Special Education and Direct Instruction:

An Effective Combination

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Making the Difference

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Executive Summary

The U.S. House of Representatives and Senate bills (H.R. 1350 and S. 1248) contain important revisions central to reauthorization of the Individuals with Disabilities in Education Act (IDEA), and proclaim major 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 that determines if students respond to scientific, research-based intervention as part of the evaluation procedures for determination of a specific learning disability. This process benefits both children with disabilities and the numerous other children who enter school with limited literacy and language knowledge and who, therefore, are at risk for failure. Concentrating on research-based intervention legislation ensures that students are truly qualified for special education services as opposed to merely failing to receive instruction in scientifically based instructional programs.

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 work with special education students. It suggests that the most effective way of improving academic skills for students who are significantly behind their peers is through direct and explicit teaching of skills.
- Part II provides a description of the procedures used to conduct the research review of studies involving Direct Instruction and special education populations. Data confirms that even students who would be predicted to have low levels of 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 instructed with Direct Instruction materials fared better than students who used other programs.
- Part IV describes eight studies involving Direct Instruction and students with low-incidence disabilities. These studies show that students with more severe disabilities can learn at high levels when provided 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 their peers in academic, behavioral, and/or functional living skills, intensive instruction is not only necessary, it is crucial for their academic success.

Though the level of intensity will likely differ depending on the needs of each student, research shows that explicit, individualized, and validated instruction — like that offered through Direct Instruction programs — is key for optimal learning opportunities among students with special needs.

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

Special Education

Ensure Effective Learning through Goal-Directed Instruction

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
- Using sign language

where it is provided:
- Resource room
- Separate classroom
- Residential school

or **what** curriculum is used.

The combination of these features makes special education effective and "special" 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. It is important to closely monitor students' performance and adjust instruction accordingly.
- **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 with special needs should provide evidence of sufficient field-testing or results from experimental studies. This ensures that instructional time will yield maximum benefits. In addition, you should use programs that involve ways to meet the needs of each student by monitoring individual student performance through:

- Placement testing
- Within-program progress monitoring
- Mastery tests
- "Fast cycle"
- Review opportunities

Set Special Education Apart through Intensive, Explicit Support

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

- Explicit – Nothing is left to chance; all skills are taught directly
- Systematic – Instruction is purposeful, well-organized, and hierarchical
- Intensive – Students receive more instructional interaction and experience substantial time on task
- Supportive – Students need encouragement, feedback, and positive reinforcement

Programmatic Scaffolding is central to quality special education. Students need a great deal of support during the early stages of learning and then diminishing support as they acquire the ability 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 the following instructional elements exist:

- Controlled task difficulty (i.e., examples are sequenced to maintain high levels of success; task difficulties are matched with student skill levels)
- Small interactive groups
- Direct and explicit instruction with clear modeling and guided practice activities
- Ongoing progress monitoring
- Focus on the building blocks (i.e., essential research-based elements) of instructional skill areas

Similar findings are noticed for students with more severe disabilities. According to Halle, Chadsey, Lee, and Renzaglia (2004), instruction for this population of students should be:

- Systematic
- Meaningful and functional
- Delivered using frequent opportunities for students to respond and receive feedback
- Focused on errorless learning (curricular materials are structured so as to prevent errors from occurring the first time)
- Measured using progress monitoring mechanisms to ensure data-based decision making

The level of explicitness, intensity, and support may differ depending on the needs of the students. However, explicit instruction seems to be the key for optimizing 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 **d**irect **i**nstruction (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), checking often 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). You show students what to do, give them opportunities to practice with feedback, and then provide opportunities for them 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 are significantly behind their peers in terms of their academic, behavioral, and/or functional living skills. These students 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 of shortening the learning time for special needs students is through the direct and explicit teaching of skills. Initially, you take full responsibility for student learning but gradually relinquish responsibility to students as they 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 Do More in Less Time

One explicit, teacher-directed model of effective instruction is **D**irect **I**nstruction (DI) as exemplified in programs authored by Siegfried Engelmann. Direct Instruction can be distinguished from other models of explicit instruction **d**irect **i**nstruction (lowercase "d," "i") 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 the features of instruction.

A typical Direct Instruction lesson includes:

- Explicit and carefully sequenced instruction provided by the teacher (a model of what students will do)
- Scaffolding to provide students the assistance they need before being able to complete the task on their own (guided practice)
- Frequent opportunities for students to practice skills (independent practice)
- Repeated practice over time (review)

For example, if the sound **/m/** appeared for the first time, you might say, "You're going to learn a new sound. My turn to say it. When I move under the letter, I'll say the sound. I'll keep on saying it as long as I touch under it. Get ready. **mmm**" (model).

"My turn again. Get ready. **mmm**" (model). "Say it with me. Get ready. **mmm**" (guided practice).

"Your turn. When I move under the letter, you say the sound. Keep on saying it as long as I touch under it. Get ready." (independent practice).

