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Special Education and Direct Instruction: An Effective Combination

Abstract: This paper considers the unique and successful combination of using Direct Instruction programs with special education populations. The introduction establishes the need for valid, scientifically based materials. Next is a description of studies using Direct Instruction with students who have high-incidence disabilities. Thirty-seven studies were found across academic areas. In only 3 of the 37 studies did students who were instructed with other materials fair better than the students who received Direct Instruction. Next, a research review of 8 studies involving Direct Instruction and students with low-incidence disabilities is presented. These studies showed positive effects for this population, with one investigation showing higher effects when another component (Discrimination Learning Theory) was added to *Distar Arithmetic* than when *Distar Arithmetic* was used alone. In all, 45 studies were found across student disability categories with over 90% noting positive effects for Direct Instruction programs. Finally, conclusions are drawn regarding the effective combination of Direct Instruction and special education, and further research is called for particularly in the areas of language, spelling, writing, and mathematics.

The Individuals With Disabilities Education Act of 1997 (IDEA) 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). This instruction may differ in terms of *how* it is provided (e.g., one-on-one, small groups, using sign language), *where* it is provided (e.g., resource room, separate classroom, residential school), or *what* curriculum is used (e.g., Direct Instruction programs, *Touch Math, Edmark Reading*).

Two of the critical elements of "specially designed" instruction include 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). Validation pertains to rigorous experimental studies that have been conducted over time yielding converging evidence. "When practiced most effectively and ethically, special education is characterized by the use of research-based teaching methods" (Heward, 2003, p. 38).

Interestingly, the 2004 reauthorized IDEA (Council for Exceptional Children, 2004) includes increased focus on the use of scientifically based instructional practices and programs and peer-reviewed research. For example, a special rule for determining eligibility was made noting that students cannot be qualified for special education services if they lack appropriate instruction in reading (as

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defined in section 1208[3] of the Elementary and Secondary Education Act of 1965) or mathematics. Further, local educational agencies may use a process that determines if students respond to scientific, research-based intervention as part of the evaluation procedures for identifying a specific learning disability. This focus on research-based intervention ensures that students are qualified for special education services for the "right" reasons, and not due to an absence of scientifically based instructional programs.

Prior to the 2004 reauthorization of IDEA, the No Child Left Behind legislation expected educators to demonstrate that *all* children can make progress, which led to an increased focus on the use of valid, scientifically based materials (Allbritten, Mainzer, & Ziegler, 2004). Thus, states, districts, and schools have been reviewing the research base supporting published programs to find curricula that will be effective, especially with students receiving special education. These reviews conclude that "More than any other commercially available instructional programs, Direct Instruction is supported by research" (Watkins & Slocum, 2004, p. 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 in which Direct Instruction was compared to another treatment. Not 1 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. Further, Adams and Engelmann (1996) analyzed 37 research studies involving Direct Instruction programs compared 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 posttest assessments). Finally, 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. Thus, it is no surprise that Direct Instruction is often referred to as a program for special education or at-risk students (Watkins & Slocum, 2004).

In fact, Direct Instruction was initially used to teach young, at-risk children as part of the largest educational study in U.S. history—Project Follow Through—which compared nine different educational approaches to determine the best instructional practice for low-income, at-risk children in kindergarten through third grade (Kennedy, 1978; Stebbins, St. Pierre, Proper, Anderson, & Cerva, 1977; Watkins, 1997). Project Follow Through demonstrated that the Direct Instruction model for teaching reading, language, and arithmetic had significant positive effects on basic, cognitive–conceptual, and affective skills.

Much of the Project Follow Through research took place prior to national legislation requiring special education, at a time when students with mild disabilities were typically taught in general education classrooms. In an effort to assess the effectiveness of Direct Instruction for students with disabilities, Gersten, Becker, Heiry, and White (1984) analyzed data previously collected from Direct Instruction Follow Through participants including the intellectual/cognitive ability variable. Gersten et al. found that students in *all* IQ groups had the same pattern of growth from kindergarten to first, second, and third grades. That is, even those students with low IQs maintained consistent gains and gained the same amount per year as those with higher IQs. This investigation of the use of Direct Instruction to teach students with varied intellectual abilities led the way for many additional studies.

The purpose of this paper is to review published investigations where Direct Instruction programs were used with special education populations. Specifically, the review centers on two populations of students with special needs—those with high-incidence disabilities (e.g., learning disabilities, communication disorders, behavior disorders, mild mental retardation) and those with low-incidence disabilities (e.g., autism, traumatic brain injuries, moderate to severe mental retardation).

Literature Search

Search procedures for the articles in this review included: (a) hand searches of all issues of *ADI News, DI News, Effective School Practices,* and *Journal of Direct Instruction* (publications produced by the Association for Direct Instruction—www.adihome.org); (b) 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, Slocum, & Martella, 2004); (c) ERIC and PsycINFO computerized searches using various search terms related to Direct Instruction; and (d) 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).

Only articles appearing in education journals were included; grant reports, dissertations, technical reports, and paper presentations at conferences were excluded. This process resulted in 37 journal articles in which the participants were students with high-incidence disabilities and 8 articles with participants who had low-incidence disabilities.

The investigations were grouped within these special education population areas by academic program (i.e., language, reading, spelling, writing, and mathematics), where appropriate. Tables were devised to present specific details regarding these studies. Each table identifies: (a) researchers and year of publication of the study; (b) Direct Instruction programs used; (c) number of participating students, including the number in the intervention group and the number in the control group; (d) participant information including disability, mean age and age range, and IQ and IQ range; (e) research design; (f) research purpose; (g) intervention details; (h) outcome measures; and (i) findings. (Note: If information is missing in the tables with regard to these details, it was not provided in the studies.)

Direct Instruction Research With Students With High-Incidence Disabilities

As previously stated, 37 studies investigating the effects of Direct Instruction on participants with high-incidence disabilities were found. These studies spanned 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 6 studies were earlier investigations, some taking place in other countries, but the descriptions of the participants were consistent with individuals with learning disabilities. Seven of the 22 investigations not only included students with learning disabilities but also those who were slow learners and students with behavior disorders, mild cognitive disabilities, other health impairments, and/or traumatic brain injuries. One study's participants were children with a low socioeconomic status (SES) with mild cognitive disabilities. Eight studies included kindergarteners or preschoolers who were not yet categorically identified. These children were often described as language or developmentally delayed. In addition, 5 studies identified school-aged students simply as mildly disabled, developmentally delayed, or eligible for special education.

These 37 studies also investigated a range of Direct Instruction programs including *Distar* (*Reading*, *Language*, and/or *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), and *Connecting Math Concepts* (*n* = 1). (Note: These studies do not equal 37 given that some studies included more than one Direct Instruction program.)

