

Special Education and Direct Instruction: An Effective Combination

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Executive Summary

The U.S. House of Representatives and Senate bills (H.R. 1350 and S. 1248) contain substantial revisions central to the reauthorization of the Individuals with Disabilities in Education Act (IDEA) and proclaim significant changes in how learning disabilities will be identified. This affects services and special education determinations.

This landmark legislation places emphases on instruction, early intervention, and building success by requiring “specially designed” instruction to meet the unique needs of students with disabilities. IDEA 2004 (see www.wrightslaw.com for further details) includes increased focus on the use of scientifically-based instructional practices and programs and peer-reviewed research. Local educational agencies may use a process to determine if students respond to scientific, research-based intervention as part of evaluation procedures to determine a specific learning disability. This process benefits children with disabilities as well as any children who enter school at risk of failure. Concentrating on research-based intervention legislation ensures that students qualify for special education services rather than failing to receive appropriate instruction.

This report highlights the unique and successful use of Direct Instruction among special education populations. It is divided into four parts:

- Part I describes methods and approaches that research implies will benefit special education students. It indicates that direct, explicit instruction is the most effective way to improve skills of students who are significantly behind peers.
- Part II provides a description of procedures used to review the Direct Instruction and special education populations studies. Data confirms that students predicted to have low achievement benefit greatly from Direct Instruction.
- Part III summarizes studies using Direct Instruction with students who have high-incidence disabilities from pre-school to high school. Thirty-seven studies were found across academic areas. In 34 of the 37 studies, students who were taught with Direct Instruction fared better than students who used other programs.
- Part IV describes eight studies using Direct Instruction for students who have low-incidence disabilities. These studies show that students with more severe disabilities can learn at high levels with systematic, research-proven programs such as Direct Instruction.

In all, 45 studies were found across student disability categories with over 90 percent noting positive effects for Direct Instruction programs.

Part I: An Overview of Special Education and Effective Instruction



Overview

Because special education students fall significantly behind peers in academic, behavioral, and/or functional living skills, intensive instruction is crucial for their academic success.

Though the level of intensity will likely differ for individual students, research shows that explicit, individualized, and validated instruction—like that offered by Direct Instruction programs—is key for optimal learning opportunities among students who have special needs.

IDEA (Individuals with Disabilities Education Act, reauthorized in 1997 and amended in 2004) requires specially designed instruction for students with disabilities. Specially designed instruction pertains to adapting content, methodology, or delivery of instruction to meet students' needs and to ensure their access to the general curriculum [(34 CFR 300.24(b)(3) as cited in Bateman & Linden, 1998)].

Special Education

Special education has been defined as “individually planned, specialized, intensive, goal-directed instruction” (Heward, 2003, pg. 38).

This instruction may differ in terms of

How it is provided:

- One-on-one
- Small groups

Where it is provided:

- Resource room
- Separate classroom
- Residential school

What curriculum is used:

This combination of features makes special education effective for students with disabilities.

Achieve Maximum Benefits With Individualization and Validation

Two critical elements of effective special education are individualization and validation (Fuchs, 1996; Fuchs & Fuchs, 1995):

- **Individualization** refers to developing instruction with an individual student's needs in mind—as the student's needs change, so does the treatment (Fuchs, 1996). Thus, **progress monitoring** is a key aspect of individualization.
- **Validation** pertains to rigorous experimental studies that have been conducted over time yielding converging evidence. “When practiced most effectively and ethically, special education is [also] characterized by the use of **research-based** teaching methods” (Heward, 2003, pg. 38).

Therefore, curricular programs selected for students who have special needs should provide evidence of sufficient field-testing or results from experimental studies. This ensures that instructional time yields maximum benefits. In addition, programs should meet the needs of each student by monitoring individual student performance through:

- Placement testing.
- In-program progress monitoring.
- Mastery tests.
- Review opportunities.

Set Special Education Apart Through Intensive, Explicit Support

Special education differs from general education (Torgesen, 1996) because it is typically more:

- **Explicit** – All skills are taught directly.
- **Systematic** – Instruction is purposeful, well-organized, and hierarchical.
- **Intensive** – Students receive more interactions and experience significant time on task.
- **Supportive** – Students need encouragement, feedback, and positive reinforcement.

Programmatic Scaffolding is central to quality special education. Students initially need considerable support and then diminishing support as they learn to perform skills independently (Slavin, 2003).

Vaughn and Linan-Thompson (Vaughn & Linan-Thompson, 2003, pg. 142) note that instruction is more effective for students with mild disabilities when:

- Task difficulty is controlled (i.e., examples are sequenced to ensure success; tasks are matched to students' skills).
- Groups are small and interactive.
- Instruction is direct and explicit, with clear modeling and guided practice activities.
- Progress monitoring is ongoing.
- There is focus on foundational skills.

According to Halle, Chadsey, Lee, and Renzaglia (2004), instruction for students with more severe disabilities should be:

- Systematic, meaningful, and functional.
- Delivered using frequent opportunities for students to respond and receive feedback.
- Focused on mastery learning .
- Measured using progress monitoring to ensure data-based decision making.

While the level of explicitness, intensity, and support may vary, explicit instruction seems to be the key to optimize learning opportunities for students with special needs (see Vaughn & Linan-Thompson, 2003 for further details).

Effective Instruction

Build Understanding Through Systematic, Explicit Instruction

Explicit or direct instruction (lowercase “d,” “i”) offers a systematic method of teaching with emphasis on (Rosenshine, 1987, pg. 34):

- Proceeding in small steps.
- Checking for student understanding.
- Achieving active and successful participation by all students.

Rosenshine (1986) provided highlights of research on explicit instruction of well-defined knowledge and skills such as math procedures, grammatical rules, and vocabulary. These highlights include daily instruction techniques such as:

- Starting every lesson by correcting the previous day’s homework and reviewing what students have recently been taught.
- Describing the goals of today’s lesson.

- Presenting new material in small steps, giving clear and detailed explanations of the skill(s) to be learned (modeling), often checking for student understanding through strategic questioning.
- Providing repeated opportunities for students to practice in an active manner and to obtain feedback on their performance (guided practice).
- Monitoring student learning through varied exercises (i.e., seatwork).
- Providing continual practice opportunities until students are performing skills independently and with ease (independent practice).
- Reviewing previous week’s lesson at the beginning of each week and reviewing what students have learned over the past four weeks at the end of each month.

Explicit instruction can be summarized as unambiguous, clear, and direct teaching (Arrasmith, 2003). Show students what to do, provide opportunities to practice with feedback, and then provide opportunities to apply these skills on their own over time.

According to Harris & Graham (1996), explicit instruction is not:

- Trial-and-error learning.
- Discovery.
- Exploration.
- Facilitated learning.
- A constructivist approach where teachers assist performance rather than directly provide knowledge/information to students.

Accomplish More in Less Time With Explicit Instruction

Students who qualify for special education services must be accelerated in their learning to catch up with their grade-level peers. Thus, you must do more in less time.

The most effective way to decrease the learning time for special needs students is through direct and explicit teaching of skills. Initially, you take full responsibility for student learning but gradually relinquish responsibility as students become successful. “This progression can be seen as a continuum that moves from teacher modeling, through guided practice using prompts and cues, to independent and fluent performance by the learner” (Rosenshine, 1986, pg. 69).

Use the Carefully Sequenced Lessons of Direct Instruction to Accomplish More in Less Time

One explicit, teacher-directed model of effective instruction is Direct Instruction (DI) as exemplified in programs authored by Siegfried Engelmann. Direct Instruction can be distinguished from other models of explicit instruction/direct instruction by its focus on effective instructional delivery and curriculum design.

Guiding principles of Direct Instruction include the belief that every child can learn if carefully taught and that anyone can teach successfully when given effective programs and instructional delivery techniques. Thus, ultimately it is you who is responsible for student learning (see Tarver, 1999 for further details).

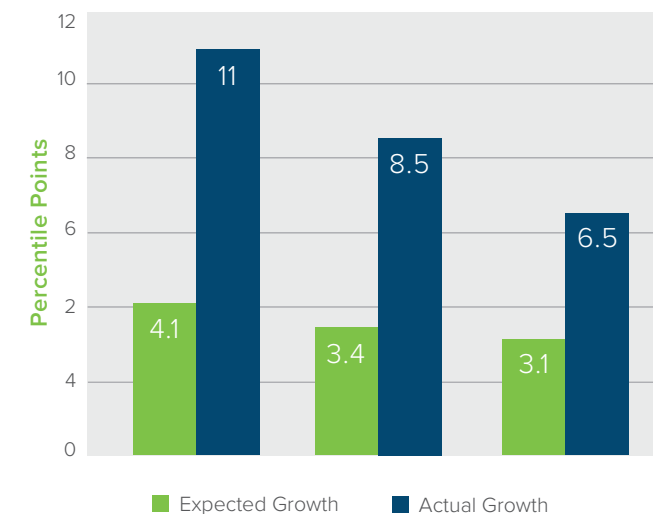
The goal of Direct Instruction is to do more in less time—accelerating student learning by carefully controlling instruction. A typical Direct Instruction lesson includes:

- Explicit, carefully sequenced instruction (a model of what students will do).
- Scaffolding before students complete a task on their own (guided practice).
- Frequent opportunities for students to practice skills (independent practice).
- Repeated practice over time (review).



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Average Growth of Intensive Students



Build Success through the Design and Delivery of Direct Instruction

The Unique Elements of Direct Instruction Make the Difference

Most academic programs require modifications to meet the needs of students who receive special education services (Carnine et al., 2004). These modifications include:

- Identifying the most important tasks to teach in order to cover priority topics.
- Providing clear directions on how to structure active student responses and teacher feedback.
- Determining where students should be placed and how to monitor progress.
- Adjusting the rate of instruction to ensure adequate practice and mastery.
- Controlling the vocabulary/syntax used to ensure student understanding.

These modifications take time and energy to complete; essentially, programs must be changed to meet the unique needs of students who struggle.

In contrast, Direct Instruction programs do not require teacher modification to achieve student success. The design and delivery of Direct Instruction programs make them effective and uniquely designed for special education populations. Direct Instruction programs feature a unique program design, instructional organization, and presentation techniques that make them highly successful for special education populations.

Direct Instruction is Proven Effective for Students with Special Needs

Elements of Direct Instruction That Make the Difference

“More than any other commercially available instructional program, Direct Instruction is supported by research” (Watkins & Slocum, 2004, pg. 57). Several independent reviews of research add to this strong support with a particular focus on students with special needs (Carnine, Silbert, Kame’enui, & Tarver, 2004). For example:

- White (1988) found 25 investigations where Direct Instruction was compared to some other treatment. Not one of the 25 studies showed results favoring the comparison groups; 53 percent of the outcomes significantly favored Direct Instruction with an average effect size of .84 (considered a large magnitude of change from pre- to post-assessments).
- Adams and Engelmann (1996) analyzed 37 research studies that compared Direct Instruction to other treatments. When those studies involving special education students (n = 21) were analyzed separately, the mean effect size was .90 (considered a large magnitude of change from pre- to post-assessments).
- Forness, Kavale, Blum, and Lloyd (1997) conducted an analysis of various intervention programs for students receiving special education services and found Direct Instruction to be one of only seven interventions with strong evidence of success.

Positive effects on at-risk populations have been noted by the American Federation of Teachers (1999), American Institutes of Research (Herman et al., 1999), and the Center for Research on the Education of Students Placed at Risk (Borman, Hewes, Overman, & Brown, 2002). Direct Instruction offers sufficient validation as noted by Fuchs (1996) to warrant its use with special education populations.

Thus, it is no surprise that Direct Instruction is often referred to as a program for special education or at-risk students; however, it is important to note that Direct Instruction is appropriate for talented and gifted students, grade-level students, and those with diverse language backgrounds or “learning styles” (Watkins & Slocum, 2004).

