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META-ANALYSIS OF READING COMPREHENSION INTERVENTIONS FOR STUDENTS WITH LEARNING DISABILITIES: STRATEGIES AND IMPLICATIONS

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Abstract

This paper examines research studies, which focus on interventions commonly used with students who are learning disabled and identify effective methods that produce substantial benefits concerning reading comprehension. This paper synthesizes previous observation studies by conducting a meta-analysis of strategies used to improve the reading comprehension skills of students with learning disabilities. A systematic search of research conducted between 1985 and 2005 yielded 15 studies. The results of the synthesis revealed an effect size (ES) of 0.94 for visually dependent reading comprehension and 1.18 for auditory-language dependent strategies. Two important findings emerged from the synthesis: (a) auditory/language dependent strategies have a greater impact on the reading comprehension skills of students with learning disabilities compared to visually dependent strategies and (b) questioning strategies involving self-instruction and paragraph restatements along with text-structure-based strategies yield the most significant outcomes. Implications from the synthesis related to instructional strategies concerning the outcomes are discussed.

Meta-Analysis of Reading Comprehension Interventions for Students with Learning Disabilities: Strategies and Implications

Reading comprehension is a significant concern of students with learning disabilities. According to the Mastropieri, Scruggs, & Graetz (2003), reading is the major problem area for most students who are learning disabled. In fact, 90% of students with learning disabilities demonstrate significant difficulties learning to read (Lyon, 1995; Vaughn, Levy, Coleman, & Bos, 2002). Students with learning disabilities not only struggle with basic reading skills at a young age, e.g. phonemic and phonological awareness, but they are unable to analyze the context of the word, which leads to an inability to interpret or understand the meaning of the text. Reading comprehension has been defined as a process of constructing and extracting meaning from written texts, based on a complex coordination of a number of interrelated sources of information (Anderson, Hiebert, Scott, & Wilkinson, 1985; Mastropieri & Scruggs, 1997). Students with learning disabilities in reading comprehension have difficulty associating meaning with words (semantics), recognizing and recalling specific details, making inferences, drawing conclusions, and predicting outcomes, which is often attributed to a lack of metacognitive skills. According to Bender (2004), metacognition involves the overall planning of a cognitive task, self-instructions to complete the task, and performance self-monitoring, or checking to see that each phase of the task is completed appropriately and in the appropriate order.

Proficient readers typically execute one or more metacognitive behaviors as they read; for example, as they read a passage, they use self-questioning techniques to monitor their understanding of the material or "look back" to locate important information and reread the section (Swanson & De La Paz, 1998). Many competent readers are not aware that these actions require metacognitive skills; rather, good readers engage in these strategic behaviors because they have proven, over time, to be useful (Swanson & De La Paz, 1998).

The primary purpose of this study was to conduct a meta-analysis on metacognitive instructional strategies used to improve the reading comprehension levels of students with learning disabilities. A synthesis of previous experimental studies focused on measures of reading comprehension and the effects of strategy instruction, specifically concerning visually dependent and auditory/language dependent strategies.

REVIEW OF READING COMPREHENSION RESEARCH

Many researchers are constantly striving to identify the most effective strategies for improving the comprehension levels of students with learning disabilities. Although remedial efforts have typically focused on lower order reading skills, such as word attack and word recognition, both researchers and teachers are increasingly exploring the efficacy of methods for improving these students' reading comprehension (Johnson, Graham, & Harris, 1997). Numerous research studies have been conducted with intent to identify the best practices for improving the reading comprehension levels of students with learning disabilities, and much of the research has focused on strategy instruction because many students with learning disabilities lack metacognitive skills. Students with learning disabilities appear to be prime candidates for strategy instruction, as their strategic reading behavior is often inefficient and inflexible (Johnson, Graham, & Harris, 1997; Wong et al., 1986). When students with learning disabilities are taught how to utilize metacognitive strategies, and teachers facilitate the process, comprehension levels increase. Over the past two decades, many experiments have reaffirmed this theory.

In a review of the literature, Mastropieri, Scruggs, and Thomas (1997) reveal best practices in promoting reading comprehension for students with learning disabilities. Their analysis of the review reported the strongest outcomes for facilitating reading comprehension for students with learning disabilities were in teacher-led questioning and self-questioning strategies, followed by text-enhancement strategies, and, finally, strategies involving basic skills and reinforcement. According to Mastropieri et al. (1997), specific interventions in reading comprehension make a difference make a difference in performance. Table 1 identifies the effect sizes and comprehension strategies.