The 37 studies included not only a wide range of Direct Instruction programs and participants but also varying age/grade ranges from 3 years 2 months to high school. The majority of the studies (*n* = 28) included elementary-school-aged students (*n* = 22) and/or middle-school-aged students (*n* = 6). As previously noted, the participants in eight of the studies were preschool or kindergarten children. Finally, six studies included high-school-aged students. (Note: These do not equal 37 because some studies included more than one age group.)

The 37 investigations are described next in more detail. First, studies of Direct Instruction as it relates to language instruction are examined. Next, research investigations using *Distar Reading* and *Reading Mastery*, *Corrective Reading*, writing and spelling programs, and mathematics programs are provided. Overall, in only 3 of the 37 studies (i.e., Cole, Dale, & Mills, 1991; Lewis, 1982; Marston, Deno, Kim, Diment, & Rogers, 1995) did students who were instructed with other materials fair better than the students who received Direct Instruction.

Direct Instruction Language Research

Our search identified five studies of Direct Instruction language programs used with preschool-aged children with high-incidence disabilities (see Table 1). Children in these studies were eligible for special education services, identified in the general category of developmentally delayed, or language delayed. Each of these studies focused on language instruction. Four of these studies (i.e., Cole & Dale, 1986; Cole et al., 1991; Cole, Dale, Mills, & Jenkins, 1993; Dale & Cole, 1988) comprised a series of investigations involving *Distar Language* alone or in combination with *Distar Reading* and *Arithmetic* 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 et al., 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 comparison, classification, perspective changing, and so forth rather than emphasizing specific academic content. Table 1 provides the details of these studies including the extensive measures. Cole et al. (1991) found statistically significant increases from pretest to posttest for both DI and ML groups. No statistically significant differences were found 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.

Given the strong evidence of the efficacy of *Distar Language* in Follow Through (Adams & Engelmann, 1996) with at-risk, primary-aged students, the lack of significant differences in the Cole series of studies comparing *Distar Language* and interactive language, or ML, for young children with language and developmental disabilities is of interest. When examining these studies, one finds that the teachers had preparation to teach Direct Instruction and that procedural validity observations confirmed fidelity of implementation. The notable differences between these studies and Follow Through are (a) the students in DI/ML studies were younger, including 3-year-olds, (b) the preschool students in the DI/ML studies attended school part time, and (c) the students in the DI/ML all had identified disabilities. These differences suggest several possibilities. It is possible that *Distar Language I*, designed for kindergarten-aged students, may not be as appropriate for preschool-aged students. It is also of interest that due to their part-time schedule, these younger, lower performing students received less *Distar Language* instruction than students in Follow Through received. Direct Instruction principles suggest that completing a lesson each day is critical and specify that the lowest performing students require the most instruction.

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 greater improvement in receptive and expressive language and in social interactions compared to children in the comparison group who received traditional preschool instruction. Waldron-Soler et al. noted that the children in the *Language for Learning* condition received only 30 lessons. Further, Waldron-Soler et al. spoke to the difficulty of implementation since group instruction was challenging with the children in the study.

Distar Reading/Reading Mastery Research

Our search found 10 studies with school-aged populations that included *Distar Reading* or *Reading Mastery*, the revised and extended Direct Instruction reading program (see Table 2). Seven of the 10 studies compared *Distar Reading* or *Reading Mastery* to other approaches; in addition, 2 studies described the effects of *Reading Mastery* and *Corrective Reading*. Two *Reading Mastery* studies went beyond the question of the efficacy of Direct Instruction reading to explore supplementing *Reading Mastery* with spelling or to compare two Direct Instruction reading programs. Most students across these studies were in Grades K–6 and were identified as learning disabled or they would meet the definition of learning disabilities (e.g., in other countries). This finding is not surprising given that 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).

For example, Chamberlain (1987) presented 7 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, Canada. Chamberlain reported that students gained an average of 1.5 months for each month of instruction.

One study (i.e., 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

Table 1

Language Research With Preschoolers With High-Incidence Disabilities

Study	DI program	*N*	Participants	Research design
Cole & Dale (1986)	*Distar Language I*	44 (19 in *Distar Language I*, 25 in *Interactive Language Instruction*)	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 = 52–109	Experimental—Pretest–posttest control group
Cole, Dale, & Mills (1991)	*Distar Language*, *Distar Arithmetic*, and *Distar Reading*	107 (55 in Direct Instruction programs, 52 in ML program)	Children (ages 3 to 7 years, *M* = 5.0) with mild to moderate developmental delays	Experimental—Pretest–posttest control group
Cole, Dale, Mills, & Jenkins (1993)	*Distar Language*, *Distar Arithmetic*, and *Distar Reading*	164 (81 in DI programs, 83 in ML program)	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

Research purpose	Intervention details	Outcome measures	Findings
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 hr per 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.
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 hr a day, 5 days per week for 180 school days (preschool) and 5.5 hr 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.
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 hr a day, 5 days per week for 180 school days (preschool) and 5.5 hr 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.

Distar Reading II to Diagnostic Prescriptive Remediation (DPR) with 8- and 9-year-old students who were described as "retarded in reading" (p. 293). Both *Distar* and DPR were phonics-based programs; however, after 55 days of instruction the students in the *Distar* group scored significantly higher on reading tests than the students taught with DPR. At that point, both groups were placed in *Distar Reading*. The original Direct Instruction group continued to make progress while the group who received DPR followed by Direct Instruction showed significant growth and, in fact, "caught up" with the group who received Direct Instruction from the start.

Haring and Krug (1975) investigated the efficacy of *Distar Reading* supplemented with

Table 1, continued

Language Research With Preschoolers With High-Incidence Disabilities

Study	DI program	*N*	Participants	Research design
Dale & Cole (1988)	*Distar Language*, *Distar Arithmetic*, and *Distar Reading*	83	Preschool (*N* = 61, ages 3 years to 5 years 11 months) and kindergarten/primary (*N* = 22, ages 6 to 8 years) developmentally delayed children	Experimental—Pretest–posttest control group
Waldron-Soler, Martella, Marchand-Martella, Warner, Miller, & Tso (2002)	*Language for Learning*	36 (16 in *Language for Learning*, 20 in standard early childhood programs)	Preschool children (3 to 5 years of age) 28 typical children, 8 with developmental delays: Preschool A (12 children without developmental delays, 4 children with developmental delays), Preschool B (16 children without developmental delays), and Preschool C (4 children with developmental delays)	Quasi-experimental—Nonequivalent control group

Sullivan Programmed Reading and precision teaching compared to traditional reading instruction. Low 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 *Sullivan Programmed Reading* and precision teaching perform better on standardized reading posttests as compared to the students who did not receive this 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.)

Research purpose	Intervention details	Outcome measures	Findings
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 hr a day, 5 days per week for 180 school days (preschool) and 5.5 hr 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 that these results did not reach statistical significance).
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 compared to the comparison group.