Three main components of McGraw-Hill Education Direct Instruction programs—program design, instructional organization, and presentation techniques—make them uniquely effective for special education populations.



Program Design

- **Careful Content Analysis** The content in Direct Instruction programs is carefully analyzed to identify central concepts, rules, strategies, and “big ideas” (those strategies that promote generalization of learning). Thus, teachers do not have to develop lessons or modify curriculum to help students gain proficiency in areas critical to success.
- **Clear Communication** The instructional language used in Direct Instruction programs is carefully written to be clear and consistent to reduce student confusion. “Teacher talk” is kept to a minimum and phrases used in teaching routines are repeatedly used. Instructional examples are introduced and carefully planned to promote student success. Teachers do not have to invent “learner friendly” instruction.
- **Clear Instructional Formats** Direct Instruction formats are teaching routines that model new content, provide guided practice, and implement independent practice opportunities. As students master skills, formats evolve to accommodate their progress and growing independence. These formats are “written, tested, rewritten, retested—polished in a cycle of classroom field testing and revision that ends only when trials show that 90 percent of students grasp a lesson the first time around” (AFT, 1999, pg. 4). Teachers do what they do best—teach—rather than develop instructional plans to try to ensure student success day after day.
- **Sequencing of Skills** In Direct Instruction programs, skills are taught in a cumulative and carefully integrated scope and sequence to help students reach mastery level and generalize their learning to new, untaught situations (AFT, 1999). Students learn “rules” before exceptions and easy skills before more difficult ones. Appropriate scaffolding is utilized, moving students from teacher-directed activities to independent ones.
- **Track Instruction** Each Direct Instruction lesson consists of multiple “tracks” (strands) and skills to teach the tracks. Rather than introduce skills in isolation, multiple tracks are taught in unison, and each is related to provide efficient instruction. Tracks ensure that:
 - Lessons are made up of several relatively short exercises.
 - Difficult tasks are interspersed with easier ones.
 - New skills are interspersed with well-practiced skills.
 - Practice is distributed so that students do not “forget” skills over time.

In track instruction, errors are reduced, and skill integration is enhanced.



Presentation Techniques

Seven aspects of Direct Instruction presentation techniques for delivering instruction (also called teacher/student interactions) help to achieve superior outcomes with special education populations.

- **Active Student Participation** Every minute of instruction provides students with many opportunities to actively respond. Students participate orally through unison (choral) responses, individual turns, and in writing. Active participation ensures that each student gains ownership of concepts and skills, and it reduces off-task behavior. When Direct Instruction programs are implemented correctly, there is no time to misbehave.
- **Unison Responding** Unison or choral responding is a key feature of Direct Instruction programs. Instructional signals cue students to respond together, ensuring that each student practices all content. This feature is crucial for those students who struggle. It provides the maximum opportunity for students to practice each skill as it is being taught. Even error corrections are taught to the entire group. Students are not singled out in any way and feel “safe.” The lesson continues to move smoothly. All students practice the correct response again, and everyone remains engaged.
- **Signals** Unison responding requires clear signals to “cue” students to respond together. Direct Instruction programs include a variety of signals to elicit student responses. Signals help to control pacing and provide adequate think time before students answer. Signaling is an effective technique for minimizing students’ tendency to guess or blurt out incorrect answers and for increasing automaticity of response.
- **Instructional Pacing** In a well-paced lesson, the dialogue between teacher and students occurs as a rapid interchange, allowing a smooth transition between activities. Direct Instruction teachers adjust pacing, so that is quick enough to keep students attending and on task but not so fast that they begin to guess and make errors.
- **Error Corrections** Students must receive immediate corrective feedback when they make errors. All errors are corrected as soon as they occur using pre-planned correction procedures within each Direct Instruction program. Corrections are typically a “model-lead-test and re-test” sequence wherein the teacher shows students how to perform a task, practice it with them, test their knowledge, and then come back to check understanding after a little time has passed.

Instructional Organization

- **Instructional Grouping** Direct Instruction programs are generally presented to small groups—and can be used one-on-one—to provide intensive instruction when promoting individual student growth. Students are placed in a group according to skill level and move in the program depending upon how rapidly they acquire skills and concepts.
- **Instructional Time** Direct Instruction lessons encourage rapid and constant interactions between teachers and students to maximize engagement. The objective is to keep students focused and provide plenty of academic learning time—time that students are engaged with a high degree of success—because academic learning time is “one of the strongest predictors of student achievement” (Watkins and Slocum, 2004, pg. 42).
- **Continuous Assessment** Student progress is carefully monitored to ensure academic success and to allow program individualization, a key element of effective special education (see Fuchs, 1996; Fuchs & Fuchs, 1995). Placement tests ensure that students are taught at their optimal instructional levels. Ongoing, in-program assessments help track progress and make data-informed instructional decisions, and mastery (goal) criteria help to document achievement and monitor grade-level benchmark progress.

- **Teaching to Mastery** Direct Instruction programs are engineered so that every student can perform every skill without making a mistake. The exception is that students begin each new activity ready to achieve at least 80 percent accuracy on their first try, with 100 percent accuracy after error correction. Individual turns and in-program assessments confirm that each student has mastered the activity. Teaching to mastery communicates that what is learned today is important because it will be needed tomorrow.
- **Motivation** Success is motivating to even the most challenging students. Direct Instruction lessons keep students focused and engaged. New information in each lesson is minimal, while the majority—80 to 90 percent—is review and application. Students make few errors, success rates are high, and enthusiasm for learning is enhanced. The early introduction of Direct Instruction in these areas led to its use among students with special needs today. From 1968 to 1976, Direct Instruction was part of the largest educational study in U.S. history: Project Follow Through. After the success of Head Start with at-risk preschool students, Project Follow Through was designed to compare educational approaches to determine best practice for instruction of low income, at-risk children in kindergarten through third grade.

Much of the Project Follow-Through research took place prior to national legislation requiring special education for students with disabilities. Although many children with severe disabilities were not included in schools at that time, students with mild disabilities—learning disabilities, language delays, behavior problems, and slightly lower IQs were typically taught in general education classrooms.

Students with Diverse Learning Needs

In the earliest efforts to assess the effectiveness of Direct Instruction for students with disabilities, Gersten, Becker, Heiry, and White (1984) classified the data from 1,500 Direct Instruction Follow-Through students into six IQ groups. Then achievement gains made by students in each of the groups were compared statistically to see if the growth patterns from year to year differed for high IQ students as compared to low IQ students.

Results

It is not surprising that the higher IQ students started with higher achievement in reading and math than the lower IQ students, nor is it surprising that at the end of third-grade students with higher IQs ended with higher achievement.

However, the surprising result was that students in all IQ groups had the same pattern of growth from Kindergarten, to Grade 1, Grade 2, and Grade 3. Those students with low IQs maintained consistent gains and gained the same amount per year as those with higher IQs. These year-by-year results for the six IQ groups are illustrated in Figure 1 (reading) and Figure 2 (mathematics).

Summary

Research shows strong evidence of success when Direct Instruction programs are used with students with special needs. In fact, Direct Instruction is one of only seven interventions proven effective (Forness, Kavale, Blum & Lloyd, 1997). With its research-supported design and systematic delivery, Direct Instruction is often referred to as a program for special education or at-risk students.

Direct Instruction programs are structured for success, and successful students are motivated to continue the path of achievement.

Part II: Description of Research Review and Project Follow Through



Overview

This research includes an analysis of published investigations where Direct Instruction programs were used with special education populations. Specifically, the review centered on two populations of students with special needs:

1. High-incidence disabilities

- Learning disabilities
- Communication disorders
- Behavior disorders
- Mild developmental disabilities

2. Low-incidence disabilities

- Autism
- Traumatic brain injuries
- Moderate to severe developmental disabilities

Investigations were grouped within special education population areas by academic program (i.e., language, reading, spelling, writing, and mathematics), where appropriate. This research includes tables of study details. Each table identifies:

- The study's researchers and year of publication.
- Direct Instruction programs used.
- Number of participating students.
- Participant information including disability, mean age and age range, and intelligence quotient (IQ) and IQ range.
- Research design.
- Research purpose.
- Intervention details.
- Outcome measures.
- Findings.

If information is missing from the tables, it was not provided in the studies.

Search procedures for the articles in this review included:

- Hand searches of all issues of publications produced by the Association for Direct Instruction (www.adihome.org), which includes ADI News, DI News, Effective School Practices, and Journal of Direct Instruction.
- Ancestral searches of references in key Direct Instruction texts including *Research on Direct Instruction: 25 Years Beyond DISTAR* (Adams & Engelmann, 1996), *Designing Effective Mathematics Instruction: A Direct Instruction Approach* (Stein, Silbert, & Carnine, 1997), *Direct Instruction Reading* (Carnine et al., 2004), and *Introduction to Direct Instruction* (Marchand-Martella et al., 2004).
- ERIC and PsycINFO computerized searches using terms related to Direct Instruction.
- Examination of references listed in SRA-produced research overviews, including *Corrective Reading* (Grossen, 1998), *Reading Mastery*® (Schieffer, Marchand-Martella, Martella, & Simonsen, 2002), spelling programs (Simonsen, Gunter, & Marchand-Martella, 2001), and mathematics programs (Przychodzin, 2004).

Project Follow Through

Background

A number of independent reviews of research show that Direct Instruction is effective for teaching students with special needs (e.g., Adams & Engelmann, 1996; AFT, 1999; Borman et al., 2002; White, 1988). However, Direct Instruction was not initially used for students with special needs. Direct Instruction was first introduced to:

- Teach young, at-risk children.
- Accelerate learning.
- Prevent failure.
- Close gaps.
- Elevate the learning of those with lower IQs.

The early introduction of Direct Instruction in these areas led to its use among students with special needs today. From 1968 to 1976, Direct Instruction was part of the largest educational study in U.S. history: Project Follow Through. After the success of Head Start with at-risk preschool students, Project Follow Through was designed to compare educational approaches to determine best practice for instruction of low income, at-risk children in kindergarten through third grade.

Much of the Project Follow Through research took place prior to national legislation requiring special education for students with disabilities. Although many children with severe disabilities were not included in schools at that time, students with mild disabilities—learning disabilities, language delays, behavior problems, and slightly lower IQs—were typically taught in general education classrooms.

Part III: Direct Instruction Research with Students with High-Incidence Disabilities

Students With Diverse Learning Needs

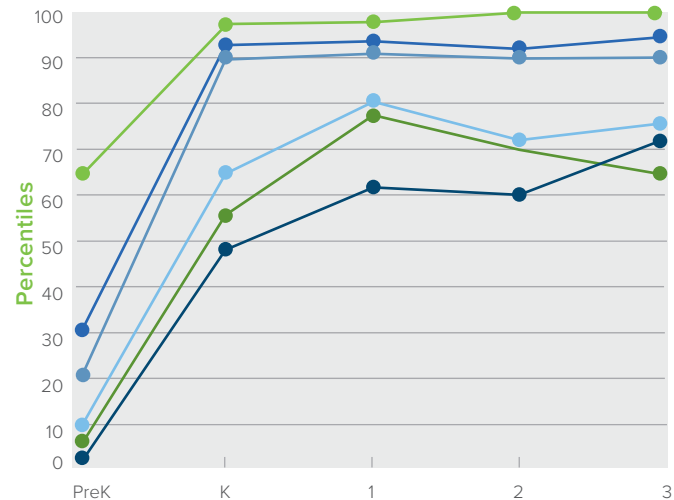
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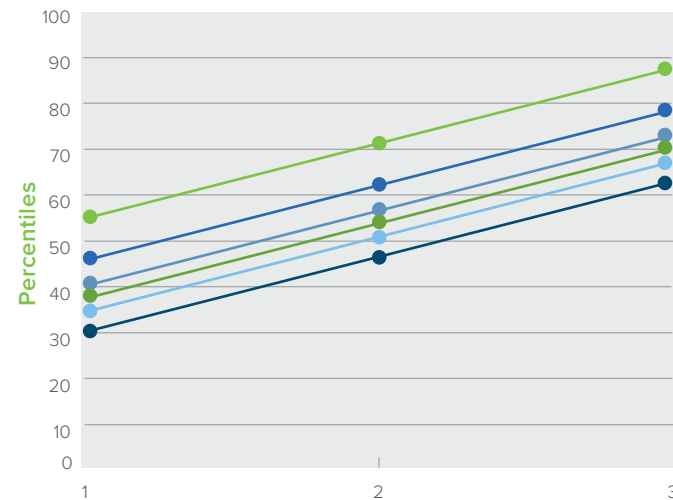
However, the surprising result was that students in all IQ groups had the same pattern of growth from kindergarten to third grade. Those students with low IQs maintained consistent gains and gained the same amount per year as those with higher IQs. These year-by-year results for the six IQ groups are illustrated in Figure 1 (reading) and Figure 2 (mathematics).