"Again. Get ready." (independent practice).

In addition, errors are corrected as soon as they occur. In the previous example, if an error occurred during instruction, you would model the sound ("My turn. **mmm**"), use guided practice ("Say it with me. Get ready. **mmm**"), and have students practice independently ("Your turn. Get ready"). The lesson part in which the error occurred is then repeated; this might include starting over at the top of a column or row of sounds so that students get increased practice on the **/m/** sound. The **/m/** would appear throughout the lesson and in subsequent lessons to ensure skill mastery over time.

In a Direct Instruction lesson, every activity is taught to mastery. Teaching to mastery ensures that students are ready to move forward without lessons becoming too challenging.

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 so that priority topics are covered
- Providing clear directions on how to structure active student responding and teacher feedback
- Determining where students should be placed and how to monitor their progress once they receive instruction
- Adjusting the rate of instruction to ensure adequate practice and mastery
- Controlling the vocabulary/syntax used to ensure student understanding

These modifications take your time and energy to complete; essentially, you have to become a curriculum designer — changing programs to meet the unique needs of students who struggle in school.

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 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% 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 with 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).**

Build Success through the Design and Delivery of Direct Instruction (continued)

Three main components of SRA/McGraw-Hill's 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 to untaught examples). Thus, you do not have to develop lessons or modify existing curriculum to help students gain proficiency in areas critical for 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 used repeatedly. Instructional examples are introduced and carefully planned to promote student success. You do not have to invent "learner friendly" instruction.
- ***Clear instructional formats.*** Direct Instruction formats are teaching routines that help you model new content, provide guided practice, and implement independent practice opportunities. As students master skills, the formats evolve to accommodate students' 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). You do what you do best — teach — rather than develop the instructional plans you will use 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. In this way, you permit students to concentrate on and complete only those elements within their range of competence.
- ***Track instruction.*** Each Direct Instruction lesson consists of multiple "tracks" (strands) and the skills used to teach those tracks. Rather than introducing skills in isolation — one skill at a time — multiple tracks are taught in unison and each track is interrelated with the next to provide an efficient framework for teaching. 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.

Instructional Organization

- ***Instructional grouping.*** Direct Instruction programs are generally presented to small groups of students — and can be used even one-to-one — to provide intensive instruction when promoting an individual student's growth. Students are placed in a group according to their current skill level and move "up or down" in the program depending upon how rapidly they acquire skills and concepts.
- ***Instructional time.*** Direct Instruction lessons encourage rapid and constant interchange between teachers and students to maximize academic engagement. The objective is to keep students focused and to 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 are provided to ensure that students are being taught at their optimal instructional level. Ongoing, within-program assessments help you track progress and make informed decisions to determine which concepts and skills need to be targeted for further instruction. Direct Instruction programs also include mastery (goal) criteria to help you document achievement and monitor progress toward grade-level benchmarks.

Presentation Techniques

Seven aspects of Direct Instruction presentation techniques for delivering instruction (also called teacher/student interactions) help you 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 student participation ensures that each student gets enough practice with concepts and skills to gain ownership and reduces the chance of 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. You provide instructional cues and students 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, regardless of which student made the mistake. 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.* When you incorporate unison responding into your instruction, you need to have clear signals to "cue" students to respond together. Direct Instruction programs include a variety of signals to elicit student responses. Using signals helps you 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 you and your students occurs as a rapid interchange, allowing you to move quickly from activity to activity. As you are trained and become familiar with Direct Instruction programs, you learn to adjust your pacing based on the unique needs of your students. Your pacing becomes fast enough to keep students attending and on task but not so fast that they begin to guess and make errors.
- *Error corrections.* It is important to give immediate corrective feedback to your students when they make errors. All errors are corrected as soon as they occur using pre-planned correction procedures found within each Direct Instruction program. These error corrections typically take the form of a "model-lead-test and re-test" sequence wherein you show the students how to do something, practice it with them, test their knowledge, and then come back to check their understanding after a little time has passed. By correcting errors immediately, you ensure that students are ready to move forward without the lessons becoming too difficult — a critical point for students who struggle academically.
- *Teaching to mastery.* Direct Instruction programs are engineered to allow every student to perform every skill without making a mistake. The exception is that students begin each new activity ready to achieve at least 80% accuracy on their first try, with 100% accuracy after error correction. Individual turns and within-program assessments are incorporated to determine whether each student has truly mastered the activity. Teaching to mastery communicates that what is learned today is important because it will be needed tomorrow. It ensures that students are ready to move forward without the lessons becoming more difficult.
- *Motivation.* Being successful is motivating for even the most challenging students. Direct Instruction lessons are structured so that students are focused and engaged. The amount of new information introduced in any one lesson is kept to a minimum. The majority of each lesson — 80% to 90% — is composed of review and application. Students make few errors, success rates are high, and enthusiasm for learning is enhanced.