Table 2

Reading Mastery/Distar Reading

Research With Students With High-Incidence Disabilities

Study	DI program	*N*	Participants	Research design
Branwhite (1983)	*Distar Reading II*	14 (Phase I: 7 in *Distar Reading*, 7 in Diagnostic Prescriptive Remediation; Phase II: 14 in *Distar Reading*)	Likely learning disabilities from description 8 and 9 years (*M* = 8 years 7 months) IQs from 74–108 (*M* = 92)	Phase I: Quasi-experimental—Nonequivalent control group Phase II: Preexperimental—One group pretest–posttest
Cooke, Gibbs, Campbell, & Shalvis (2004)	*Reading Mastery Fast Cycle* and *Horizons Fast Track A–B*	30 (15 in *Reading Mastery Fast Cycle*, 15 in *Horizons Fast Track*)	Learning disabilities, educable mental retardation, behavior disorders, and other health impairments Third and fourth graders (mean age: *Reading M*astery = 8.0 and *Horizons* = 8.3)	Quasi-experimental—Nonequivalent control group
Chamberlain (1987)	*Reading Mastery* and *Corrective Reading*	120	Learning disabilities and “slow learners” First–sixth grade	Preexperimental—One group pretest–posttest
Haring & Krug (1975)	*Distar Reading I*	54 (24 in *Distar Reading + Sullivan Programmed Reading Series*, 30 in variety of materials determined by their teachers)	Educable mental retardation 9–12 years Mean IQ = 72.3 for *Distar* group; 71.9 for other group	Experimental—Pretest–posttest control group
Kuder (1990)	*Distar Reading*	48 (Year 1: 24 in *Distar Reading*, 24 in traditional basal readers; Year 2: 18 in *Distar Reading* for 2 years, 8 in basal 1 year and *Distar Reading* 1 year, 8 in basal for 2 years)	Learning disabilities Mean age = 8 years 10 months	Quasi-experimental—Static group comparison

Research purpose	Intervention details	Outcome measures	Findings
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.
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.*
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	On average students gained about 1.5 months for every month of instruction.
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.
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.

Table 2, continued

Reading Mastery/Distar Reading

Research With Students With High-Incidence Disabilities

Study	DI program	*N*	Participants	Research design
Marston, Deno, Kim, Diment, & Rogers (1995)	*Reading Mastery*	176 (25 in generic direct instruction with *Holt*, 30 in *Reading Mastery*, 24 in reciprocal teaching, 27 in peer tutoring, 25 in computer-assisted instruction, 22 in effective teaching)	Mild disabilities First–sixth grade (*M* = 3.6 grade)	Experimental—Pretest–posttest control group
O'Connor, Jenkins, Cole, & Mills (1993)	*Reading Mastery*	81 (43 in *Reading Mastery*, 38 in *Superkids*)	Developmental delays (mean *Reading Mastery* = 6.2; *Superkids* = 6.3)	Experimental—Pretest–posttest control group
O'Connor & Jenkins (1995)	*Reading Mastery*	10 (5 in *Reading Mastery* + spelling, 5 in *Reading Mastery* + additional reading)	Developmental delays Kindergarten children	Experimental—Pretest–posttest control group
Richardson, DiBenedetto, Christ, Press, & Winsberg (1978)	*Distar Reading*	72 (36 in Direct Instruction, 36 in Integrated Skills Method)	Likely learning disabilities from description Mean age: DI = 10 years 0 months; IMS = 9 years 11months Mean IQ: DI = 81; IMS = 83	Experimental—Pretest–posttest control group
Stein & Goldman (1980)	*Distar Reading*	63 (30 in *Distar Reading*, 33 in *Palo Alto*)	Learning disabilities 6–8 years Mean IQ: *Distar* = 98.7; *Palo Alto* = 101.4	Quasi-experimental—Nonequivalent control group

Research purpose	Intervention details	Outcome measures	Findings
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), and 6. effective teaching	Reading CBM	Student achievement was highest in CAI, reciprocal teaching, and generic direct instruction with *Holt*.
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, 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.
Determining if spelling with phonics-based reading would encourage application and 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* word and pseudoword 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 pseudoword reading and did better on the WRMT Word Identification subtest.
Assessing two reading approaches	Intervention group received *Distar Reading*, control group received Integrated Skills Method combining thematic and eclectic teacher-designed methods, small group instruction, 45 min daily, average of 63 days.	Peabody Individual Achievement Test, Gilmore Oral Reading Test	Both groups made gains, but there were no statistically significant differences between the groups on any reading measure.
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	*Distar* group performed statistically significantly higher on posttest.

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 pseudowords. 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. Interestingly, the teachers at the end of the study stated a preference for *Horizons* because spelling instruction was included in the program.

Only 1 of the 10 studies found that a comparison group outperformed the students who were taught with Direct Instruction reading programs (i.e., Marston et al., 1995). Marston et al. examined six promising interventions for elementary students with mild disabilities. Although the interventions were implemented for only 10 weeks, students taught with computer-assisted learning, reciprocal teaching, and generic direct instruction using *Holt* outperformed the 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, most participants were identified as having learning disabilities or whose descriptions matched the definition of learning disabilities (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 (i.e., Lewis, 1982). Results of one of two studies conducted by Lewis found 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 revealed that the gains for the *Corrective Reading* group were partly due to novelty effects. The gains for all three groups were similar; however, the *English Colour Code* group demonstrated the greatest gains.

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* as well as two non-Direct Instruction programs. Teachers in the control group studied the manuals on their own. One group received 6 weeks of training and another group received 1 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 6 weeks of training faired better than the students whose teachers received 1 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.

Direct Instruction Writing and Spelling Research

Our search identified five studies using Direct Instruction spelling and writing programs (see Table 4). The participants in four studies were students with learning disabilities whose ages 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 through 5.

Three studies investigated Direct Instruction spelling programs. Darch and Simpson (1991) compared the effectiveness of 40 lessons of *Spelling Mastery* to visual imagery instruction and found that the students who received Direct Instruction significantly outperformed those students who were taught using the other program. In a study that took place in Australia using *Morphographic Spelling*, Maggs, McMillan, Patching, and Hawke (1981) found that students whose academic problems fit our description of learning disabilities made gains of over 11 months after only 8 months of instruction. More recently, Owens, Fredrick, and Shippen (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 fourth- and fifth-grade students with learning disabilities and behavior disorders. Students were shown to make significant gains in only 6 weeks.

Recently, Martella and Waldron-Soler (2005) 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.