FIGURE 1: READING



Results of Direct Instruction on Reading as Measured by the Wide Range Achievement Test for Students with Diverse IQ Scores. Adapted from Gersten et al. (1984).

FIGURE 2: MATHEMATICS



Results of Direct Instruction on Math as Measured by the Metropolitan Achievement Test for Students with Diverse IQ Scores. Adapted from Gersten et al. (1984).

■ IQ Under 71 ■ IQ 71-90 ■ IQ 91-100 ■ IQ 101-110 ■ IQ 111-120 ■ IQ 121

Summary

These results provide evidence that Direct Instruction is appropriate for and effective with a wide variety of students. In reading, the group with the lowest IQ scores (under 70) improved nearly as much each year in reading as students with much higher IQ scores. In math, the results were even more pronounced—the growth rate for all groups of students corresponds to one grade equivalent for each year in school. In addition, because students in Project Follow-Through were taught in small groups, the gains of students with lower IQ scores were not made at the expense of other students.



Overview

This section reviews studies specific to students with high-incidence disabilities. Thirty-seven studies were used spanning the mid-1970s to 2005:

- The participants in the majority of these studies (n = 22) were students with learning disabilities; 16 of these 22 studies specifically identified participants as learning disabled; the remaining six studies were earlier investigations, some taking place in other countries but the descriptions of the participants matched those of students with learning disabilities.
- Seven of the 22 investigations not only included students with learning disabilities but also those with behavior disorders, mild cognitive disabilities, other health impairments, and/or traumatic brain injuries as well.
- One study's participants were low socioeconomic status (SES) children with mild cognitive disabilities.
- Eight studies included preschoolers who were not yet categorically identified. These children were often described as language or developmentally delayed.
- Five studies identified school-aged students simply as mildly disabled, developmentally delayed, or eligible for special education.

These 37* studies also investigated a range of Direct Instruction programs including:

- *DISTAR (Reading, Language, and Arithmetic)* (n = 9)
- *Reading Mastery®* (n = 5)
- *Horizons* (n = 1)
- *Corrective Reading* (n = 17)
- *Language for Learning* (n = 1)
- *Language for Writing* (n = 1)
- *Reasoning and Writing* (n = 1)
- *Spelling Mastery* (n = 2)
- *Morphographic Spelling* (now called *Spelling Through Morphographs*) (n = 2)
- *Connecting Math Concepts* (n = 1)

*The number of studies does not equal 37 because some studies included more than one Direct Instruction program or more than one age group.

These 37 studies included not only a wide range of Direct Instruction programs and participants, but also varying age/grade ranges from three years, two months to high school. The majority of the studies (n = 28) included:

- Elementary school-aged students (n = 22)
- Middle school-aged students (n = 6)

Participants in eight of the studies were preschool-aged, kindergarten children. Finally, six studies included high-school aged students.

Overall, in only three of the 37 studies did students who were instructed with other materials fare better than the students who received Direct Instruction.

**The number of studies does not equal 37 because some studies included more than one Direct Instruction program or more than one age group*

Direct Instruction Language Research

Five studies used Direct Instruction with preschool-aged children with high-incidence disabilities (see Table 1 on pg. 15). Children in these studies were eligible for special education services, often identified in the general category of developmentally delayed or language delayed. Each of these studies focused on language instruction.

Four of these studies comprised a series of investigations involving *DISTAR Language* (now called *Language for Learning*) contrasted with other language approaches. The first study in the series (i.e., Cole & Dale, 1986) compared *DISTAR Language* to interactive language instruction that incorporated language throughout daily activities; no statistically significant differences were found. Thus, both groups performed similarly.

Later studies (i.e., Cole et al., 1991; Cole, Dale, Mills, & Jenkins, 1993; Dale & Cole, 1988) examined the effectiveness of a Direct Instruction package including *DISTAR Language, Reading, and Arithmetic* (DI) and Mediated Learning (ML), a program that focused on interactive cognitive processes like comparisons, classification, and changing perspective, rather than emphasizing specific academic content. Table 1 (on pg. 15) provides the details of these studies.

Cole et al. (1991) found no statistically significant differences between the DI and ML group on any language, cognitive, or other measure except for the Peabody Picture Vocabulary Test-Revised (PPVT-R) Standard Score favoring the ML group. Additionally, children who scored higher on pretests of cognitive ability and language gained more from DI programs in language development, while lower-performing children gained more from ML. Cole et al. (1993) also found that higher-performing children gained more from DI; however, in this study there were no statistically significant differences between the groups on any measure. In contrast, Dale and Cole (1988) found that higher-performing children did better on the posttest in ML while lower-performing children did better on the posttest in DI. Dale and Cole also found that each program had at least one measure on which it was superior.

In a more recent study, Waldron-Soler et al. (2002) investigated the effects of *Language for Learning*, the new, accelerated version of *DISTAR Language I*. This investigation found that 15 weeks of instruction with *Language for Learning* resulted in children outperforming the comparison group who received traditional preschool instruction on receptive language and social interaction skills.

TABLE 1: LANGUAGE RESEARCH WITH PRESCHOOLERS WITH HIGH-INCIDENCE DISABILITIES

Study	D1 Program	(N) Participants	Research Design/Purpose	Intervention Details	Outcome Measures	Findings
Cole & Dale (1986)	<i>DISTAR Language I</i>	(44) Preschool children with language delays ranging in age from 2 years, 10 months to 5 years, 9 months (mean age 4 years, 6 months) IQ range 52 to 109	Experimental — Pretest-posttest control group Determining the relative effects of the <i>DISTAR Language I</i> and Interactive Language Instruction programs with preschool and Kindergarten children with language delays.	<i>DISTAR Language I</i> and Interactive Language Instruction implemented 2 hours a day, 5 days per week for 32 weeks. Student to teacher ratio was 4 to 1.	Columbia Mental Maturity Scale, Carrow Auditory-Visual Abilities Test, Language samples (Mean Length of Utterance, developmental sentence scoring), Preschool Language Scale (Auditory Comp. and Verbal Abilities subscales and Overall score), Basic Language Concepts Test, Northwest Syntax Screening Test (Receptive subtest), Northwestern Syntax Screening Test (Expressive subtest), and Peabody Picture Vocabulary Test-Revised.	Statistically significant differences were noted between pretest and posttest for both groups on every measure except developmental sentence scoring. No statistically significant difference between the effectiveness of the programs was found.
Cole, Dale, & Mills (1991)	<i>DISTAR Language, DISTAR Arithmetic, and DISTAR Reading</i>	(107) Children (ages 3 to 7 years, mean 5.0) with mild to moderate developmental delays	Experimental — Pretest-posttest control group Determining the relative effectiveness of Direct Instruction programs versus Mediated Learning with preschool and Kindergarten children with mild to moderate developmental delays.	Implemented <i>DISTAR Language, DISTAR Arithmetic, and DISTAR Reading</i> (DI), and Mediated Learning (ML) 2 hours a day, 5 days per week for 180 school days (preschool) and 5.5 hours a day, 5 days per week over 180 school days (kindergarten). Program provided over a 4 year period.	Peabody Picture Vocabulary Test-Revised (PPVT-R), Test of Early Language Development, Preschool Language Assessment Inventory (PLAI), Mean Length of Utterance, Basic Language Concepts Test, and McCarthy Scales of Children's Abilities (MSCA).	Both groups had gains on several measures. No statistically significant differences were found between the two programs except for the PPVT-R Standard Score favoring the ML group. Higher performing children on MSCA General Cognitive Index and PLAI pretest measures benefited more from Direct Instruction whereas lower performing children benefited more from Mediated Learning.
Cole, Dale, Mills, & Jenkins (1993)	<i>DISTAR Language, DISTAR Arithmetic, and DISTAR Reading</i>	(164) Children with developmental delays in language (3 to 7 years old, mean age 4.75 years) Mean IQ 76.03	Experimental — Pretest-posttest control group Determining the relative effectiveness of Direct Instruction programs versus Mediated Learning with preschool and Kindergarten children with mild to moderate developmental delays.	Implemented <i>DISTAR Language, DISTAR Arithmetic, and DISTAR Reading</i> (DI), and Mediated Learning (ML) 2 hours a day, 5 days per week for 180 school days (preschool) and 5.5 hours a day, 5 days per week over 180 school days (Kindergarten). Program provided over a 4 year period.	Peabody Picture Vocabulary Test-Revised, Test of Early Language Development, Test of Early Reading Ability, McCarthy Scales of Children's Abilities, Preschool Language Assessment Inventory, Mean Length of Utterance, and Basic Language Concepts Test.	No statistically significant differences were found between the two programs on any measures. Higher performing children gained significantly more in the Direct Instruction program although these gains were modest.
Dale & Cole (1988)	<i>DISTAR Language, DISTAR Arithmetic, and DISTAR Reading</i>	(83) Preschool (N = 61, ages 3 years to 5 years 11 months of age) and kindergarten/primary (N = 22, ages 6 to 8) developmentally delayed children	Experimental — Pretest-posttest control group Determining the relative effectiveness of Direct Instruction programs versus Mediated Learning with preschool and Kindergarten children with mild to moderate developmental delays.	Implemented <i>DISTAR Language, DISTAR Math, and DISTAR Reading</i> (DI), and Mediated Learning (ML) 2 hours a day, 5 days per week for 180 school days (preschool) and 5.5 hours a day, 5 days per week over 180 school days (kindergarten). Implemented over 1 academic year.	McCarthy Scales of Children's Abilities, Peabody Picture Vocabulary Test-Revised, Test of Early Language Development, Mean Length of Utterance, Basic Language Concepts Test, Test of Early Reading Ability, Test of Early Mathematics Ability, and Stanford Early School Achievement Test.	The DI group scored significantly higher on Tests of Early Language Development and the Basic Language Concepts Test while the ML group scored significantly higher on the McCarthy Verbal and Memory Scales and Mean Length of Utterance. Higher performing children did better on the posttest in Mediated Learning, while lower performing children did better on the posttest in Direct Instruction programs on 18 of the 24 analyses (although the authors reported these results did not reach statistical significance).
Waldron-Soler, Martella, Marchand-Martella, Warner, Miller, & Tso (2002)	<i>Language for Learning</i>	(36) Preschool children (3 to 5 years of age) 28 typical children, 8 with developmental delays: Preschool A (12 children without developmental delay, 4 children with developmental delay), Preschool B (16 children without developmental delays), and Preschool C (4 children with developmental delays)	Quasi-experimental — Nonequivalent control group Investigating the differential effects of the <i>Language for Learning</i> program and standard early childhood education programs with preschoolers with and without developmental delays.	<i>Language for Learning</i> implemented for 15 weeks.	Peabody Picture Vocabulary Test-Third Edition (PPVT-3), Expressive Vocabulary Test, and Social Skills Rating System (SSRS); Preschool Teacher Questionnaire.	Children with disabilities instructed with <i>Language for Learning</i> made greater gains than the comparison group on all three measures. Children without disabilities made greater gains on all three measures; however, there was a statistically significant increase on the PPVT-3 and SSRS versus the comparison group.