For further details, see Carnine et al., 2004 and Marchand-Martella, Slocum & Martella, 2004 (with a particular emphasis on Chapter 2 by Watkins and Slocum).

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, so teachers do not need to force-fit curriculum to meet the needs of their struggling students. Because Direct Instruction students are successful, they also are motivated to continue down this newly discovered 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 mental retardation
2. Low-incidence disabilities:
   - Autism
   - Traumatic brain injuries
   - Moderate to severe mental retardation

Investigations were grouped within these special education population areas by academic program (i.e., Language, Reading, Spelling, Writing, and Mathematics), where appropriate. This research includes tables that present specific details regarding these studies. 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 in the tables with regard to these details, 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 various search 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 have found 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 different educational approaches to determine best practice for instruction of low-income, at-risk children in Kindergarten through Grade 3.

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 the achievement gains made by the 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

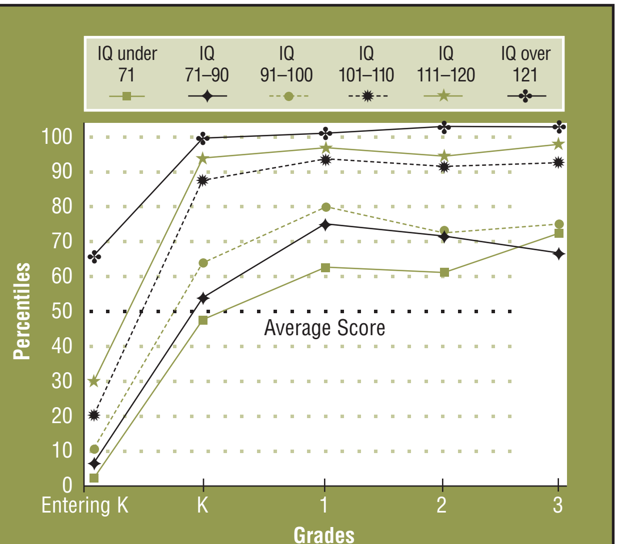
It is not surprising that the higher IQ students started with higher achievement in Reading and Math than the lower IQ students, nor is it surprising that at the end of Grade 3 students with higher IQs ended with higher achievement.

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

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 Follow-Through were taught in small groups, the gains of students with lower IQ scores were not made at the expense of other students.

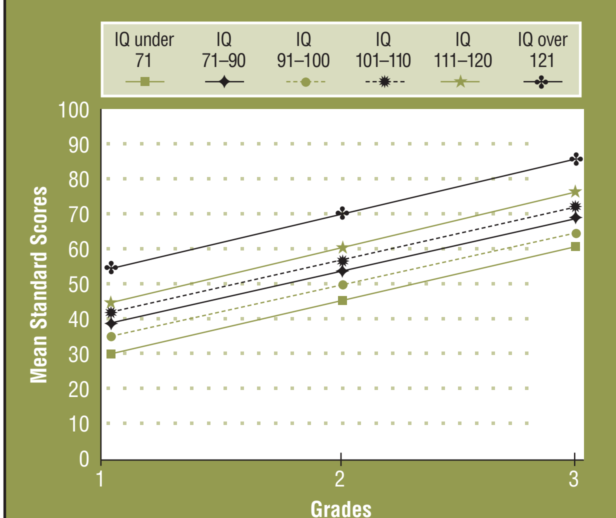
Figure 1: Reading



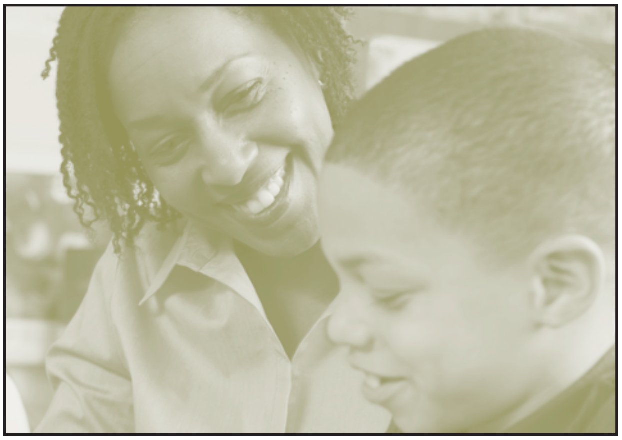
All tests performed at end of academic year, except EK.

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 Gerten et al. (1984).



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

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.
- 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 SRA 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 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. 12). 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. 12) 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.

"Using *Direct Instruction*, I have seen all of my students with learning disabilities make gains in their fluency and comprehension. Many have been able to maintain grade level progress using this system. I think consistent use of this system is responsible for the reading gains of all my students. It has also helped me develop as a professional."