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). Positive findings were noted on various measures after completing 30 lessons of this program. It should be noted that the various investigations conducted by Cole and colleagues described in Table 1 used

Table 3

Corrective Reading *Research With Students With High-Incidence Disabilities*

Study	DI program	*N*	Participants	Research design
Arthur (1988)	*Corrective Reading*	6	Learning disabilities Junior high school students Grades 7–8 Age range 12.2 to 14.2	Preexperimental—One group pretest–posttest
Benner, Kinder, Beaudoin, Stein, & Hirschmann (2005)	*Corrective Reading Decoding B1*	41 (28 in *Corrective Reading*, 23 in comparison)	Learning disabilities, behavior disorders, Title 1 Elementary school and middle school students (Grades 3–8)	Quasi-experimental—Nonequivalent control group
Campbell (1984)	*Corrective Reading*	55 (42 in *Corrective Reading* group, 13 in comparison group)	Poor readers, likely learning disabilities (more than 1 standard deviation below the mean) Grades 7 and 8	Quasi-experimental—Nonequivalent pretest–posttest control group
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
Edlund & Ogle (1988)	*Corrective Reading*, *Morphographic Spelling*, and other non-DI programs	6 teachers (2 in 6-week training, 2 in 1-week training, 2 in control) 48 students	Teachers with 6.5 years of special education experience Students with learning disabilities (12- to 19-years-old, IQ range = 90–100)	Experimental—Pretest–posttest control group

Research purpose	Intervention details	Outcome measures	Findings
Determining the effectiveness 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.
Comparing the effects of *Corrective Reading* with another reading intervention	One group received *Corrective Reading* taught by student 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* group did significantly better than comparison on all measures, significant decrease in the number of treatment nonresponders.
Assessing the effects of the *Corrective Reading* program versus regular English classes	*Corrective Reading* program provided to the experimental group 50 min 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.
Investigating the effects of *Corrective Reading* with incarcerated males	8 weeks, 1 hr 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	All participants demonstrated positive gains on oral reading fluency measures. Positive trends were noted in attitudes toward reading instruction.
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.

Table 3, continued

Corrective Reading *Research With Students With High-Incidence Disabilities*

Study	DI program	*N*	Participants	Research design
Gregory, Hackney, & Gregory (1982)	*Corrective Reading Decoding B*	19 (11 in *Corrective Reading*, 8 in comparison)	Likely learning disabilities Mean age: *Corrective Reading* group = 11 years 9 months; comparison group = 11 years 10 months	Quasi-experimental—Nonequivalent control group
Holdsworth (1984–1985)	*Corrective Reading Decoding B* and *C*	15	Students placed in a school for students with special needs in the United Kingdom	Preexperimental—One group pretest–posttest
Lewis (1982)	*Corrective Reading Decoding B*	41 (Study 1: 7 in *Corrective Reading*, 6 in Control-Group 1, 7 in Control-Group 2; Study 2: 7 in *Corrective Reading*, 7 in Control-Group 1, 7 in Control-Group 2)	Likely learning disabilities 11–12-year-olds	Experimental—Pretest–posttest control group
Lloyd, Cullinan, Heins, & Epstein (1980)	*Corrective Reading Decoding A & B*, and *Comp. A*	23 (15 in *Corrective Reading*, 8 in control)	Learning disabilities Elementary aged (9 years 9 months to 10 years 4 months)	Experimental—Posttest only control group
Malmgren & Leone (2000)	*Corrective Reading* among other programs	45	Incarcerated males, 20 receiving special education services Average age = 17.07 years (Range = 13.92–18.7) EBD (*N* = 10), LD (*N* = 7), and MR (*N* = 3)	Preexperimental—One group pretest–posttest
Marchand-Martella, Martella, Orlob, & Ebey (2000)	*Corrective Reading Decoding*	22	Special education students Ninth graders	Preexperimental—One group pretest–posttest

Research purpose	Intervention details	Outcome measures	Findings
Comparing the effects of *Corrective Reading* with 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 and Diack Test of Reading, behavior surveys, attendance records	*Corrective Reading* group did significantly better than the comparison group in reading gains, behavior, and attendance.
Determining the effects of *Corrective Reading* with 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
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.
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.
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 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.
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.

Table 3, continued

Corrective Reading *Research With Students With High-Incidence Disabilities*

Study	DI program	*N*	Participants	Research design
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)	Preexperimental—One group pretest–posttest
Scarlato & Asahara (2004)	*Corrective Reading Decoding B2*	9 (5 in *Corrective Reading*, 4 in comparison)	Adjudicated youth Emotional/behavioral disorders; learning disabilities 16–17 years	Quasi-experimental—Nonequivalent control group
Somerville & Leach (1988)	*Corrective Reading*	40 (10 in each of four groups *Corrective Reading*, psychomotor, self-esteem, control)	Learning disabilities Mean age = 10 years 11 months	Experimental—Pretest–posttest control group
Thomson (1992)	*Corrective Reading*	255 (144 in *Corrective Reading*, 61 in traditional basal, 50 in whole language)	Learning disabilities Elementary and middle school students	Quasi-experimental—Nonequivalent control group
Thorne (1978)	*Corrective Reading*	13	Junior maladjusted boys in England Age range = 8 to 12 years	Preexperimental—One group pretest–posttest

Research purpose	Intervention details	Outcome measures	Findings
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.
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.	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.
Comparing the effects of *Corrective Reading* with psychomotor, 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.
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.
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.

Table 4

Writing and Spelling Research With Students With High-Incidence Disabilities

Study	DI program	*N*	Participants	Research design
Anderson & Keel (2002)	*Reasoning and Writing*	10	Learning disabilities; behavior disorders Fourth and fifth graders	Preexperimental—One group pretest–posttest
Darch & Simpson (1991)	*Spelling Mastery*	28	Learning disabilities Mean age = 10 years 6 months Mean IQ = 92	Experimental—Pretest–posttest control group
Maggs, McMillan, Patching, & Hawke (1981)	*Morphographic Spelling*	31	Likely learning disabilities from description—remedial with severe spelling problems 9 years 9 months–11 years 3 months (mean age = 11 years 3 months)	Preexperimental—One group pretest–posttest
Martella & Waldron-Soler (2005)	*Language for Writing*	126	General education students in second to third grade, special education students in third to fifth grade (60% African American and/or Hispanic) 105 general education, 21 special education	Preexperimental—One group pretest–posttest
Owens, Fredrick, & Shippen (2004)	*Spelling Mastery*	6	Learning disabilities, 1 with traumatic brain injury (TBI) 7 years 10 months–9 years 8 months (mean age = 8 years 9 months)	Single case—Multiple baseline across participants

Research purpose	Intervention details	Outcome measures	Findings
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	Educationally important gains were found.
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.
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.
Determining the effects of the *Language for Writing* program on second- to third-grade general education students and third- to fifth-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.
Determining if: 1. a paraprofessional 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.