DISTAR Reading / Reading Mastery Research

This research includes 10 studies with school-aged populations that include *DISTAR Reading* or *Reading Mastery*, the revised and extended Direct Instruction reading program (See Table 2 on page 17):

- Seven of the 10 studies compared *DISTAR Reading* or *Reading Mastery* to other approaches.
- One study described the effects of *Reading Mastery* and *Corrective Reading*.
- Two *Reading Mastery* studies went beyond the question of the efficacy of Direct Instruction reading. In addition, they explored supplementing *Reading Mastery* with Spelling and comparing two Direct Instruction reading programs.

Most students across these studies were in Grades K–6 and were identified as learning disabled or would meet the definition of learning disabilities (e.g., other countries). This finding is not surprising given that specific learning disability is the largest special education category coupled with the fact that Reading is the area where most of these students experience difficulty (Meese, 2001).

Chamberlain (1987) presented seven years of program evaluation data on *Reading Mastery* and *Corrective Reading* with elementary-aged students with learning disabilities or “slow learners” in learning assistance classrooms in Victoria, British Columbia. Chamberlain reported that students gained an average of one and half months for each month of instruction.

One study (Branwhite, 1983) illustrating the impact of *DISTAR Reading*, was conducted in the United Kingdom with students who fit the common description of learning disabilities. This study compared the effectiveness of *DISTAR Reading II* to Diagnostic Prescriptive Remediation (DPR) with eight- and nine-year old students who were described as delayed in reading (pg. 293). Both *DISTAR* groups scored significantly higher on reading tests than the students taught with DPR. At that point, the DPR group was placed in *DISTAR Reading*. The group who originally received DPR made significant growth in Direct Instruction in *DISTAR Reading* and, in fact, caught up with the group who received Direct Instruction from the start.

Haring and Krug (1975) investigated the efficacy of *DISTAR Reading* supplemented with precision teaching compared to traditional reading instruction. Low socioeconomic status (SES) students with mild cognitive disabilities (mean IQ = 72.3) who were in self-contained special education placements participated in this study. Interestingly, not only did the students who received *DISTAR Reading* supplemented with precision teaching perform better on standardized reading posttests—as compared to the students who did not receive instruction—but also one-third of these students returned to the general education classrooms due to adequate reading levels. (Note: None of the students who received regular classroom instruction returned to general education placements.)

O’Connor and Jenkins (1995) found that *Reading Mastery* supplemented with spelling resulted in improved reading of words from *Reading Mastery* as well as improved scores on tests of word identification and decoding of pseudo-words.

More recently, Cooke, Gibbs, Campbell, and Shalvis (2004) compared reading achievement of students with mild disabilities taught with the accelerated versions of *Reading Mastery* (Fast Cycle) and *Horizons* (Fast Track). Both groups made significant gains on the state literacy exam and the reading subtests of the Woodcock Johnson— Revised: Tests of Achievement. A comparison of the two groups showed small differences favoring the *Reading Mastery* students; however, these differences were not statistically significant.

Only one of the 10 studies found that a comparison group outperformed the students who were taught with Direct Instruction reading programs. Marston et al. (1995) examined six promising interventions for elementary students with mild disabilities. The interventions were implemented for only 10 weeks and students taught with computer-assisted learning, reciprocal teaching, and generic direct instruction outperformed students taught with *Reading Mastery*.

TABLE 2: READING MASTERY/DISTAR RESEARCH WITH STUDENTS WITH HIGH-INCIDENCE DISABILITIES

Study	DI Program	(N) Participants	Research Design/ Purpose	Intervention Details	Outcome Measures	Findings
Branwhite (1983)	<i>DISTAR Reading II</i>	(14) Likely learning disabilities from description 8 and 9 years (mean = 8 years, 7 months) IQs from 74–108 (mean = 92)	Phase I: Quasi-experimental — Non-equivalent control group Phase II: Pre-experimental — One group, pretest/posttest Investigating the efficacy of Direct Instruction reading in the UK.	Phase I: 55 days of <i>DISTAR Reading II</i> , comparison group received Diagnostic-Prescriptive Remediation (DPR) with phonics focus. Phase II: Both groups received <i>DISTAR Reading II</i> .	Schonell’s Graded Word Reading Test.	Phase I: <i>DISTAR Reading</i> group scored statistically significantly better than the DPR comparison group. Phase II: Both groups’ achievement was similar with <i>DISTAR Reading</i> the major contributor to both.
Cooke, Gibbs, Campbell, & Shalvis (2004)	<i>Reading Mastery Fast Cycle and Horizons Fast Track A-B</i>	(30) Learning disabilities, intellectual and developmental disabilities, behavior disorders, and other health impairments 3rd and 4th graders (mean age: <i>Reading Mastery</i> = 8.0 and <i>Horizons</i> = 8.3)	Quasi-experimental—Nonequivalent control group Comparing differences in reading gains with two Direct Instruction reading programs.	Each teacher taught <i>Reading Mastery</i> and <i>Horizons</i> to small groups of 2–5 students daily for 2 years.	Woodcock Johnson-Revised (WJ-R) — Broad Reading Score and Basic Reading Score, North Carolina Literacy Assessment, teacher interviews.	Students in both programs made statistically significant gains from pretest to posttest on WJ-R and NC Literacy Assessment. <i>Reading Mastery</i> students scored better but not significantly. Teachers preferred <i>Horizons</i> .
Chamberlain (1987)	<i>Reading Mastery and Corrective Reading</i>	(120) Learning disabilities and “struggling students” 1st to 6th grade	Pre-experimental — One group pretest/posttest Describing the effects of two Direct Instruction reading programs in learning assistance classrooms in Victoria, British Columbia from 1980–1986.	Classroom teacher reported 7 years of evaluation data when <i>Reading Mastery</i> and <i>Corrective Reading</i> were used.	Schonnel Reading Inventory, Classroom Reading Inventory (CRI).	On average, students gained about 1.5 months for every month of instruction.
Haring & Krug (1975)	<i>DISTAR Reading I</i>	(54) Intellectual and developmental disabilities 9 to 12 years (mean IQ = 72.3 for <i>DISTAR</i> group; 71.9 for other group)	Experimental — Pretest-posttest control group Evaluating systematic instruction for poverty students with mild, cognitive disabilities.	<i>DISTAR Reading I</i> supplemented with the Sullivan Programmed Reading Series, in the control group teachers had access to a variety of materials, one year implementation.	Wide Range Achievement Test (WRAT), return to general education classroom.	On WRAT, <i>DISTAR</i> + Sullivan group gained 13.5 months in reading in 8 months. The other group made 4.5 months gain. A return to general education occurred for 8 of 24 <i>DISTAR</i> + Sullivan group participants, 0 for control group.
Kuder (1990)	<i>DISTAR Reading</i>	(48) Learning disabilities (mean age = 8 years, 10 months)	Quasi-experimental — Static group comparison Examining the effectiveness of Direct Instruction reading.	2-year study comparing <i>DISTAR Reading</i> to a number of basals, 18 students received <i>DISTAR</i> for 2 years, 8 received 1 year of basal followed by a year of <i>DISTAR</i> , and 8 received 2 years of basal reading (basal only).	Woodcock <i>Reading Mastery</i> Test.	Year 1: No statistically significant differences were noted. Year 2: Both <i>DISTAR</i> groups made greater gains than basal — only group but not statistically significant.
Marston, Deno, Kim, Diment, & Rogers (1995)	<i>Reading Mastery</i>	(176) Mild disabilities 1st to 6th grade, (mean = 3.6 grade)	Experimental — Pretest-posttest control group Translating research into practice and determining the efficacy across interventions.	Six interventions — 1) generic direct instruction with Holt 2) <i>Reading Mastery</i> 3) reciprocal teaching 4) peer tutoring 5) computer-assisted instruction (CAI) 6) effective teaching.	Reading CBM.	Student achievement was highest in CAI, reciprocal teaching, and generic direct instruction with Holt.
O’Connor, Jenkins, Cole, & Mills (1993)	<i>Reading Mastery</i>	(81) Developmental delays (mean <i>Reading Mastery</i> = 6.2; Superkids = 6.3)	Experimental — Pretest-posttest control group Determining the contribution of instructional design to two phonics-based beginning reading programs.	Kindergarten 30 min. daily instruction in homogenous groups of two to four, 4 years of data collected, in either <i>Reading Mastery</i> or Superkids 13-26 sounds were taught.	Test of Early Reading Abilities (TERA), Portions of California Achievement Test (CAT), Subtests of the Peabody Individual Achievement Test (PIAT).	Few statistically significant differences were found. <i>Reading Mastery</i> group performed significantly better on the sounds subtest of the CAT and on the PIAT spelling subtest.
O’Connor & Jenkins (1995)	<i>Reading Mastery</i>	(10) Developmental delays Kindergarten children	Experimental — Pretest-posttest control group Determining if spelling with phonics-based reading would encourage application & transfer.	All students taught <i>Reading Mastery</i> , one intervention group received individual spelling instruction for 20 min. for 1 month; control group received 20 min. of additional reading for the month.	Phonological blending and segmenting, <i>Reading Mastery</i> (RM) word and pseudo-word reading, Woodcock <i>Reading Mastery</i> Test Revised (WRMT).	No differences were found in blending and segmenting. The spelling group significantly outperformed the control group on word reading and pseudo-word reading and did better on Word Identification WRMT subtest.
Richardson, DiBenedetto, Christ, Press, & Winsberg (1978)	<i>DISTAR Reading</i>	(72) Likely learning disabilities from description (mean age: DI = 10 years, 0 months; IMS = 9 years, 11 months) (mean IQ: DI = 81; IMS = 83)	Experimental — Pretest-posttest control group Assessing two reading approaches.	Intervention group received <i>DISTAR Reading</i> , control group received Integrated Skills Method (ISM) combining thematic and eclectic teacher designed methods, small group instruction, 45 min. daily, average of 63 days.	Peabody Individual Achievement Test (PIAT), Gilmore Oral Reading Test.	Both groups made gains but there were no statistically significant differences between the groups on any reading measure.
Stein & Goldman (1980)	<i>DISTAR Reading</i>	(63) Learning disabilities 6 to 8 years (mean IQ <i>DISTAR</i> = 98.7; Palo Alto = 101.4)	Quasi-experimental — Nonequivalent control group Comparing the effects of two reading programs.	60 min daily instruction, approximately 11-month intervention, two programs included <i>DISTAR Reading</i> and Palo Alto.	Peabody Individual Achievement Test (PIAT).	<i>DISTAR</i> group performed statistically significantly higher on posttest.