Swanson's (1999) findings from an extensive meta-analysis showed that a prototypical intervention study has an effect size of .72 for reading comprehension. Specifically, effect sizes for measures of reading comprehension were higher when derivatives of strategy instruction involving cognitive and direct instruction were implemented. Robust gains in reading comprehension were a direct result of the instructional components, which are identified in Table 2. The impact on the effect size was greater when the strategies were combined, especially concerning small group interactive instruction and strategy cueing. This research synthesis provides support that specific interventions in reading produce significant results.

Another study by Swanson and De La Paz (1998) formally evaluated strategies that were effective for improving the reading comprehension of students with learning disabilities. Specifically, the authors identified metacognitive strategies emphasizing the self-regulated strategy development (SRSD) model, which involves teaching students with learning disabilities how to comprehend text by becoming strategic readers. Table 3 provides descriptions of the strategies. Swanson and De La Paz (1998) provided the following essential components for effectively teaching comprehension strategies:

> First, start with simple materials to ensure initial success; then help students practice using a given comprehension strategy with more challenging text. Second, individualize instruction by deciding (a) what strategy is most likely to benefit a given group of students, (b) which type of self-regulatory procedure is relevant for each student, and (c) how to give specific feedback to each student to monitor his or her progress in using the target strategy and overall success in comprehending text. Third, teachers should realize that it may be hard, initially, to fade instructional supports, e.g. prompting, because students are often unsure whether they are implementing various components of the strategy correctly. Finally, students with learning and reading disabilities must be explicitly taught to generalize whichever metacognitive strategy teachers expect them to use.

Generalizations from the research indicate that students with learning disabilities who are trained to use specific cognitive strategies such as self-questioning techniques using summarization or paragraph restatement strategies along with self-monitoring components significantly improve performance (Bakken, Mastropieri, & Scruggs, 1997; Graves, 1986; Jenkins, Heliotis, Stein, & Haynes, 1987). Strategy instruction ameliorates the critical thinking skills of students with learning disabilities while increasing their active participation in the learning process.

METHOD

Data Collection

The EBSCO Host and ERIC online data bases were scanned for studies, which address reading comprehension strategies for students with learning disabilities between 1985 and 2005. Specific criteria searched included a combination of the following terms: learning disabilities, reading comprehension, and

strategy instruction. The search produced approximately 350 records of abstracts, articles, and dissertations. The literature was narrowed down to specific studies, which utilized experimental design in which students anywhere from K-12 were given a treatment to augment their reading comprehension skills. Fifteen studies were selected for analyses based on the following criteria:

1. *Students in K-12*. Students must be in grades K-12.

2. *Possess a learning disability or reading disability*. Participants must be identified as learning disabled, which is indicative of a discrepancy between ability (IQ) and achievement, or they must be identified as having a reading disability, which is characterized by below average reading scores on a standardized comprehension test.

3. *Reading comprehension measure*. The study must include reading comprehension interventions, which focus on strategy instruction, either visual or auditory/language (independent variable) and the outcome must focus on measuring reading comprehension skills (dependent variable), which is demonstrated by responding to questions to reveal an understanding of the passage.

4. *Experimental design*. The study must involve a treatment-comparison design.

5. *Calculation of effect size*. The study must provide sufficient statistical or quantitative information to allow a calculation of the effect size.

DATA ANALYSIS

Effect Size Calculation

One of the most commonly used indexes of effect size called Delta, Δ, was calculated on intervention studies with sufficient statistical information. Fraenkel and Wallen (2000) identified the following two formulas for calculating effect size. The effect size was calculated on treatment-comparison studies by taking the difference between the intervention group's mean score and the comparison group's mean score and dividing by the comparison group's standard deviation. In addition, when pre-to-post test gains in the mean scores of two groups are compared, the difference between the mean experimental gain and the mean comparison gain is divided by the standard deviation of gain of the comparison group. Interpretation of the effect sizes was based on Cohen's (1988) guidelines, which are as follows: 0.20 = a small size effect; 0.50 is considered a medium size effect; and 0.80 reveals a large or significant size effect.

RESULTS

Fifteen studies, which were reported in journal articles, were included in the synthesis. A review of the 15 journal articles revealed 23 separate intervention strategies that were either categorized as visually dependent or auditory/language dependent. The participants, interventions, measures, and findings (effect size), which utilized visual dependent strategies as interventions, are identified in Table 4, and Table 5 represents the study/participants, interventions, measures, and findings (effect size), which used the auditory/language dependent strategies as interventions.

Key Elements of the Studies

All of the studies reported in this synthesis reported on interventions using types of strategy instruction to improve the reading comprehension levels of students with learning disabilities. All of the studies employed group designs, either a treatment-comparison design ($n = 9$) or a single-group design with multiple treatments ($n = 6$). The following sections detail the study and participants, interventions, measures, and findings (effect size).