Distar Arithmetic (with the exception of Cole & Dale, 1986) as part of an intervention package for preschoolers; however, specific math measures were not used. These studies are not summarized here. An additional study (i.e., Kelly, Carnine, Gersten, & Grossen, 1986) investigated the effectiveness of the *methods* for teaching fractions using videodisc instruction that were originally designed for *Corrective Mathematics* and found favorable results for students with learning disabilities compared to traditional basal approaches. This study was not included in the review given that a specific Direct Instruction program was not utilized.

Areas of Emerging Research

Little research has been done examining the academic impact of Direct Instruction with students who have 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 on behavior measures. Although the studies that Colvin and his colleagues cited were not carefully controlled experimental research, they do suggest further research needs to be conducted investigating the relationship between the structure and design of Direct Instruction and gains in reading and behavior.

Summary

As can be seen, 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.

Direct Instruction Research With Students With Low-Incidence Disabilities

Eight investigations were found specific to students with low-incidence disabilities. These studies spanned the mid-1970s to 2004. The majority of these investigations included

Table 5

Math Research With Preschoolers With High-Incidence Disabilities

Study	DI program	*N*	Participants	Research design
McKenzie, Marchand-Martella, Moore, & Martella (2004)	*Connecting Math Concepts—Level K*	16	5 with developmental delays 3 years 5 months–5 years 4 months (mean age = 4 years 5 months)	Preexperimental—One group pretest–posttest

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), and intellectual disabilities (n = 1) as well as those identified as "educationally subnormal" (n = 1). Our analysis includes one table (Table 6) 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), and *Arithmetic* (n = 1); *Corrective Reading* (n = 2); *Reading Mastery* (n = 1); and *Corrective Mathematics* (n = 1). (Note: These studies do not equal 8 given that some studies included more than one Direct Instruction program.)

Participants ranged in age from 6 to 16 years (mean age = 10) and had IQ scores between 30 and 81 (average IQ of participants = 52). Such scores, coupled with other factors, led 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.

The following sections describe these eight studies in more detail. In the first section research on *Distar Reading* is shared. Next, the effects of *Distar Language* are highlighted. Two studies that combined *Distar Reading* and *Language* follow. The remaining sections cover *Corrective Reading*, combined Direct Instruction programs (i.e., *Corrective Reading* and *Corrective Mathematics*, *Distar Language*, and *Reading Mastery*), and *Distar Arithmetic*. Overall, all eight studies showed positive effects for this population of students; one study conducted by Young, Baker, and Martin (1990) found higher effects when Discrimination Learning Theory was added to *Distar Arithmetic* than when *Distar Arithmetic* was used alone for students with intellectual disabilities.

Distar Reading Research

Our search found two studies that involved *Distar Reading*. As shown in Table 6, researchers identified the participants in these studies as

Research purpose	Intervention details	Outcome measures	Findings
Investigating the efficacy of *CMC—Level K*	10–20 min of small group instruction daily for 6.5 weeks, all students completed all 30 lessons of *CMC—Level K*.	Cognitive Domain of the Battelle Developmental Inventory, *CMC* placement test	Students with developmental delays made statistically significant gains on the Battelle. All students were ready to begin *Connecting Math Concepts Level A*.

Table 6

Direct Instruction Research With Students With Low-Incidence Disabilities

Study	DI program	*N*	Participants	Research design
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 = 35–55	Preexperimental—One shot case study Longitudinal study over a 5-year period
Bracey, Maggs, & Morath (1975)	*Distar Reading I*	6	Mental retardation 7 to 14 years IQ range = 30–40	Preexperimental—One group pretest–posttest
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
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 age = 10.34 years	Preexperimental—One group pretest–posttest

Research purpose	Intervention details	Outcome measures	Findings
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 test 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 third-grade language and reading levels. *Distar Language* children outperformed “normal” children on 31 of 66 objectives on the Baldie Language Ability Test.
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 letter–sound correspondences, spelling by sounds, and sounding words out and saying them the fast way
Investigating the effects of *Corrective Reading* on learning letter–sound correspond-ences, 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 of correct 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.
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 min a day (average) for 195 school 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 found at end of program on other measure.

students with mental retardation (i.e., Bracey, Maggs, & Morath, 1975) or those who were “educationally subnormal” (i.e., 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 only be provided with sight words). These studies set out to show that students with mental retardation could learn to read. Additionally, these studies focused on how these students could learn to read rapidly. Overall, the two studies showed that students with low-incidence disabilities could learn

Table 6, continued

Direct Instruction Research With Students With Low-Incidence Disabilities

Study	DI program	*N*	Participants	Research design
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; 81 IQ Case study 2: 6 years; 65 IQ	Case study 1: Multiple baseline across behaviors; Case study 2: A–B design
Gregory & Warburton (1983)	*Distar Reading II*	8	Educationally subnormal 6 to 7 years	Preexperimental—One group pretest–posttest
Maggs & Morath (1976)	*Distar Language I*	28 (14 in *Distar Language* and 14 in *Peabody Language*)	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
Young, Baker, & Martin (1990)	*Distar Arithmetic I*	5	Intellectual disabilities 8 to 10 years IQ range = 35–54	Single case—Multiple baseline across participants

sophisticated reading strategies such as decoding words and sentences (i.e., using phonic analysis strategies as opposed to sight words).

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* asks students to identify sounds, blend these sounds into words, and say the words the fast way. Results showed that these students made significant improvements in reading words. The authors

Research purpose	Intervention details	Outcome measures	Findings
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
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.
Determining the relative effectiveness of *Distar Language I* versus *Peabody Language Kit* (P-level) with institutionalized children with moderate to severe retardation	*Distar Language I* implemented 1 hr 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.
Assessing the effects of two mathematics interventions	Participants received *Distar Arithmetic I* and Discrimination Learning Theory (DLT) based on content from *Distar Arithmetic I*, baseline from 6 to 20 days, intervention ended on Day 26, maintenance data gathered Days 52–56	Percentage of academic engagement and scores on mastery tests	DLT plus *Distar Arithmetic I* produced higher percentages of academic engagement; students scored higher on the mastery tests in this condition.

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" (p. 88).

Distar Language Research

Our search found one study demonstrating the efficacy of *Distar Language* without additional Direct Instruction programs (see Table 6). Maggs and Morath (1976) included 28 students with mental retardation, 14 who received instruction in *Distar Language I* and 14 who received instruction using the *Peabody Language Kit* or a program using components of the *Peabody Language Kit*. For 2 years the first group of students received instruction from *Distar Language I* for 1 hr each school day while students in the other group received instruction from the *Peabody Language Kit*. Results showed that on all measures, 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 obtain 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 of gain 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. Booth, Hewitt, Jenkins, and Maggs (1979) implemented an extensive 5-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 third- to fourth-grade levels. Gersten and Maggs (1982) investigated the long-term effects of an intensive 5-year program in *Distar Language I–III* and *Distar Reading I–III* in Sydney, Australia. Twelve children with mental retardation ranging in age from 6 years 10 months to 12 years 6 months received instruction in *Distar Language* and *Reading* an average of 30 min per day. The Stanford-Binet Intelligence Test (pretest and posttest), the 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 9 of the 66 objectives on the Baldie Language Ability Test (five favoring children with mental retardation, four favoring children without disabilities).