Corrective Reading Research

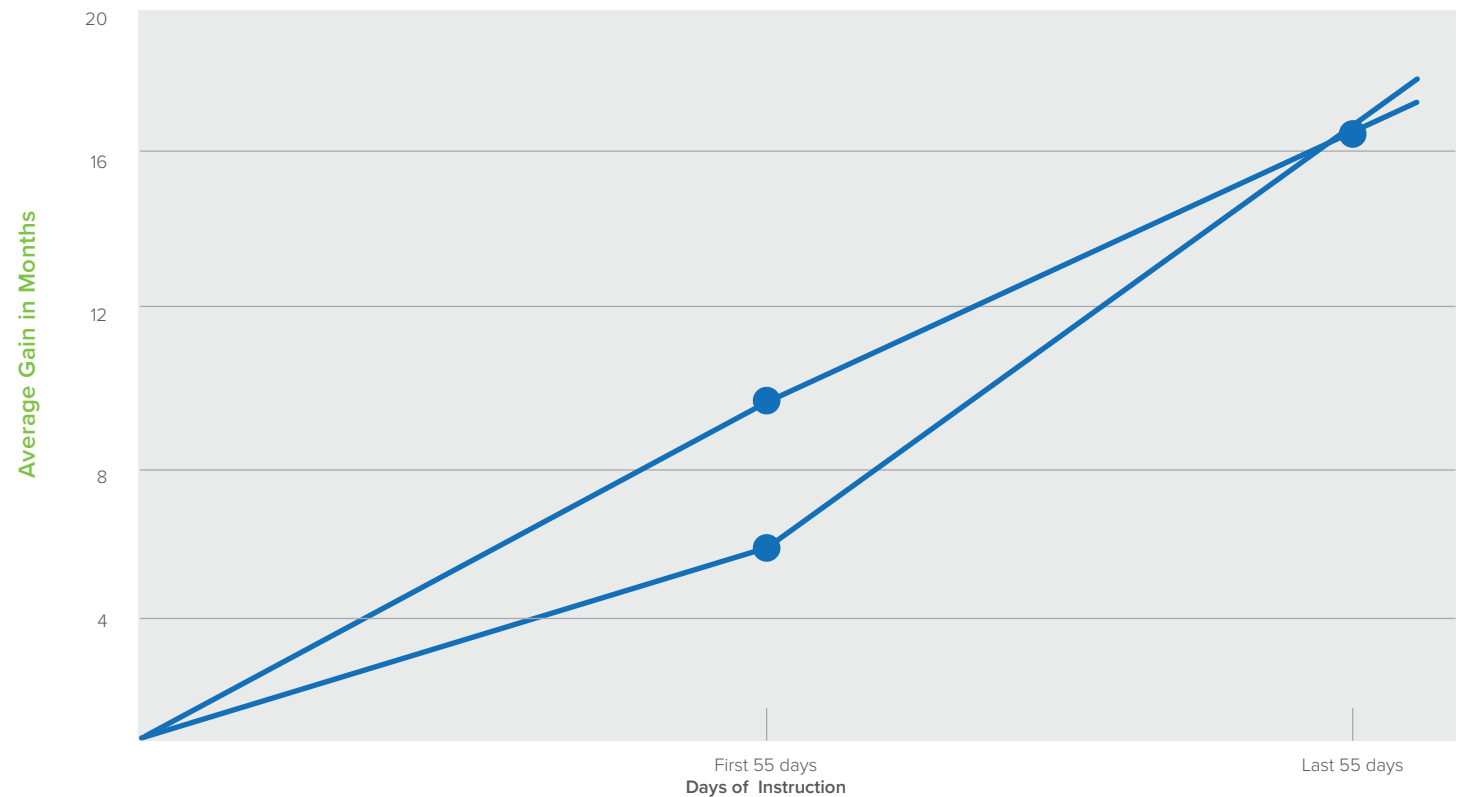
Sixteen studies were found that included *Corrective Reading* with students with high-incidence disabilities. As seen in Table 3 (on pg. 20), most participants were specifically identified as having learning disabilities or whose descriptions matched the definition of learning disabilities (i.e., other countries). Most investigations were conducted in elementary and/or middle school settings. One study investigated the effects of the amount of teacher training on student performance.

Eight of these studies compared the relative effectiveness of *Corrective Reading* to other programs. Results showed that students who received *Corrective Reading* significantly outperformed comparison groups in all but one of these studies (Lewis, 1982). Results of one of two studies conducted by Lewis found that both the *Corrective Reading* group and English Colour Code (a reading intervention program) group outperformed the school's own remedial program. However, results of the second study found that gains for all three groups were similar.

“
Coming from a ‘whole-language only’ upbringing, I was very skeptical about *Direct Instruction*. Now, I have several years with *Reading Mastery*®...children are reading stories they thought they’d never read!
”
Principal, Tacoma, Washington



FIGURE 3



Average Gain in months for each group across days of instruction

Six studies evaluated the effectiveness of *Corrective Reading* by comparing pretest and posttest scores. Each of these studies reported that students who received *Corrective Reading* made gains. Polloway, Epstein, Polloway, Patton, and Ball (1986) found that students with learning disabilities and developmental disabilities made significantly greater gains with *Corrective Reading* than they had made in the previous year when they were taught with different materials.

One study (i.e., Edlund & Ogle, 1988) investigated different levels of teacher training for implementation of *Corrective Reading* and *Morphographic Spelling* (currently published as *Spelling Through Morphographs*) as well as two non-Direct Instruction programs. Teachers in the control group studied the manuals on their own. One group received six weeks of training and another group got one week of training. The students instructed by each group of teachers were pretested and posttested. The students whose teachers studied the manuals on their own (control group) demonstrated losses in reading and spelling. Students whose teachers had six

weeks of training fared better than the students whose teachers received one week of training.

Finally, Marchand-Martella, Martella, Orlob, and Ebey (2000) examined the issue of implementation of *Corrective Reading* at the high school level, where scheduling and grouping are often challenging. The authors found that high-school students in Honors English, when properly trained, could effectively teach *Corrective Reading* to freshman in special education. This study suggests that with careful training, parents, volunteers, and peers can effectively tutor struggling readers using the *Corrective Reading* program.

TABLE 3: LANGUAGE RESEARCH WITH PRESCHOOLERS WITH HIGH-INCIDENCE DISABILITIES

Study	DI Program	(N) Participants	Research Design/ Purpose	Intervention Details	Outcome Measures	Findings
Arthur (1988)	<i>Corrective Reading</i>	(6) Learning disabilities Junior-high school students Grades 7 and 8 Age range 12.2 to 14.2	Pre-experimental — One-group pretestposttest Determining the effects of <i>Corrective Reading</i> with junior-high school special education students.	Provided students <i>Corrective Reading</i> Decoding and Comprehension over a 1 year academic period.	Test of Language Development, Test of Reading Comprehension, Test of Written Language, Sequential Test of Educational Progress, Woodcock-Johnson Psycho-Educational Battery, Wide Range Achievement Test.	Large gains in standard scores and grade equivalents were seen on all measures.
Benner, Kinder, Beaudoin, Stein, & Hirschmann (in press)	<i>Corrective Reading</i> Decoding B1	(41) Learning disabilities, behavior disorders, Title 1 Elementary school and middle school students (Grades 3–8)	Quasi-experimental — Nonequivalent control group Comparing the effects of <i>Corrective Reading</i> with another reading intervention.	One group received <i>Corrective Reading</i> taught by students and cooperating teachers for 4 months; other group received current reading program.	Woodcock-Johnson Achievement Tests-III, DIBELS, Child Behavior Checklist: Teacher Form.	<i>Corrective Reading</i> did significantly better than comparison on all measures; significant decrease in the number of treatment nonresponders.
Campbell (1984)	<i>Corrective Reading</i>	(55) Poor readers, likely learning disabilities (more than 1 standard deviation below the mean) Grades 7 and 8	Quasi-experimental — Nonequivalent pretestposttest control group Assessing the effects of the <i>Corrective Reading</i> program vs. regular English classes.	<i>Corrective Reading</i> program provided to the experimental group 50 minutes per day for 6 to 9 months.	Woodcock <i>Reading Mastery</i> Test.	<i>Corrective Reading</i> group made greater grade-equivalent and standard score gains than did the comparison group. Further, the students initially at a higher reading level made greater gains than did the students initially at a lower reading level.
Drakeford (2002)	<i>Corrective Reading</i>	(6) Incarcerated males Average age = 17 years All participants had a history of educational disabilities and/or had received special education services	Single-case — Multiple baseline across participants Investigating the effects of <i>Corrective Reading</i> with incarcerated males.	8 weeks, 1 hour per day, 3 days per week. Teachers delivered the <i>Corrective Reading</i> program to incarcerated youth. Participant 1 completed 24 lessons, Participant 2 completed 19 lessons, Participant 3 completed 18 lessons, Participant 4 completed 22 lessons, Participant 5 completed 19 lessons, and Participant 6 completed 17 lessons.	Measures of oral reading fluency, Rhody-Secondary Reading Attitude Assessment (RSRA).	All participants demonstrated positive gains on oral reading fluency measures. Positive trends were noted in attitudes toward reading instruction.
Edlund & Ogle (1988)	<i>Corrective Reading</i> , Morphographic Spelling, and other non-DI programs	(6*)(48**) Teachers with 6.5 years of special education experience Students with learning disabilities (12- to 19- years-old, IQ range 90 to 100)	Experimental — Pretest-posttest control group Comparing the differential effects of amount of teacher training on student performance.	Two teachers received 6 weeks of training, 2 teachers received 1 week of training, and 2 teachers received no formal training (studied manual on their own). Students received a variety of instructional materials including <i>Corrective Reading</i> .	Wide Range Achievement Test.	Results indicated that students whose teachers had more training had greater standard score increases in reading and spelling.
Gregory, Hackney, & Gregory (1982)	<i>Corrective Reading</i> Decoding B	(19) Likely learning disabilities Mean age: <i>Corrective Reading</i> group = 11 years, 9 months; comparison group = 11 year, 10 months	Quasi-experimental — Nonequivalent control group Comparing the effects of <i>Corrective Reading</i> with the school's own remedial program in Britain.	One group received <i>Corrective Reading</i> ; comparison group received the current remedial reading class; 4 periods per week for 5 months.	Daniels & Diack Test of Reading, behavior surveys, attendance records.	<i>Corrective Reading</i> group did significantly better than the comparison group in reading gains, behavior, and attendance.
Holdsworth (1984-85)	<i>Corrective Reading</i> Decoding B and C	(15) Students placed in a school for students with special needs in the United Kingdom	Pre-experimental — One group pretestposttest Determining the effects of <i>Corrective Reading</i> with the students with special needs in the United Kingdom.	Provided <i>Corrective Reading</i> , Decoding B to 9 students over a period of 4 months and Decoding C to 6 students over 2.5 months.	Neale Analysis of Reading Ability.	Large improvements in reading accuracy and reading comprehension grade equivalent scores.
Lewis (1982)	<i>Corrective Reading</i> Decoding B	(41) Likely learning disabilities 11- to 12-year-olds	Experimental — Pretest-posttest control group	One group received <i>Corrective Reading</i> ; one group received "novelty" program (The English Colour Code); another group received traditional remedial program. Length of program was 7-16 months (Study 1) and 8 months (Study 2).	Neale Analysis of Reading, oral reading miscue analysis (comparison of self-corrections to substitutions).	<i>Corrective Reading</i> group made significantly greater gains than traditional remedial group. Novelty program group made gains similar to <i>Corrective Reading</i> group. <i>Corrective Reading</i> group demonstrated a significant increase in self-corrections on miscue analysis.