–Rhonda Stelling
Grades K-4 LD Teacher,
Unity Schools,
Balsam Lake, Wisconsin

Direct Instruction Language Research (continued)

Table 1 - Language research with preschoolers with high-incidence disabilities

Study	DI Program	n	Participants	Research Design	Research Purpose	Intervention Details	Outcome Measures	Findings
Cole & Dale (1986)	*DISTAR Language 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 *DISTAR Language I* and *Interactive Language Instruction* programs with preschool and Kindergarten children with language delays.	*DISTAR Language 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)	*DISTAR Language, DISTAR Arithmetic,* and *DISTAR Reading*	**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 *DISTAR Language, DISTAR Arithmetic*, and *DISTAR Reading* (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)	*DISTAR Language, DISTAR Arithmetic,* and *DISTAR Reading*	**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 *DISTAR Language, DISTAR Arithmetic*, and *DISTAR Reading* (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)	*DISTAR Language, DISTAR Arithmetic,* and *DISTAR Reading*	**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 developmental delays.	Implemented *DISTAR Language, DISTAR Math*, and *DISTAR Reading* (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)	*Language for Learning*	**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 *Language for Learning* program and standard early childhood education programs with preschoolers with and without developmental delays.	*Language for Learning* 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 *Language for Learning* 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 14):

- 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).

"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!"

–Sandra Espino
Grades 1-2 Reading Resource Teacher,
Wilson Primary School,
Phoenix, Arizona

"One of my second-grade students, Bradley, was a real fan of *Reading Mastery*. One day, a bad storm rolled into our town. The sky was dark and the lights went off. Bradley was at the point in his lesson where he was reading the story for the day. He was determined to finish the lesson. He asked if we had a flashlight anywhere; we found one. He sat by the window holding the flashlight to his book and continued reading until he was finished with the story. Fortunately we had a camera. A picture of Bradley reading by flashlight [is posted in the classroom with] the word 'determination' beneath."

–Joan Cockrane
Teacher,
formerly from Kingston
Elementary School,
Kingston, Illinois

Table 2 - Reading Mastery/DISTAR research with students with high-incidence disabilities

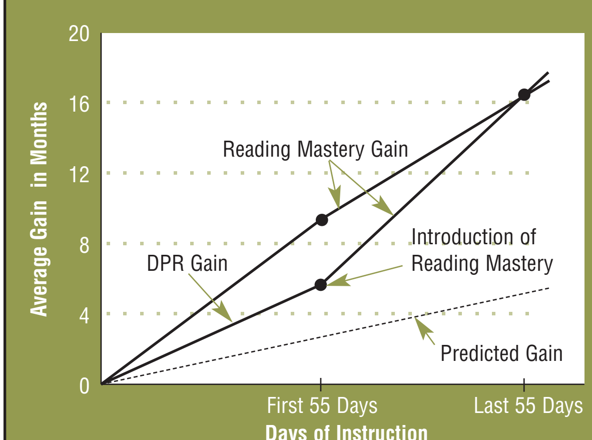
Study	DI Program	n	Participants	Research Design	Research Purpose	Intervention Details	Outcome Measures	Findings
Branwhite (1983)	*DISTAR Reading II*	14	Likely learning disabilities from description 8 and 9 years (mean = 8 years, 7 months) IQs from 74-108 (mean = 92)	Phase I: Quasi-experimental — Non-equivalent 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 *DISTAR Reading II*, comparison group received Diagnostic-Prescriptive Remediation (DPR) with phonics focus. Phase II: Both groups received *DISTAR Reading II.*	*Schonell's Graded Word Reading Test.*	Phase I: *DISTAR Reading* group scored statistically significantly better than the DPR comparison group. Phase II: Both groups' achievement was similar with *DISTAR Reading* the major contributor to both.
Cooke, Gibbs, Campbell, & Shalvis (2004)	*Reading Mastery Fast Cycle* and *Horizons Fast Track A-B*	30	Learning disabilities, educable mental retardation, behavior disorders, and other health impairments 3rd and 4th graders (mean age: *Reading Mastery* = 8.0 and *Horizons* = 8.3)	Quasi-experimental—Nonequivalent control group	Comparing differences in reading gains with two Direct Instruction reading programs.	Each teacher taught *Reading Mastery* and *Horizons* 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. Reading Mastery* students scored better but not significantly. Teachers preferred *Horizons*.
Chamberlain (1987)	*Reading Mastery* and *Corrective Reading*	120	Learning disabilities and "slow learners" 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 *Reading Mastery* and *Corrective Reading* 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)	*DISTAR Reading I*	54	Educable mental retardation 9 to 12 years (mean IQ = 72.3 for *DISTAR* group; 71.9 for other group)	Experimental — Pretest-posttest control group	Evaluating systematic instruction for poverty students with mild, cognitive disabilities.	*DISTAR Reading I* supplemented with the *Sullivan Programmed Reading Series*, in the control group teachers had access to a variety of materials, 1-year implementation.	*Wide Range Achievement Test (WRAT)*, return to general education classroom.	On *WRAT, DISTAR + 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 *DISTAR + Sullivan* group participants, 0 for control group.
Kuder (1990)	*DISTAR Reading*	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 *DISTAR Reading* to a number of basals, 18 students received *DISTAR* for 2 years, 8 received 1 year of basal followed by a year of *DISTAR*, and 8 received 2 years of basal reading (basal only).	*Woodcock Reading Mastery Test.*	Year 1: No statistically significant differences were noted. Year 2: Both *DISTAR* groups made greater gains than basal — only group but not statistically significant.
Marston, Deno, Kim, Diment, & Rogers (1995)	*Reading Mastery*	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) *Reading Mastery* 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)	*Reading Mastery*	81	Developmental delays (mean *Reading Mastery* = 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 *Reading Mastery* 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. *Reading Mastery* group performed significantly better on the sounds subtest of the *CAT* and on the *PIAT* spelling subtest.
O'Connor & Jenkins (1995)	*Reading Mastery*	10	Developmental delays Kindergarten children	Experimental — Pretest-posttest control group	Determining if spelling with phonics-based reading would encourage application & transfer.	All students taught *Reading Mastery*, 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, *Reading Mastery* (RM) word and pseudo-word reading, *Woodcock Reading Mastery 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)	*DISTAR Reading*	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 *DISTAR Reading*, 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)	*DISTAR Reading*	63	Learning disabilities 6 to 8 years (mean IQ *DISTAR* = 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 *DISTAR Reading* and *Palo Alto.*	*Peabody Individual Achievement Test (PIAT).*	*DISTAR* group performed statistically significantly higher on posttest.