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. Glang, Singer, Cooley, and Tish (1992) provided two case studies conducted with students with traumatic brain injuries. In the first case study, an 8-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, the student demonstrated increases in correctly answered story problems, and the rate per minute of correctly completed facts almost doubled with instruction.

In the second case study, Glang et al. (1992) targeted instruction using *Distar Language* (sentence repetition) and *Reading Mastery* (letter sounds) with a 6-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 et al. (1990) analyzed the effects of the Discrimination Learning Theory (DLT) and *Distar Arithmetic*. 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

A promising area of Direct Instruction research involves students who are deaf or hard-of-hearing 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 their educational performance (Kraemer, Kramer, Koch, Madigan, & Steely, 2001). Students who attended a high school in Irvine, California received instruction with several Direct Instruction programs (*Corrective Reading Series—Decoding* and *Comprehension, Corrective Spelling Through Morphographs, Spelling Mastery*, and *Expressive Writing*) in self-contained settings. Twelfth-grade students made grade-level gains of 3.0 years in total language, 2.5 years in reading comprehension, and 3.8 years in spelling when compared to end-of-year testing in eighth grade. In order to gain perspective on these gains for students who are deaf or hard-of-hearing, consider the Gallaudet Center for Assessment and Demographics (CADS) report identifying that self-contained students demonstrated yearly grade-level gains of .0 years for total language, .0 years for reading comprehension, and 1.3 years for spelling. Grade-level gains for all students (including mainstreamed students) in the Gallaudet assessment who were deaf or hard-of-hearing were .3 years for total language, .4 years for reading comprehension, and .9 years for spelling. Another method of viewing the gains made by the Irvine students is to consider their achievement level upon completing high school. On average, the Irvine students who spent 4 years in Direct Instruction programs were at the 7.2 grade level in total language, 5.7 grade level in reading comprehension, and 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, and 2.2 years in spelling. Finally, the students taught using Direct Instruction programs outperformed the Gallaudet assessment 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, and .9 years in spelling.

Similarly, in a recent pilot study Trezek (2002) asked, "Does Direct Instruction in Phonics Benefit Deaf Students? If So, How?" Trezek discussed the findings of the National Reading Panel 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 that 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 7 months of instruction. Although the implementation of the Direct Instruction programs used by Trezek 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.

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 that after examining which students needed Braille, large print, or standard print, that "Most beginning Direct Instruction programs are already written in larger than standard print and would, therefore, work for several students with little adaptation" (p. 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 them learned to read and master language skills otherwise thought unattainable. A characteristic of the Direct Instruction research that educators may find particularly appealing is the rapid learning gains evidenced in studies. It seems that students with more severe disabilities can learn at high levels when provided with systematic, research-validated programs such as Direct Instruction.

Conclusions

Direct Instruction and special education have been demonstrated as an effective combination (Adams & Engelmann, 1996; Forness et al., 1997; White, 1988). The carefully designed instructional materials in Direct Instruction programs meet the IDEA standard of "specially designed" instruction for students with disabilities. Direct Instruction programs are designed with the needs of individual students in mind and have strong research support validating them for instruction of students with disabilities. School districts expressing concern regarding special education students' ability to meet the annual yearly progress provision of the No Child Left Behind Act (Allbritten et al., 2004) have evidence of the success of Direct Instruction programs for these students. Of the 45 studies reviewed here, over 90% identified positive effects for Direct Instruction programs.

The most researched Direct Instruction area is reading, with numerous studies involving *Distar Reading*, *Reading Mastery*, and *Corrective Reading* with students with high- and low-incidence disabilities. This focus on reading research is not surprising given the high rate of reading disabilities among students (Meese, 2001). In addition, the *Distar Reading* materials were developed early for use in Project Follow Through and were soon followed by *Reading Mastery* as a full, kindergarten to sixth grade reading program; therefore, these materials have been available for study for many years. Similarly, *Corrective Reading* has been the subject of research since the early 1980s. As a result, the support for Direct Instruction reading programs is clear.

Given the strong research base of Direct Instruction with students who have disabilities, the limited numbers of studies identified in the areas of language, writing, spelling, and math was unanticipated. *Language for Learning* and *Language for Thinking* are relatively recent publications. We found no research using *Language for Thinking* in special education. Research needs to be conducted using these programs with the full range of students in general and special education. Although the writing programs, *Expressive Writing* and *Reasoning and Writing* have been available, they have not been widely researched (Fredrick & Steventon, 2004). Again, research in this area is encouraged.

Perhaps the need for additional research is greatest in the area of mathematics. As the "math wars" (Schoenfeld, 2004) spread from California across the nation, the need for evidence-based curricula has reached the boiling point in many communities. Concern has been expressed regarding the math achievement of general education students on national and international assessments (Przychodzin, Marchand-Martella, Martella, & Azim, 2004), yet there is limited research on effective mathematics instruction (Baker, Gersten, & Lee, 2002). In their review of Direct Instruction mathematics programs, Przychodzin et al. identified three studies of *Corrective Mathematics* and seven studies using *Connecting Math Concepts*. In the current review, few studies were identified using Direct Instruction mathematics programs to teach students with disabilities. This lack of research examining the efficacy of Direct Instruction mathematics programs for students with disabilities suggests a line of research ripe for educators dedicated to meeting the individual needs of students with disabilities to using validated mathematics curricula.

References

(Note: * indicates the studies included in the research review)

Adams, G. L., & Engelmann, S. (1996). *Research on Direct Instruction: 25 years beyond DISTAR*. Seattle, WA: Educational Achievement Systems.

Allbritten, D., Mainzer, R., & Ziegler, D. (2004). Will students with disabilities be scapegoats for school failures? *Educational Horizons, 82,* 153–60.

*Anderson, D. M., & Keel, M. C. (2002). Using *Reasoning and Writing* to teach writing skills to students with learning disabilities and behavior disorders. *Journal of Direct Instruction, 2,* 49–55.

*Arthur, C. (1988). Progress in a high school LD class. *ADI News, 27*(4), 17–18.

Baker, S., Gersten, R., & Lee, D. (2002). A synthesis of empirical research on teaching mathematics to low-achieving students. *The Elementary School Journal, 103,* 51–92.

Bateman, B., & Linden, M. (1998). *Better IEPS: How to develop legally correct and educationally useful programs* (3rd ed.). Longmont, CO: Sopris West.

*Benner, G. J., Kinder, D., Beaudoin, K. M., Stein, M., & Hirschmann, K. (2005). The effects of the *Corrective Reading Decoding* program on the basic reading skills and social adjustment of students with high-incidence disabilities. *Journal of Direct Instruction, 5,* 67–80.

