collins, M. (1983). *DIAL Reasoning Skills Program.* Eugene: Engelmann-Becker Corp.