DISTAR Reading/Reading Mastery Research (continued)

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 1.5 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 8- and 9-year-old students who were described as "retarded 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 (see Figure 3 below).

Figure 3



Average Gain in months for each group across days of instruction

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*.

Corrective Reading Research

Sixteen studies were found that included *Corrective Reading* with students with high-incidence disabilities. As seen in Table 3 (on pg. 17), most participants were specifically identified as having learning disabilities or whose descriptions matched the definition of learning disabilities (i.e., other countries). Three studies included individuals with disabilities who were incarcerated/adjudicated. 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.

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. Malmgren and Leone (2000) found statistically significant gains for incarcerated males on several subtests of the *Gray Oral Reading Test-3*. Polloway, Epstein, Polloway, Patton, and Ball (1986) found that students with learning disabilities and educable mental retardation made significantly greater gains with *Corrective Reading* than they had made in the previous year when they were taught with different materials. Drakeford (2002) conducted an investigation with six incarcerated males. Drakeford found that all participants showed gains in reading fluency and positive trends in their attitude toward Reading instruction.

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 is often challenging. The authors found that Honors English high school students, 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.

"Garret came to the principal's office to show his new reading book and read to us. After he read very successfully, we asked him how he got to read in that book. He said, 'You know…to get in this group and to get these really cool books — you have to be really smart!'"

–Cindy Johnson
Principal,
Fawcett Elementary School,
Tacoma, Washington

Corrective Reading Research (continued)

Table 3 - Corrective Reading research with students with high-incidence disabilities

Study	DI Program	n	Participants	Research Design	Research Purpose	Intervention Details	Outcome Measures	Findings
Arthur (1988)	*Corrective Reading*	**6**	Learning disabilities Junior-high school students Grades 7 and 8 Age range 12.2 to 14.2	Pre-experimental — One-group pretest-posttest	Determining the effects of *Corrective Reading* with junior-high school special education students.	Provided students *Corrective Reading 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)	*Corrective Reading 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 *Corrective Reading* with another reading intervention.	One group received *Corrective Reading* 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.*	*Corrective Reading* did significantly better than comparison on all measures; significant decrease in the number of treatment nonresponders.
Campbell (1984)	*Corrective Reading*	**55**	Poor readers, likely learning disabilities (more than 1 standard deviation below the mean) Grades 7 and 8	Quasi-experimental — Nonequivalent pretest-posttest control group	Assessing the effects of the *Corrective Reading* program vs. regular English classes.	*Corrective Reading* program provided to the experimental group 50 minutes per day for 6 to 9 months.	*Woodcock Reading Mastery Test.*	*Corrective Reading* 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)	*Corrective Reading*	**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 *Corrective Reading* with incarcerated males.	8 weeks, 1 hour per day, 3 days per week. Teachers delivered the *Corrective Reading* 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)	*Corrective Reading, Morpho-graphic 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 *Corrective Reading.*	*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)	*Corrective Reading Decoding B*	**19**	Likely learning disabilities Mean age: *Corrective Reading* group = 11 years, 9 months; comparison group = 11 year, 10 months	Quasi-experimental — Nonequivalent control group	Comparing the effects of *Corrective Reading* with the school's own remedial program in Britain.	One group received *Corrective Reading*; comparison group received the current remedial reading class; 4 periods per week for 5 months.	*Daniels & Diack Test of Reading,* behavior surveys, attendance records.	*Corrective Reading* group did significantly better than the comparison group in reading gains, behavior, and attendance.
Holdsworth (1984-85)	*Corrective Reading Decoding B* and *C*	**15**	Students placed in a school for students with special needs in the United Kingdom	Pre-experimental — One group pretest-posttest	Determining the effects of *Corrective Reading* with the students with special needs in the United Kingdom.	Provided *Corrective Reading,* 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)	*Corrective Reading Decoding B*	**41**	Likely learning disabilities 11- to 12-year-olds	Experimental — Pretest-posttest control group	Comparing the effects of *Corrective Reading* with *Colour Code* program and school's own remedial program in Britain.	One group received *Corrective Reading*; 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).	*Corrective Reading* group made significantly greater gains than traditional remedial group. Novelty program group made gains similar to *Corrective Reading* group. *Corrective Reading* group demonstrated a significant increase in self-corrections on miscue analysis.