TABLE 3, CONTINUED

Study	DI Program	(N) Participants	Research Design/ Purpose	Intervention Details	Outcome Measures	Findings
Lloyd, Cullinan, Heins, & Epstein (1980)	<i>Corrective Reading</i> : Decoding A & B; & Comp. A	(23) Learning disabilities Elementary aged (9 years, 9 months to 10 years, 4 months)	Experimental — Posttest only control group Comparing the effects of <i>Corrective Reading</i> with individual and small group instruction in a variety of areas.	Study took place over 1 school year; one group received <i>Corrective Reading</i> while other group received teacher-developed language instruction based on district guidelines and Houghton- Mifflin reading.	Slosson Intelligence Test, Gilmore Oral Reading Test.	On both measures, the <i>Corrective Reading</i> group scored significantly higher.
Malmgren & Leone (2000)	<i>Corrective Reading</i> among other programs	(45) Incarcerated males, 20 receiving special education services Average age = 17.07 years (Range = 13.92–18.75) EBD (N = 10), LD (N = 7), and MR (N = 3)	Pre-experimental — One group pretestposttest Determining the effects of <i>Corrective Reading</i> with incarcerated youth.	6 weeks, 45 min. per day, 5 days per week. Teachers delivered an intensive <i>Corrective Reading</i> program to incarcerated youth.	Gray Oral Reading Test (GORT-3) subtests (i.e., Rate, Accuracy, Passage, and Comprehension).	Overall, positive results were noted. Statistically significant gains on Rate, Accuracy, and Passage subtests were found. Gains were made on Comprehension subtest but they did not reach statistical significance.
Marchand- Martella, Martella, Orlob, & Ebey (2000)	<i>Corrective Reading</i> Decoding	(22) Special education students 9th graders	Pre-experimental — One group pretest-posttest Investigating the effects of <i>Corrective Reading</i> as delivered by peer instructors.	Honors English students taught one-on-one, 3 days per week, 80 days; students completed 39–53 lessons of <i>Corrective Reading</i> Decoding programs.	Gates-MacGinitie Reading Tests, measures of reading fluency.	Grade equivalent scores improved for B1 group in vocabulary, B2 and C in vocabulary and comprehension; oral reading fluency for B1 and B2 increased.
Polloway, Epstein, Polloway, Patton, & Ball (1986)	<i>Corrective Reading</i> : Decoding A, B, and C	(119) Middle and high school Learning disabilities (N = 78); educable developmental disabilities (N = 41) (Learning disabilities mean age = 15 years, 7 months; educable developmental disabilities mean age = 16 years, 0 months) (Learning disabilities mean IQ = 87; educable developmental disabilities mean IQ = 62.5)	Pre-experimental — One group pretestposttest Investigating the effects of <i>Corrective Reading</i> ; determining if handicapping condition interacted with treatment.	Study took place over 1 school year, daily small group instruction provided, middle and high school students taught by teachers using <i>Corrective Reading</i> .	Peabody Individual Achievement Test.	Students' gains were significantly greater with <i>Corrective Reading</i> than in previous year. Students with learning disabilities improved at a greater rate than students with educable developmental disabilities.
Scarlato & Asahara (2004)	<i>Corrective Reading</i> : Decoding B2	(9) Adjudicated youth Emotional/behavioral disorders; learning disabilities 16 to 17 years	Quasi-experimental — Nonequivalent control group Comparing the effects of <i>Corrective Reading</i> and reading specialist group.	19 weeks of instruction, 5 students received instruction using <i>Corrective Reading</i> Decoding Level B2 while the other group received instruction developed by a reading specialist (RS).	Woodcock <i>Reading Mastery</i> Test–Revised.	Majority of students in <i>Corrective Reading</i> group had moderate to large gains on standardized measures. Majority of students in comparison group demonstrated moderate to large losses on standardized measures.
Somerville & Leach (1988)	<i>Corrective Reading</i>	(40) Learning disabilities (mean age = 10 years, 11 months)	Experimental — Pretest-posttest control group Comparing the effects of <i>Corrective Reading</i> with psycho-motor, self-esteem, and control groups.	12 weeks, groups received 1 hr. of teacher-directed instruction per week and 15 min. of daily homework, parents monitored or taught. Groups: 1) Psycho-motor 2) Self-esteem 3) <i>Corrective Reading</i> 4) No intervention.	Tests of reading, psychomotor skills, and self-esteem measures.	On the reading test, <i>Corrective Reading</i> students scored significantly higher than other three groups. No significant differences on psychomotor or self-esteem measures were found.
Thomson (1992)	<i>Corrective Reading</i>	(255) Learning disabilities Elementary and middleschool students	Quasi-experimental — Nonequivalent control group Comparing <i>Corrective Reading</i> to a traditional basal approach and a whole language approach.	<i>Corrective Reading</i> , traditional basal approach, and whole language approach implemented for 1 academic year.	Woodcock-Johnson Individual Achievement Tests, Dolch Story Reading Test.	<i>Corrective Reading</i> students had greater standard score gains and larger increases in words read per minute than the other two reading group students.
Thorne (1978)	<i>Corrective Reading</i>	(13) Junior maladjusted boys in England Age range = 8 to 12 years	Pre-experimental — One group pretestposttest Investigating the effects of <i>Corrective Reading</i> with maladjusted boys in England.	35 lessons of the <i>Corrective Reading</i> program were taught to two groups of boys by the same teacher. A contractbased system was used.	Neale Analysis of Reading.	After 35 lessons, Group 1 made gains in reading accuracy. Group 2 made gains in reading accuracy and reading comprehension.

Direct Instruction Writing and Spelling Research

Our search identified five studies using Direct Instruction spelling and writing programs (See Table 4 on pg. 23). The participants in four studies were students with learning disabilities whose age ranged from eight to 11 years. Two studies, in addition to students with learning disabilities, included students with behavior disorders and traumatic brain injuries. One study identified participants as special education resource room students in grades three through five.

Three studies investigated Direct Instruction spelling programs. Darch and Simpson (1991) compared the effectiveness of 40 lessons of *Spelling Mastery* and found that the students who received Direct Instruction significantly outperformed those students who were taught using another program. In a study that took place in Australia using *Morphographic Spelling*, Maggs, McMillan, Patching, and Hawk (1981) found that students whose academic problems fit our description of learning disabilities made gains of over 11 months after only eight months of instruction. More recently, Owens et al. (2004) investigated the efficacy of *Spelling Mastery* taught by a paraprofessional. They found that the paraprofessional was successful in implementing *Spelling Mastery* as determined by observations of her teaching and the improvement of her students. This study suggests another instructional delivery option for special educators.

The Direct Instruction writing programs *Language for Writing* and *Reasoning and Writing* were developed later than the reading and spelling programs; thus, there is limited, although strong, evidence of their success (Fredrick & Steventon, 2004). Anderson and Keel (2002) investigated the effects of *Reasoning and Writing* Level C fourth and fifth grade students with learning disabilities and behavior disorders. Students were shown to make significant gains in only six weeks.

Recently, Martella and Waldron-Soler (in press) conducted a year-and-a-half program evaluation of *Language for Writing* that included 21 special education elementary students. All students were pretested and posttested using the Test of Written Language-3 (TOWL-3). Students in special education made educationally significant gains; in particular, these students closed the gap between their performance and that of the normative sample.

“

After one year of using Reasoning and Writing, the difference between everyday thinking and alertness among my special education students compared with newly identified special education students is stunning. Those using Reasoning and Writing can listen to complex directions and follow them accurately. They write in simple, yet complete sentences that aren't just a collection of words but express ideas.

”

Resource Specialist,
Glendale, California

TABLE 4: WRITING AND SPELLING RESEARCH WITH STUDENTS WITH HIGH-INCIDENCE DISABILITIES

Study	DI Program	(N) Participants	Research Design/Purpose	Intervention Details	Outcome Measures	Findings
Anderson & Keel (2002)	<i>Reasoning and Writing</i>	(10) Learning disabilities; behavior disorders 4th and 5th graders	Pre-experimental — One group pretest-posttest Determining the gains using <i>Reasoning and Writing</i> for a short period.	25 lessons of <i>Reasoning and Writing</i> Level C were taught in 6 weeks.	Test of Written Language-2 (TOWL-2).	Educationally important gains were found.
Darch & Simpson (1991)	<i>Spelling Mastery</i>	(28) Learning disabilities (mean age = 10 years, 6 months) (mean IQ = 92)	Experimental — Pretest-posttest control group Comparing two models of spelling instruction.	Two groups (<i>Spelling Mastery</i> and visual imagery) used same practice words, 25–30 min. daily instruction for 5 weeks. <i>Spelling Mastery</i> students completed 40 lessons.	Probes every 8–10 lessons, posttest of all words in unit, Test of Written Spelling (TWS).	<i>Spelling Mastery</i> group performed statistically significantly better on the probes, posttest, and each subset of the TWS than the visual imagery group.
Maggs, McMillan, Patching, & Hawke (1981)	<i>Morphographic Spelling</i>	(31) Likely learning disabilities from description — remedial with severe spelling problems 9 year, 9 months–11 years, 3 months (mean = 11 years, 3 months)	Pre-experimental — One group pretest-posttest Determining the efficacy of <i>Morphographic Spelling</i> (only remedial student results included here).	35 min. of daily instruction in <i>Morphographic Spelling</i> , 8 months, all 140 lessons completed, fidelity checks indicated strict adherence to procedures.	Schonell Graded Word Spelling Test.	Remedial students made 11.63 months growth on the Schonell in 8 months.
Martella & Waldron-Soler (in press)	<i>Language for Writing</i>	(126) General education students in 2nd to 3rd grade, special education students in 3rd to 5th grade (60% African American and/or Hispanic) 105 general education, 21 special education	Pre-experimental — One group pretest-posttest Determining the effects of the <i>Language for Writing</i> program on 2nd- to 3rd-grade general education students and 3rd to 5th-grade special education students.	<i>Language for Writing</i> program implemented for 5 months (Classrooms 1–5) and 14 months (Classroom 6) (Evaluation I) and 1 academic year (Classrooms 7–10) (Evaluation II).	Test of Written Language-3, student errors, lesson duration, lesson ratings, mastery test performance, social validity survey, and curriculum-based measure.	General and special education students made statistically and educationally significant improvements in their writing performance.
Owens, Fredrick, & Shippen (2004)	<i>Spelling Mastery</i>	(61) Learning disabilities, 1 with traumatic brain injury 7 years, 10 months– 9 years, 8 months Mean age = 8 years, 9 months	Single-case — Multiple baseline across participants Determining if: 1) a para-professional could effectively and efficiently be trained to implement <i>Spelling Mastery</i> and 2) if <i>Spelling Mastery</i> was effective	All students received <i>Spelling Mastery</i> in pairs; implementation was staggered; while waiting for <i>Spelling Mastery</i> , probes were given; pairs received 4, 9, and 12 weeks of instruction.	CBM of spelling using taught and untaught words, Test of Written Spelling-2 (TWS-2).	97% errors corrected and 97% script compliance were noted. Correct letter sequence improvement on CBM ranged from 9.6% (student with TBI) to 29.8%; improvement on TWS-2 from 0% (student with TBI) to 50% was found.



TABLE 5: MATH RESEARCH WITH PRESCHOOLERS WITH HIGH-INCIDENCE DISABILITIES

Study	DI Program	(N) Participants	Research Design/Purpose	Intervention Details	Outcome Measures	Findings
McKenzie, Marchand-Martella, Moore, & Martella (2004)	Connecting Math Concepts, K. (CMC-K)	(16) 5 with developmental delays. 3 years, 5 months–5 years, 4 months (mean age = 4 years, 5 months).	Pre-experimental, one group pretest/posttest Investigating the efficacy of CMC-K.	10–20 min. of small group instruction daily for 6.5 weeks; all students completed all 30 lessons of CMC-K.	Cognitive Domain of the Battelle Developmental Inventory; CMC placement test.	Students with developmental delays made significant gains on the Battelle; all students were ready to begin Connecting Math Concepts A.

Areas of Emerging Research

Little research has been done examining the academic impact of serious emotional disturbance (SED). Low graduation rates associated with academic failure are common for these students (Greenbaum et al., 1996). Educators have begun to look at Direct Instruction as positive behavior support for students with SED. Colvin, Greenberg, and Sherman (1993) reviewed two unpublished studies with *Corrective Reading* and *Reading Mastery* Fast Cycle used to teach students with SED.

These studies found that students taught with the Direct Instruction curricula not only made gains in reading but also made substantial gains in behavior measures. Although the studies that Colvin and his colleagues cited were not carefully controlled experimental research, they do suggest that further research needs to be conducted investigating the relationship between the structure and design of Direct Instruction and gains in reading and behavior.

Direct Instruction Mathematics Research

We found one study on mathematics instruction conducted by McKenzie, Marchand-Martella, Moore, and Martella (2004) using the prepublication program, *Connecting Math Concepts-K*, with typically developing three- to five-year-old children and those with developmental delays (see Table 5 on page 25). Positive findings were noted on various measures after completing 30 lessons of this program.

It should be noted that Cole et al. (1993) described in Table 1 used *DISTAR Arithmetic* as part of an intervention package for preschoolers, however, specific math measures were not used; therefore, this study was not summarized here.