*Booth, A., Hewitt, D., Jenkins, W., & Maggs, A. (1979). Making retarded children literate: A five-year study. *The Australian Journal of Mental Retardation, 5*(7), 257–260.

*Bracey, S., Maggs, A., & Morath, P. (1975). The effects of a direct phonic approach in teaching reading with six moderately retarded children: Acquisition and mastery learning stages. *The Exceptional Child, 22*(2), 83–90.

*Branwhite, A. B. (1983). Boosting reading skills by Direct Instruction. *British Journal of Educational Psychology, 53,* 291–298.

*Campbell, M. L. (1984). *Corrective Reading* program evaluated with secondary students in San Diego. *ADI News, 3*(3), 1.

Carnine, D., Silbert, J., Kame'enui, E., & Tarver, S. (2004). *Direct instruction reading* (4th ed.). Upper Saddle River, NJ: Pearson.

*Chamberlain, L. A. (1987). Using DI in a Victoria, B. C. resource room. *ADI News,* 7(1), 7–8.

*Cole, K. N., & Dale, P. S. (1986). Direct language instruction and interactive language instruction with language delayed preschool children: A comparison study. *Journal of Speech and Hearing Research, 29,* 206–217.

*Cole, K. N., Dale, P. S., & Mills, P. E. (1991). Individual differences in language delayed children's responses to direct and interactive preschool instruction. *Topics in Early Childhood Special Education, 11,* 99–124.

*Cole, K. N., Dale, P. S., Mills, P. E., & Jenkins, J. R. (1993). Interaction between early intervention curricula and student characteristics. *Exceptional Children, 60,* 17–28.

Colvin, G., Greenberg, S., & Sherman, R. (1993, Winter). The forgotten variable: Improving academic skills for students with serious emotional disturbance. *Effective School Practices*, 20–25.

*Cooke, N. L., Gibbs, S. L., Campbell, M. L., & Shalvis, S. L. (2004). A comparison of *Reading Mastery Fast Cycle* and *Horizons Fast Track A–B* on the reading achievement of students with mild disabilities. *Journal of Direct Instruction, 4,* 139–151.

Council for Exceptional Children. (2004). *The new IDEA: CEC's summary of significant issues.* Retrieved December 20, 2004, from http://www.cec.sped.org

*Dale, P. S., & Cole, K. N. (1988). Comparison of academic and cognitive programs for young handicapped children. *Exceptional Children, 54,* 439–447.

*Darch, C., & Simpson, R. G. (1991). Effectiveness of visual imagery versus rule-based strategies in teaching spelling to learning disabled students. *Research in Rural Education,* 7(1), 61–70.

*Drakeford, W. (2002). The impact of an intensive program to increase the literacy skills of incarcerated youth. *Journal of Correctional Education, 53*(4), 139–144.

*Edlund, C. V., & Ogle, R. R. (1988). Amount of training in DI and outcomes with secondary handicapped students. *ADI News,* 7(3), 14–15.

*Flores, M. M., Shippen, M. E., Alberto, P., & Crowe, L. (2004). Teaching letter–sound correspondence to students with moderate intellectual disabilities. *Journal of Direct Instruction, 4,* 173–188.

Forness, S. R., Kavale, K. A., Blum, I. M., & Lloyd, J. W. (1997). Mega-analysis of meta-analysis: What works in special education. *Teaching Exceptional Children, 19*(6), 4–9.

Fredrick, L. D., & Steventon, C. (2004). Writing. In N. E. Marchand-Martella, T. A. Slocum, & R. C. Martella (Eds.), *Introduction to Direct Instruction* (pp. 140–177). Boston: Allyn and Bacon.

Fuchs, D. (1996). Educational intervention and students with learning disabilities. *Learning Disabilities: A Multidisciplinary Journal, 7,* 63–67.

Fuchs, D., & Fuchs, L. S. (1995). What's 'special' about special education? *Phi Delta Kappan, 76,* 522–530.

Gersten, R. M., Becker, W. C., Heiry, T. J., & White, W. A. T. (1984). Entry IQ and yearly academic growth of children in Direct Instruction programs: A longitudinal study of low SES children. *Educational Evaluation and Policy Analysis, 6*(2), 109–121.

*Gersten, R. M., & Maggs, A. (1982). Teaching the general case to moderately retarded children: Evaluation of a five-year project. *Analysis and Intervention in Developmental Disabilities, 2,* 329–343.

*Glang, A., Singer, G., Cooley, E., & Tish, N. (1992). Tailoring Direct Instruction techniques for use with elementary students with brain injury. *Journal of Head Trauma Rehabilitation,* 7(4), 93–108.

Greenbaum, P. E., Dedrick, R. F., Friedman, R. M., Kutash, K., Brown, E. C., Lardierh, S. P., et al. (1996). National Adolescent and Child Treatment Study (NACTS): Outcomes for children with serious emotional and behavioral disturbance. *Journal of Emotional and Behavioral Disorders, 4,* 130–146.

*Gregory, R. P., Hackney, C., & Gregory, N. M. (1982). *Corrective Reading* programme: An evaluation. *British Journal of Educational Psychology, 52,* 33–50.

*Gregory, R. P., & Warburton, B. G. (1983). *DISTAR Reading* and remedial children in an infant school. *School Psychology International, 4,* 169–172.

Grossen, B. (1998). *The research base for* Corrective Reading *SRA*. DeSoto, TX: Science Research Associates.

*Haring, N. G., & Krug, D. A. (1975). Evaluation of a program of systematic instructional procedures for extremely poor retarded children. *American Journal on Mental Retardation, 79,* 627–631.

Heward, W. L. (2003). *Exceptional children: An introduction to special education* (7th ed.). Columbus, OH: Merrill.

*Holdsworth, P. (1984–1985). *Corrective Reading* tested in U.K. *ADI News, 4*(2), 1, 4–5.

Hunt, D., Woolly, D., & Moore, A. (2001). Arkansas School for the Blind adopts more effective curriculum. *Direct Instruction News, 1*(2), 32–33.

Kelly, B., Carnine, D., Gersten, R., & Grossen, B. (1986). The effectiveness of videodisc instruction teaching fractions to learning-disabled and remedial high school students. *Journal of Special Education Technology, 8*(2), 5–17.

Kennedy, M. (1978). Findings from Follow Through planned variation study. *Educational Researcher, 7,* 3–11.

Kraemer, J., Kramer, S., Koch, H., Madigan, K., & Steely, D. (2001). Using Direct Instruction programs to teach comprehension and language skills to deaf and hard-of-hearing students: A six-year study. *Direct Instruction News, 1*(2), 23–31.

*Kuder, S. J. (1990). Effectiveness of the *DISTAR Reading* program for children with learning disabilities. *Journal of Learning Disabilities, 23*(1), 69–71.