*** Teachers**
**** Students**

Continued on pg.18

Corrective Reading Research (continued)

Table 3 - Corrective Reading research with students with high-incidence disabilities

Study	DI Program	n	Participants	Research Design	Research Purpose	Intervention Details	Outcome Measures	Findings
Lloyd, Cullinan, Heins, & Epstein (1980)	*Corrective Reading: 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 *Corrective Reading* with individual and small group instruction in a variety of areas.	Study took place over 1 school year; one group received *Corrective Reading* 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 *Corrective Reading* group scored significantly higher.
Malmgren & Leone (2000)	*Corrective Reading* 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 pretest-posttest	Determining the effects of *Corrective Reading* with incarcerated youth.	6 weeks, 45 min. per day, 5 days per week. Teachers delivered an intensive *Corrective Reading* 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)	*Corrective Reading Decoding*	22	Special education students 9th graders	Pre-experimental — One group pretest-posttest	Investigating the effects of *Corrective Reading* as delivered by peer instructors.	Honors English students taught one-on-one, 3 days per week, 80 days; students completed 39-53 lessons of *Corrective Reading 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)	*Corrective Reading: Decoding A, B, and C*	119	Middle and high school Learning disabilities (N = 78); educable mental retardation (N = 41) (Learning disabilities mean age = 15 years, 7 months; educable mental retardation mean age = 16 years, 0 months) (Learning disabilities mean IQ = 87; educable mental retardation mean IQ = 62.5)	Pre-experimental — One group pretest-posttest	Investigating the effects of *Corrective Reading*; 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 *Corrective Reading.*	*Peabody Individual Achievement Test.*	Students' gains were significantly greater with *Corrective Reading* than in previous year. Students with learning disabilities improved at a greater rate than students with educable mental retardation.
Scarlato & Asahara (2004)	*Corrective Reading: Decoding B2*	9	Adjudicated youth Emotional/ behavioral disorders; learning disabilities 16 to 17 years	Quasi-experimental — Nonequivalent control group	Comparing the effects of *Corrective Reading* and reading specialist group.	19 weeks of instruction, 5 students received instruction using *Corrective Reading Decoding Level B2* while the other group received instruction developed by a reading specialist (RS).	*Woodcock Reading Mastery Test–Revised.*	Majority of students in *Corrective Reading* 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)	*Corrective Reading*	40	Learning disabilities (mean age = 10 years, 11 months)	Experimental — Pretest-posttest control group	Comparing the effects of *Corrective Reading* 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) Psychomotor 2) Self-esteem 3) *Corrective Reading* 4) No intervention	Tests of reading, psychomotor skills, and self-esteem measures.	On the reading test, *Corrective Reading* students scored significantly higher than other three groups. No significant differences on psychomotor or self-esteem measures were found.
Thomson (1992)	*Corrective Reading*	255	Learning disabilities Elementary and middle-school students	Quasi-experimental — Nonequivalent control group	Comparing *Corrective Reading* to a traditional basal approach and a whole language approach.	*Corrective Reading,* traditional basal approach, and whole language approach implemented for 1 academic year.	*Woodcock-Johnson Individual Achievement Tests, Dolch Story Reading Test.*	*Corrective Reading* students had greater standard score gains and larger increases in words read per minute than the other two reading group students.
Thorne (1978)	*Corrective Reading*	13	Junior maladjusted boys in England Age range = 8 to 12 years	Pre-experimental — One group pretest-posttest	Investigating the effects of *Corrective Reading* with maladjusted boys in England.	35 lessons of the *Corrective Reading* program were taught to two groups of boys by the same teacher. A contract-based 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. 20). The participants in four studies were students with learning disabilities whose age ranged from 8–11 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 3–5.

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* for Grade 4 and 5 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 1.5-year 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."