“

When I first introduced Connecting Math Concepts to my students (after a few months of another series), they began referring to it as the ‘good math.’ Each day as I would say it was time for math, they would ask whether we were going to do the ‘good math’ or the ‘icky math.’ I finally collected the other math books from them and told them we would be doing only the ‘good math’ from now on. I never went back.

Teacher, Kingston, Illinois

”

Summary

Direct Instruction programs have been shown to be effective with a wide range of children with high-incidence disabilities from preschool to high school. Although the majority of the participants in the studies were students with learning disabilities, students with developmental delays, language delays, mild cognitive disabilities, and behavior disorders also have been shown to benefit from Direct Instruction. *Reading Mastery* and *Corrective Reading* have been researched fairly extensively, demonstrating their efficacy for students with mild disabilities. Further research is needed in the areas of writing and mathematics instruction.



Part IV: Direct Instruction Research With Students With Low-Incidence Disabilities



Overview

Eight investigations were found. These studies spanned the mid-1970s to 2004. The majority of these investigations included students with developmental disabilities (n = 4). Some studies also included students with:

- Traumatic brain injury or TBI (n = 1)
- Moderate intellectual disabilities and autism/moderate intellectual disabilities (n = 1)
- Intellectual disabilities (n = 1)
- Those identified as “educationally subnormal” (n = 1)

Our analysis is presented in one table (Table 6 on page 27) given the small number of studies found.

The eight studies* examined a range of Direct Instruction programs including:

- *DISTAR Reading* (n = 4)
- *Language* (n = 4)
- *Arithmetic* (n = 1)
- *Corrective Reading* (n = 2)
- *Reading Mastery*® (n = 1)

Participants ranged in age from six to 16 years (mean age = 10) and had IQ scores between 30 and 81 (average IQ of participants = 52, which is approximately three standard deviations below the mean of 100). Such scores, coupled with other factors, lead to the classification of moderate to severe developmental disabilities for a number of the participants.

The research review uncovered common themes despite the various classifications of students with low-incidence disabilities. One theme pertained to the low expectations we often have for this population. Perhaps because of the low levels of vocabulary, deficits in language and communication skills, and a history of repeated failure with “typical” curricula, low expectations for how these individuals acquire complex skills exist. Another common theme involved the use of less sophisticated interventions.

The Direct Instruction studies did not support these themes; students were held to high standards using sophisticated interventions resulting in generalizable skills. Overall, all eight studies showed positive effects for this population of students.

*Note: The number of studies does not equal eight given that some studies included more than one Direct Instruction program.

TABLE 6: DIRECT INSTRUCTION RESEARCH WITH STUDENTS WITH LOW-INCIDENCE DISABILITIES

Study	DI Program	(N) Participants	Research Design/Purpose	Intervention Details	Outcome Measures	Findings
Booth, Hewitt, Jenkins, & Maggs (1979)	<i>DISTAR Language I, II, III and DISTAR Reading</i>	(12) Age range 8 to 14 years at beginning of study Age range 12.7 to 17.8 years at end of study IQ range 35 to 55	Pre-experimental — One shot case study Longitudinal study over a 5 year period Determining the outcomes of the <i>DISTAR Language</i> program with children with mental Intellectual and developmental disabilities.	Provided <i>DISTAR Language I, II, and III</i> and <i>DISTAR Reading</i> over a period of 4 to 5 years.	Peabody Picture Vocabulary Test, <i>DISTAR</i> Mastery in language and reading, <i>Baldie Language Ability Test</i> , <i>Neale Analysis of Reading Ability</i> , and <i>Schonell Word Recognition Test</i> .	Children mastered most language objectives on the <i>Baldie Language Ability Test</i> . Participants had an average gain of 34 (range = 15 to 49) language age months in 32 months of daily instruction. Most children read at or above the 3rd-grade language and reading levels. <i>DISTAR Language</i> children outperformed “normal” children on 31 of 66 objectives on the <i>Baldie Language Ability Test</i> .
Bracey, Maggs, & Morath (1975)	<i>DISTAR Reading I</i>	(6) Intellectual and developmental disabilities 7 to 14 years IQ range = 30–40	Pre-experimental, One group, pretest-posttest Demonstrating that students with moderate mental Intellectual and developmental disabilities can learn to read using an explicit phonics program.	Students received instruction for 15 to 30 min. per day during their school day in <i>DISTAR Reading I</i> .	Difference between pretest and posttest on specified mastery objectives from the <i>DISTAR Reading I</i> program.	Significant gains made in blending sounds, identifying letters sound correspondences, spelling by sounds, and sounding words out and saying them the fast way
Flores, Shippen, Alberto, & Crowe (2004)	<i>Corrective Reading: Decoding A</i>	(6) Moderate Intellectual Disabilities/ Autism 7 to 13 years IQ range = 38–52	Single-case — Multiple baseline across behaviors with embedded conditions Investigating the effects of <i>Corrective Reading</i> on learning letter-sound correspondences, blending sounds in CVC words, and decoding.	Baseline and intervention conditions using <i>Corrective Reading Decoding A</i> over 11 to 27 training sessions.	Percentage of correct lettersound correspondences identified in isolation, in a discrimination format, and blended together; percentage correct of letter-sound correspondences blended and telescoped into words (instruction, generalization, and maintenance conditions).	Five of 6 students correctly identified all letter-sound correspondences and blended letter sounds and correctly blended and telescoped words composed of targeted letter sounds. A high degree of maintenance was shown.
Gersten & Maggs (1982)	<i>DISTAR Language I, II, and III and DISTAR Reading I, II, and III</i>	(12) Children with moderate/severe mental Intellectual and developmental disabilities; ages at the beginning of the study ranged from 6 years, 10 months to 12 years, 6 months, mean 10.34 years	Pre-experimental, One group, pretest-posttest Determining the long-term effects of <i>DISTAR Language</i> and <i>DISTAR Reading</i> with children with mental Intellectual and developmental disabilities.	<i>DISTAR Language I, II, and III</i> and <i>DISTAR Reading I, II, and III</i> given over 5 years, language instruction was provided 30 minutes a day (average) for 195 schools days per year.	Pretest Only: Peabody Picture Vocabulary Test, <i>Baldie Language Ability Test</i> , and <i>Neale Analysis of Reading</i> . Pretest/posttest: Stanford-Binet Intelligence Test.	Statistically significant improvement was noted on Stanford-Binet Intelligence Test. Good performance levels were found at end of program on other measures.
Giang, Singer, Cooley, & Tish (1992)	<i>Corrective Reading Comprehension A, Corrective Mathematics, DISTAR Language I, Reading Mastery I*</i>	(2) Traumatic Brain Injury Case study 1: 8 years Case study 2: 6 years Case study 1: 81 IQ Case study 2: 65 IQ	Case study 1: Multiple baseline across behaviors Case study 2: A-B design Evaluating the effects of Direct Instruction programs with students with traumatic brain injury.	Case study 1: 1 week of baseline and 6 weeks of intervention. Case study 2: baseline and intervention; included various Direct Instruction programs (two different programs for each student).	Case study 1: Percentage of correctly answered reasoning problems; percentage of correctly answered story problems; and number of math facts per minute. Case study 2: Percentage of sentences correctly repeated; number of letter sounds correctly identified.	Case study 1: Increases in story problem completion and math fact computation. Case study 2: Improved skills in repeating sentences and number of letter sounds identified.
Gregory & Warburton (1983)	<i>DISTAR Reading II</i>	(8) Educationally subnormal 6 to 7 years	Pre-experimental, One group, pretest-posttest Investigating how much progress learners made with a well-designed teaching program.	Instruction provided for 25 min. per day over 5 months.	Gains on Burt Rearranged Graded Word Reading test.	Gains of an average of .9 years in reading in 5 months were found.
Maggs & Morath (1976)	<i>DISTAR Language I</i>	(28) Institutionalized (for 5 years) children with moderate or severe mental Intellectual and developmental disabilities from Stockton and Marsden Hospital schools in the state of New South Wales (age range 8 to 16 years at posttest)	Experimental — Pretest-posttest control group Determining the relative effectiveness of <i>DISTAR Language I</i> versus Peabody Language kit (P-level) with institutionalized children with moderate to severe Intellectual and developmental disabilities.	<i>DISTAR Language I</i> implemented 1 hour per school day over a 2-year period (experimental group) and Peabody Language program (P-level) or programs utilizing some components of the Peabody Language kit with variations (control group).	Basic Concept Inventory, Reynell Verbal Comprehension, Stanford-Binet (L-M) Intelligence, Piaget’s Class Inclusion, Piaget’s Seriation, and Bruner’s Matrix.	Significantly greater gains were found for children instructed with <i>DISTAR Language I</i> than children instructed with the Peabody Language program on all six measures.
Young, Baker, & Martin (1990)	<i>DISTAR Arithmetic I</i>	(5) Intellectual Disabilities 8 to 10 years IQ range = 35–54	Single-case — Multiple baseline across participants Assessing the effects of two mathematics interventions.	Participants received Discrimination Learning Theory (DLT) based on content from <i>DISTAR Arithmetic I</i> and <i>DISTAR Arithmetic II</i> , baseline from 6 to 20 days, intervention ended on day 26, maintenance data gathered days 52–56.	Percentage of academic engagement and scores on mastery tests.	DLT plus <i>DISTAR Arithmetic I</i> produced higher percentages of academic engagement; students scored higher on the mastery tests in this condition.

DISTAR Reading Research

The search found two studies that involved *DISTAR Reading*. As shown in Table 6 on page 27, researchers identified the participants in these studies as students with developmental disabilities (i.e., Bracey, Maggs, & Morath, 1975) or those who were “educationally subnormal” (Gregory & Warburton, 1983). One common theme expressed in these investigations related to the notion that these individuals could not ever be expected to learn to read or read very well (e.g., they should be provided only with sight words). These studies set out to show that students with developmental disabilities could learn to read. Additionally, these studies focused on how rapidly these students could learn to read. Overall, the two studies showed students with low incidence disabilities could learn sophisticated reading strategies such as decoding words and sentences (i.e., using phonic analysis strategies as opposed to sight words). Furthermore, the studies showed the students learned to read at an accelerated pace.

Bracey et al. (1975) showed the robust effects of *DISTAR Reading* with six institutionalized students with IQ scores ranging from 30 to 40. These students had various speech difficulties and were unable to read any words. *DISTAR Reading (Reading Mastery)* asks students to identify sounds, blend these sounds into words, and say the words the fast way. Results showed these students made significant improvements in learning to read words. The authors called attention to teaching generalizable decoding strategies to this population of students because “not every word needs to be taught directly to the students, as with a sight word approach” (pg. 88).



As a charter school, we offer a range of educational programming. Approximately half of the students are typically developing while the other half have been diagnosed as having autism spectrum disorder. In Reading Mastery® Classic II and III, I group my students by instructional performance level, not their label. Having (typically developing) peer models has turned out to be very advantageous. The students with autism have access to high levels of language, good examples of reading behavior, and can imitate the positive classroom/learning behaviors of their peers. Our students with autism really need constant repetition to retain the skills.

Teacher, Columbus, Ohio



DISTAR Reading and Language Research

The search yielded two studies that combined *DISTAR Reading* and *Language* programs with students with developmental disabilities (i.e., Booth, Hewitt, Jenkins, & Maggs, 1979). The researchers implemented an extensive five-year investigation with 12 students. Results showed an average language gain of 34 months for 32 months of instruction. At the end of the study, most students read at third- to fourth-grade levels.

Gersten and Maggs (1982) investigated the long-term effects of an intensive five-year program in *DISTAR Reading I–III* in Sydney, Australia. Twelve children with developmental disabilities ranging in age from six years, 10 months to 12 years, six months received instruction in *DISTAR Language* and *Reading* an average of 30 minutes per day. The Stanford-Binet Intelligence Test (pretest and posttest) and Peabody Picture Vocabulary Test, Baldie Language Ability Test, and Neale Analysis of Reading Ability (posttest only) were administered. Results indicated statistically significant gains on the Stanford-Binet Intelligence Test. There were significant differences between the children with developmental disabilities in this study and children without disabilities from the normative sample in Sydney on nine of the 66 objectives on the Baldie Language Ability Test (five favoring children with developmental disabilities, four favoring children without disabilities).