*Lewis, A. (1982). An experimental evaluation of a direct instruction programme (*Corrective Reading*) with remedial readers in a comprehensive school. *Educational Psychology, 2*(2), 121–135.

*Lloyd, J., Cullinan, D., Heins, E. D., & Epstein, M. H. (1980). Direct instruction: Effects on oral and written language comprehension. *Learning Disabilities Quarterly, 3,* 70–76.

*Maggs, A., McMillan, K., Patching, W., & Hawke, H. (1981). Accelerating spelling skills using morphographs. *Educational Psychology, 1,* 49–56.

*Maggs, A., & Morath, P. (1976). Effects of direct verbal instruction on intellectual development of institutionalized moderately retarded children: A 2-year study. *The Journal of Special Education, 10*(4), 357–364.

*Malmgren, K. W., & Leone, P. E. (2000). Effects of a short-term auxiliary reading program on the reading skills of incarcerated youth. *Education & Treatment of Children, 23,* 239–247.

*Marchand-Martella, N., Martella, R. C., Orlob, M., & Ebey, T. (2000). Conducting action research in a rural high school setting using peers as *Corrective Reading* instructors for students with disabilities. *Rural Special Education Quarterly, 19*(2), 20–29.

Marchand-Martella, N. E., Slocum, T. A., & Martella, R. C. (Eds.). (2004). *Introduction to Direct Instruction.* Boston: Allyn and Bacon.

*Marston, D., Deno, S. L., Kim, D., Diment, K., & Rogers, D. (1995). Comparison of reading intervention approaches for students with mild disabilities. *Exceptional Children, 62,* 20–37.

*Martella, R. C., & Waldron-Soler, K. M. (2005). *Language for Writing* program evaluation. *Journal of Direct Instruction, 5,* 81–96.

*McKenzie, M. A., Marchand-Martella, N. E., Moore, M. E., & Martella, R. C. (2004). Teaching basic math skills to preschoolers using *Connecting Math Concepts* level K. *Journal of Direct Instruction, 4,* 85–94.

Meese, R. L. (2001). *Teaching learners with mild disabilities: Integrating research and practice* (2nd ed.). Belmont, CA: Wadsworth/Thomson Learning.

*O'Connor, R. E., & Jenkins, J. R. (1995). Improving the generalization of sound/symbol knowledge: Teaching spelling to kindergarten children with disabilities. *The Journal of Special Education, 29,* 255–275.

*O'Connor, R. E., Jenkins, J. R, Cole, K. N., & Mills, P. E. (1993). Two approaches to reading instruction with children with disabilities: Does program design make a difference? *Exceptional Children, 59,* 312–323.

*Owens, S. H., Fredrick, L. D., & Shippen, M. E. (2004). Training a paraprofessional to implement *Spelling Mastery* and examining its effectiveness for students with learning disabilities. *Journal of Direct Instruction, 4,* 153–172.

*Polloway, E. A., Epstein, M. H., Polloway, C. H., Patton, J. R., & Ball, D. W. (1986). *Corrective Reading* program: An analysis of effectiveness with learning disabled and mentally retarded students. *Remedial and Special Education,* 7(4), 41–47.

Przychodzin, A. M. (2004). *The research base for Direct Instruction mathematics programs*. DeSoto, TX: Science Research Associates.

Przychodzin, A. M., Marchand-Martella, N. E., Martella, R. C., & Azim, D. (2004). Direct Instruction mathematics programs: An overview and research summary. *Journal of Direct Instruction, 4,* 53–84.

*Richardson, E., DiBenedetto, B., Christ, A., Press, M., & Winsberg, B. G. (1978). An assessment of two methods for remediating reading deficiencies. *Reading Improvement, 15,* 82–95.

*Scarlato, M. C., & Asahara, E. (2004). Effects of *Corrective Reading* in a residential treatment facility for adjudicated youth. *Journal of Direct Instruction, 4,* 211–218.

Schieffer, C., Marchand-Martella, N. E., Martella, R. C., & Simonsen, F. (2002). *The research base for* Reading Mastery: *Direct Instruction reading.* DeSoto, TX: Science Research Associates.

Schoenfeld, A. H. (2004). The math wars. *Educational Policy, 18,* 253–286.

Simonsen, F., Gunter, L., & Marchand-Martella, N. E. (2001). *Spelling research: Research on teaching children to spell.* DeSoto, TX: Science Research Associates.

*Somerville, D. E., & Leach, D. J. (1988). Direct or indirect instruction?: An evaluation of three types of intervention programme for assisting students with specific reading disabilities. *Educational Research, 30*(1), 46–53.

Stebbins, L., St. Pierre, R. G., Proper, E. L., Anderson, R. B., & Cerva, T. R. (1977). *Education as experimentation: A planned variation model.* (Vols. IV-A). Cambridge, MA: Abt Associates.

*Stein, C. L., & Goldman, J. (1980). Beginning reading instruction for children with minimal brain dysfunction. *Journal of Learning Disabilities, 13,* 52–55.

Stein, M., Silbert, J., & Carnine, D. (1997). *Designing effective mathematics instruction: A direct instruction approach* (3rd ed.). Upper Saddle River, NJ: Prentice-Hall.

*Thomson, B. (1992, Winter). A field report: Specific learning disabilities *Corrective Reading* pilot study 1989–1990. *Direct Instruction News*, 11–13.

*Thorne, M. T. (1978). Payment for reading: The use of the '*Corrective Reading* scheme' with junior maladjusted boys. *Remedial Education, 13*(2), 87–90.

Trezek, B. (2002). Does Direct Instruction in phonics benefit deaf students? If so, how? *Direct Instruction News, 2*(1), 18–23.

*Waldron-Soler, K. M., Martella, R. C., Marchand-Martella, N. E., Tso, M. E., Warner, D. A., & Miller, D. E. (2002). Effects of a 15-week *Language for Learning* implementation with children in an integrated preschool. *Journal of Direct Instruction, 2,* 75–86.

Watkins, C. L. (1997). *Project Follow Through: A case study of the contingencies influencing instructional practices of the educational establishment* [Monograph]. Concord, MA: Cambridge Center for Behavioral Studies.

Watkins, C. L., & Slocum, T. A. (2004). The components of Direct Instruction. In N. E. Marchand-Martella, T. A. Slocum, & R. C. Martella (Eds.), *Introduction to Direct Instruction* (pp. 28–65). Boston: Allyn and Bacon.

White, W. A. T. (1988). Meta-analysis of the effects of Direct Instruction in special education. *Education and Treatment of Children, 11,* 364–374.

*Young, M., Baker, J., & Martin, M. (1990). Teaching basic number skills to students with a moderate intellectual disability. *Education and Training in Mental Retardation, 25*(1), 83–93.