–Barbara DaBoll
Resource Specialist,
John Muir Elementary School,
Glendale, California

Table 4 - Writing and spelling research with students with high-incidence disabilities

Study	DI Program	n	Participants	Research Design	Research Purpose	Intervention Details	Outcome Measures	Findings
Anderson & Keel (2002)	*Reasoning and Writing*	10	Learning disabilities; behavior disorders 4th and 5th graders	Pre-experimental — One group pretest-posttest	Determining the gains using *Reasoning and Writing* for a short period.	25 lessons of *Reasoning and Writing Level C* were taught in 6 weeks.	*Test of Written Language-2* (TOWL-2).	Educationally important gains were found.
Darch & Simpson (1991)	*Spelling Mastery*	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 (*Spelling Mastery* and visual imagery) used same practice words, 25-30 min. daily instruction for 5 weeks, *Spelling Mastery* students completed 40 lessons.	Probes every 8-10 lessons, posttest of all words in unit, *Test of Written Spelling* (TWS).	*Spelling Mastery* group performed statistically significantly better on the probes, posttest, and each subtest of the TWS than the visual imagery group.
Maggs, McMillan, Patching, & Hawke (1981)	*Morphographic Spelling*	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 *Morphographic Spelling* (only remedial student results included here).	35 min. of daily instruction in *Morphographic Spelling*, 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)	*Language for Writing*	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 *Language for Writing* program on 2nd- to 3rd-grade general education students and 3rd- to 5th-grade special education students.	*Language for Writing* 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)	*Spelling Mastery*	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 *Spelling Mastery* and 2) if *Spelling Mastery* was effective	All students received *Spelling Mastery* in pairs; implementation was staggered; while waiting for *Spelling Mastery*, 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.

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 3- to 5-year-old children and those with developmental delays (see Table 5 on page 21). 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."

–George Ziders
Teacher,
Kingston Elementary School,
Kingston, Illinois

Table 5 - Math research with preschoolers with high-incidence disabilities

Study	DI Program	n	Participants	Research Design	Research 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.

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 mental retardation (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 23) 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)
- *Corrective Mathematics* (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 mental retardation for a number of the participants.

Our research review uncovered some 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	Research Purpose	Intervention Details	Outcome Measures	Findings
Booth, Hewitt, Jenkins, & Maggs (1979)	*DISTAR Language I, II, III* and *DISTAR Reading*	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 *DISTAR Language* program with children with mental retardation.	Provided *DISTAR Language I, II, and III* and *DISTAR Reading* over a period of 4 to 5 years.	*Peabody Picture Vocabulary Test, DISTAR Mastery* in language and reading, *Baldie Language Ability Test, Neale Analysis of Reading Ability*, and *Schonell Word Recognition Test.*	Children mastered most language objectives on the *Baldie Language Ability Test.* 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. *DISTAR Language* children outperformed "normal" children on 31 of 66 objectives on the *Baldie Language Ability Test.*
Bracey, Maggs, & Morath (1975)	*DISTAR Reading I*	6	Mental retardation 7 to 14 years IQ range = 30-40	Pre-experimental, One group, pretest-posttest	Demonstrating that students with moderate mental retardation can learn to read using an explicit phonics program.	Students received instruction for 15 to 30 min. per day during their school day in *DISTAR Reading I.*	Difference between pretest and posttest on specified mastery objectives from the *DISTAR Reading 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)	*Corrective Reading: Decoding A*	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 *Corrective Reading* on learning letter-sound correspondences, blending sounds in CVC words, and decoding.	Baseline and intervention conditions using *Corrective Reading Decoding A* over 11 to 27 training sessions.	Percentage of correct letter-sound 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)	*DISTAR Language I, II,* and *III* and *DISTAR Reading I, II,* and *III*	12	Children with moderate/ severe mental retardation; 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 *DISTAR Language* and *DISTAR Reading* with children with mental retardation.	*DISTAR Language I, II, and III* and *DISTAR Reading I, II, and III* 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, Baldie Language Ability Test,* and *Neale Analysis of Reading.* 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.
Glang, Singer, Cooley, & Tish (1992)	*Corrective Reading Comprehension A, Corrective Mathematics, DISTAR Language I, Reading Mastery 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)	*DISTAR Reading II*	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)	*DISTAR Language I*	28	Institutionalized (for 5 years) children with moderate or severe mental retardation 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 *DISTAR Language I* versus *Peabody Language kit* IP-level) with institutionalized children with moderate to severe retardation.	*DISTAR Language 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 *DISTAR Language I* than children instructed with the *Peabody Language* program on all six measures.
Young, Baker, & Martin (1990)	*DISTAR Arithmetic 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 *DISTAR Arithmetic I* and *DISTAR Arithmetic II*, 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 *DISTAR Arithmetic I* produced higher percentages of academic engagement; students scored higher on the mastery tests in this condition.

* A third case study used generic Direct Instruction techniques. These data are not present.