Corrective Reading Research

The search produced one study demonstrating the effectiveness of *Corrective Reading*. Similar to the *DISTAR Reading* studies, the investigation examined the degree to which students with severe disabilities could learn to read. Flores, Shippen, Alberto, and Crowe (2004) analyzed whether six students with moderate intellectual disabilities could learn letter-sound correspondences to decode words. *Corrective Reading*, Decoding A was used with modifications to the instructional sequence and formats to accommodate the students’ needs (e.g., some students used augmentative communication devices). Results demonstrated that five of the six students learned to identify all targeted letter-sound correspondences and blend letter sounds. Another positive finding showed that these students could sound out and blend words composed of the targeted letter sounds.



We used Language for Learning with three students with autism spectrum disorder. Although the students showed some initial problems—such as trying to imitate the finger snap—all three students learned to follow the Language for Learning format after four to five lessons. Not only did the students benefit from the specific content of the lessons, they also practiced taking turns and working together in a small group. They were never distracted during a lesson. The program helped them attend to me and the lesson, a strong indication that Language for Learning captured the students’ interest.

Teacher, Middletown, Pennsylvania





Research Involving the Combination of Programs

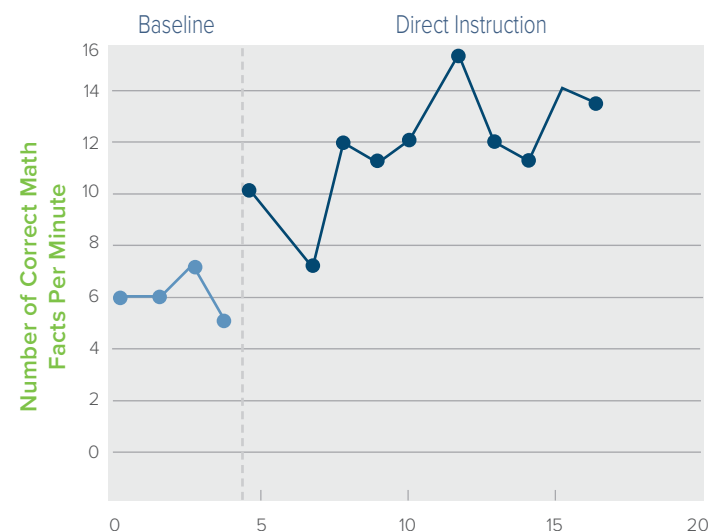
One interesting investigation used combinations of Direct Instruction programs (see Table 6 on page 27). Glang, Singer, Cooley, and Tish (1992) provided two case studies conducted with students with traumatic brain injuries. In the first case study, an eight-year-old student received instruction in *Corrective Reading*, *Comprehension A* (lessons in reasoning from the deduction strand) and *Corrective Mathematics* (two different exercises involving math story problems and math facts). Results showed that this student could complete more reasoning problems after receiving instruction. Further, he demonstrated an increased number of correctly answered story problems and his rate per minute of correctly completed facts almost doubled with instruction. Figure 4 illustrates the results of this student in mathematics.

In the second case study, Glang et al. (1992) targeted instruction using *DISTAR Language* (sentence repetition) and *Reading Mastery* (letter sounds) for a six-year-old student with a traumatic brain injury who experienced difficulty with visual motor skills, attention, and memory. Substantial improvement was evident in both statement repetition and sound identification skills.

DISTAR Arithmetic Research

The search located one study demonstrating how *DISTAR Arithmetic* can benefit students who have intellectual disabilities. Young, Baker, and Martin (1990) analyzed the effects of the Discrimination Learning Theory (DLT). DLT added specific response cards where students indicated their responses through the use of cards in a match-to-sample format. Five students received instruction in *DISTAR Arithmetic I* and *DISTAR Arithmetic I* coupled with DLT. The DLT plus *DISTAR Arithmetic I* phase produced higher percentages of academic engagement and mastery test scores as compared to *DISTAR Arithmetic I* alone. The students had limited verbal skills and responded in two to three word utterances; therefore, the match-to-sample format used during DLT served as an effective adaptation of the *DISTAR Arithmetic I* program.

FIGURE 4: CORRECTIVE MATH



Areas of Emerging Research

One area of research that offers promise in the area of Direct Instruction involves students who are hard-of-hearing or deaf or who have visual impairments or blindness. Students in these populations have traditionally displayed poor educational progress. For instance, students with hearing loss and deafness generally lag behind their same age peers in academics even though they possess average intelligence (Heward, 2003). A long-term study of students who are deaf or hard-of-hearing suggests Direct Instruction programs can make dramatic differences in the educational performance of students with hearing loss (Kraemer, Kramer, Koch, Madigan, & Steely, 2001).

Students who attended high school in Irvine, California in self-contained classrooms received several Direct Instruction programs (*Corrective Reading Series – Decoding and Comprehension*, *Spelling Through Morphographs*, *Spelling Mastery*, and *Expressive Writing*). Grade 12 students made grade level gains of:

- 3.0 years in total language.
- 2.5 years in reading comprehension.
- 3.8 years in spelling when compared to end-of-year testing in grade eight.

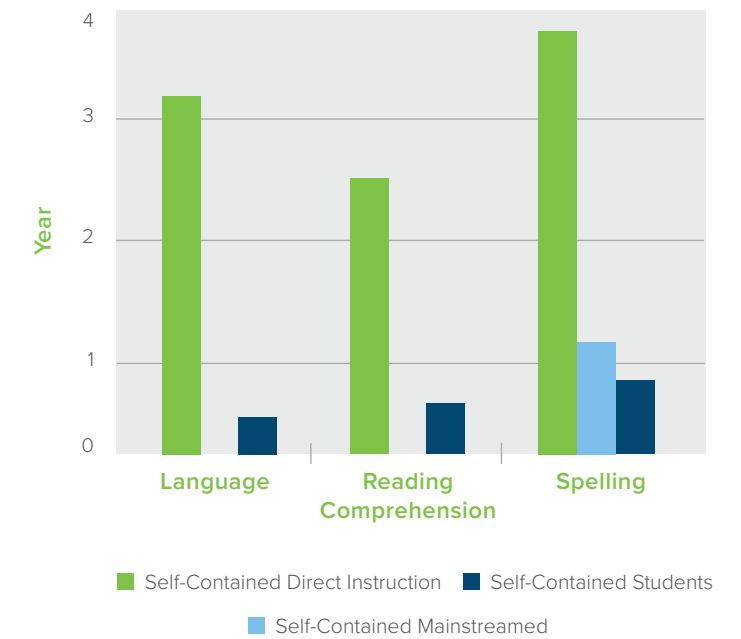
Over the same period, the Gallaudet Center for Assessment and Demographics (CADS) reported that self-contained students demonstrated yearly grade level gains of:

- 0.0 years for total language.
- 0.0 years for reading comprehension.
- 1.3 years for spelling.

Grade level gains for all CADS students who were deaf or hard-of-hearing (including mainstreamed students) were:

- 0.3 years for total language.
- 0.4 years for reading comprehension.
- 0.9 years for spelling.

FIGURE 5: GRADE LEVEL GAINS STUDENTS



On average, students who spent four years in Direct Instruction programs were at the:

- 7.2 grade level in total language.
- 5.7 grade level in reading comprehension.
- 7.0 grade level in spelling.

The students who received Direct Instruction outperformed the national averages for students who are deaf and attending self-contained classrooms by:

- 4.4 years in total language.
- 2.8 years in reading comprehension.
- 2.2 years in spelling.

Finally, the students taught using Direct Instruction programs outperformed the CADS average for all students who were deaf or hard-of-hearing (including mainstreamed students) by:

- 2.7 years in total language.
- 1.2 years in reading comprehension.
- 0.9 years in spelling.



Direct Instruction Shows Great Promise for Visually Impaired Students

Students with visual impairments represent another low incidence population that benefits from Direct Instruction programs. The Arkansas School for the Blind implemented *Reading Mastery*, *Connecting Math Concepts*, *Language for Learning*, *Spelling Mastery*, and *Spelling Through Morphographs* in the elementary grades and *Corrective Reading* Decoding and Comprehension, and *Corrective Mathematics* in the secondary grades (Hunt, Woolly, & Moore, 2001). Although the authors do not share specific outcome data, they do report after examining which students needed Braille, large print, or standard print, “Most beginning Direct Instruction programs are already written in larger than standard print and would, therefore, work for several students with little adaptation” (pg. 33).

Although these studies show great promise for students with hearing loss and visual impairments, systematic experimental studies published in quality peer-reviewed journals remain the benchmark by which educators judge efficacy through scientific validation.

“*I was skeptical about Reading Mastery, but like any teacher, I was willing to try it for the sake of the students. After a week of one hour per day, my students were rapidly improving, and I was a happy teacher.*”

Special Education Teacher,
Brookhaven, Mississippi

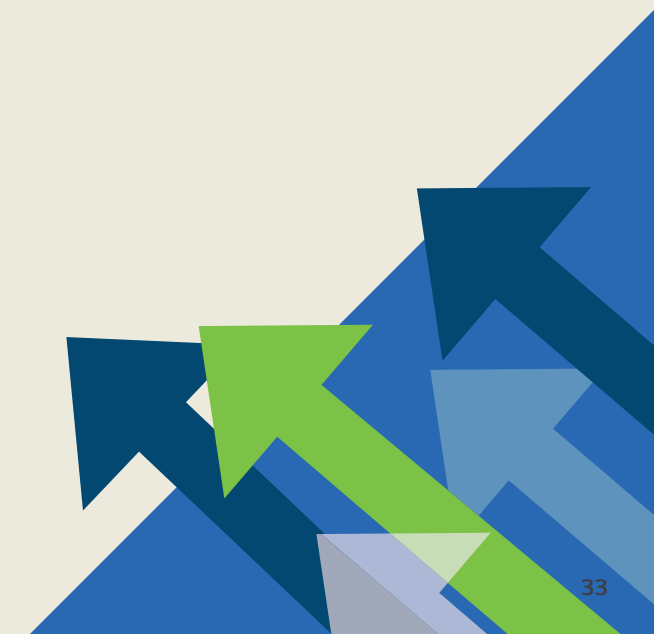
Deaf Students Using Direct Instruction Make Significant Reading Gains

Similarly, Trezek (2002) asked, “Does Direct Instruction in phonics benefit deaf students? If so how?” Trezek discussed the findings of the National Reading Panel (NICHD, 2000) and highlighted the importance of phonological processing and its role in learning to read. She presented evidence that students who are deaf can access phonological information even though they cannot do so through audition. For instance, students might rely on speech reading or cued speech.

Trezek described a pilot study showing how deaf students who received instruction from Direct Instruction reading programs (*Corrective Reading*, Decoding B2 and C) gained 1.2 to 2.5 grade levels in basic reading and comprehension measures after only seven months of instruction. Although the implementation of the DI programs used by Trezek (2002) and Kraemer et al. (2001) produced gains, both studies report making some adaptations and modifications to the programs to accommodate the students’ needs. Adaptations included extending the time to present the lesson to practice pronunciations, reviewing previously presented concepts, and using pictorial representations of selected vocabulary.

Summary

Direct Instruction programs show clear evidence of their efficacy with students who have low-incidence disabilities. Many of these students had IQs in the 30 to 50 range, yet the majority of these students learned to read and master language skills otherwise thought unattainable. Studies about Direct Instruction show evidence of rapid learning gains. It seems that students with more severe disabilities can learn at high levels when provided with systematic, research-validated programs such as Direct Instruction.



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