DISTAR Reading Research

Our search found two studies that involved *DISTAR Reading*. As shown in Table 6 on page 23, researchers identified the participants in these studies as students with mental retardation (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 mental retardation 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."

–Kathy Heron
Teacher,
Oakstone Academy,
Columbus, Ohio

DISTAR Language Research

Our search found one study demonstrating the efficacy of *DISTAR Language (Language for Learning)* only (see Table 6 on page 23). Maggs and Morath (1976) included:

- 28 students with mental retardation
- 14 who received instruction in *DISTAR Language I*
- 14 who received instruction using the *Peabody Language Kit* or a program using components of the *Peabody Language Kit*

For two years the first group of students received instruction from *DISTAR Language I* for one hour each school day while students in the other group received instruction from the *Peabody Language Kit*. Results showed that those students receiving *DISTAR Language I* significantly outperformed those students who did not receive instruction in this program. One question tested by the researchers centered on whether the students could attain a "normal rate of intellectual development." Over the 24-month investigation period the students in the *DISTAR Language* group averaged 22.5 months of gain on the Stanford-Binet (L-M) Intelligence Test. The students who did not receive *DISTAR Language* showed only 7.5 months in the same period.

DISTAR Reading and Language Research

Our search yielded two studies that combined *DISTAR Reading* and *Language* programs with students with mental retardation (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 of the students read at Grade 3 to Grade 4 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 mental retardation 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 mental retardation 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 mental retardation, four favoring children without disabilities).

"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."

–Michele Keilholtz
Teacher,
The Vista School,
Middletown, Pennsylvania

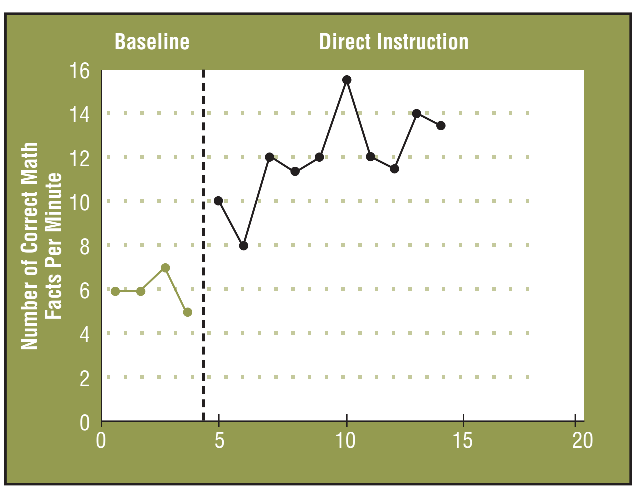
Corrective Reading Research

Our 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.

Research Involving the Combination of Programs

One interesting investigation was found that used combinations of Direct Instruction programs (see Table 6 on page 23). 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 increases in 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.

Figure 4: Corrective Math



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

Our search located one study demonstrating how *DISTAR Arithmetic* can help students with 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.

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 for 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, Corrective 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 8

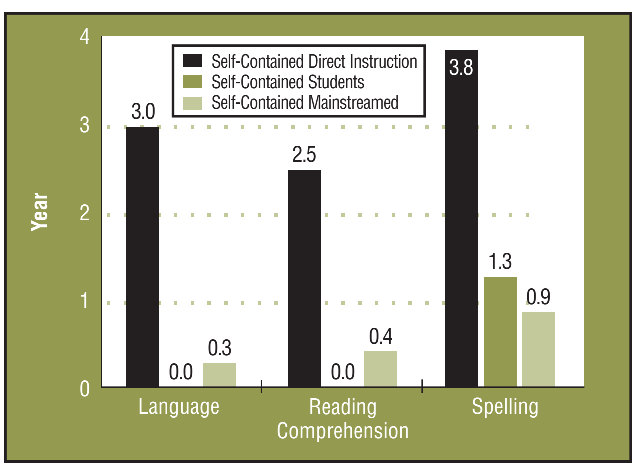
Over the same period, the Gallaudet Center for Assessment and Demographics (CADS) reported that self-contained students demonstrated yearly grade level gains of:

- 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

Grade Level Gains of 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

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.

Direct Instruction Shows Great Promise for Visually Impaired Students

Students with visual impairments represent another low-incidence population benefiting 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.

Summary

Direct Instruction programs show clear evidence of their efficacy with students with 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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"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."

–Elisabeth Nations
Special Education Teacher,
West Lincoln School,
Brookhaven, Mississippi

* Indicates studies included in the research review.

*"My students, their parents, and I are so pleased with their progress in reading and mathematics. **Direct Instruction** programs can take some of the credit. I have parents hugging me with tears of pride in their eyes as they report on their child's progress. For many parents of special needs children, this is the first time they have had good news."*

–Karen Molina
Resource Room Teacher/Teacher Consultant,
Davison Community Schools,
Davison, MI

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