Study/Participants

A total of 538 students were represented in the 15 studies. Specifically, 439 students were identified as learning disabled. In addition, 45 students were identified as poor readers; they were performing below grade level according to their scores on the Gates-MacGinitie Reading Tests (Level D, Form 1) (Graham & Wong, 1993). Thirty students were considered below-average readers based on the Gates-MacGinitie Reading Test (Level 5/6, Form K) (Solan, Shelley-Tremblay, Ficarra, Silverman, & Larson, 2003). One study included four students with mild mental retardation (Mastropieri et al, 2001). Of the 15 studies, 10 included elementary school students (grades 1-6), four included middle school students (grades 7-8), and one study included high school students (grades 9-12).

Interventions

A variety of instructional strategies were used in the studies. An analysis of the interventions revealed two general types of instructional strategies for improving reading comprehension skills. The common theme in both of the following strategies in an attempt to increase the active involvement or critical

thinking on the part of the student, and these strategies may be conceptually related to metacognitive processes (Bender, 2004).

1. *Visually dependent strategies* involve the use of pictures or visual ability in activities that improve reading comprehension (Bender, 2004). Examples from the studies include the following: visual attention therapy, llustrations in text, and semantic organizers (e.g. semantic feature analysis).

2. *Auditory/language dependent strategies* involve language usage in either pre-reading activities or post-reading exercises to assist in comprehension (Bender, 2004). Examples from the studies include the following: summarization and main idea strategies, summarization training plus self-monitoring, attribution training, self-questioning, training in inference questioning, training packages (e.g. reciprocal teaching), paragraph restatements, story retelling, collaborative strategic reading, and text-structure based strategies.

Measures

Several types of measures were used to assess the reading comprehension skills of the students. A majority of the studies (n = 10) relied on researcher-developed tests. The other five studies assessed reading comprehension through formal reading comprehension tests (e.g. Gates-MacGinitie Reading Tests, Gray Oral Reading Test—Comprehension, Nelson Reading Test, Passage Comprehension Tests, and the TALE Battery—Reading Comprehension Subtest).

Findings

The effects of the interventions by type, visually dependent or auditory-language dependent, are summarized as follows:

Visually Dependent Strategies. Three studies, which implemented a treatment-comparison design, revealed positive results when the interventions incorporated visually dependent strategies (e.g. semantic feature analysis, visual attention therapy, and illustrations). Specifically, two studies demonstrated significant size effects (Δ = 1.52 & 0.80). Study 1 (Bos, Anders, Filip, & Jaffe, 1989) revealed the largest effect size, Δ = 1.52. The intervention utilized was a semantic feature analysis, which is a graphic organizer. Previously conducted research studies have proven that graphic organizers produce positive outcomes for students with learning disabilities (Kim, Vaughn, Wanzek, & Wei, 2004). In addition, visual attention therapy in Study 3 (Solan et al., 2003) produced a large size effect, Δ = 0.80. Visual attention and attention therapy directly impact reading comprehension skills of students with learning disabilities. Study

2 (Rose, 1986) indicated a medium size effect, Δ = 0.50. Illustrations may be more distracting than helpful for students with learning disabilities.

Auditory/Language Dependent Strategies. Thirteen studies incorporated 20 specific interventions, which consisted of auditory/language dependent strategies. Effect sizes ranged from Δ = 3.65 - .12. The highest effect sizes were identified in Study 4 (Bakken, Mastropieri, & Scruggs, 1997), Δ = 3.65 for an intervention involving paragraph restatement and 2.39 for an intervention that was text structure-based. According to Bakken, Mastropieri, & Scruggs (1997), the results from their research indicated that text structure-based reading strategies and paragraph restatement strategies significantly effect the recall of central and incidental information over traditional instruction on immediate, delayed, and transfer tests. Other studies involving summarization strategies, self-instructional strategies, and reciprocal teaching revealed significant effect sizes. The ninth study (Jitendra, Hoppes, & Ping Xin, 2000) produced an effect size, Δ = 2.71, which utilized the summarization strategy as an intervention. Students in the experimental group statistically outperformed students in the control group. The instructional procedure significantly increased the reading comprehension of students with high incidence disabilities. Numerous studies involving self-instructional strategies were efficacious. The effect size of the fifth study (Chan, 1991), Δ = 1.72, and thirteenth study (Miranda, Villaescusa, & Vidal-Abarca, 1997), Δ = 1.33, revealed that self-instructional strategies significantly improved the reading comprehension of students with learning disabilities. The sixth study's (Graham & Wong, 1993) effect size was Δ = 1.50 when the experimental group implemented a self-questioning intervention. In addition, the thirteenth study produced an effect size, Δ = 1.16, when the self-instruction strategy was combined with attribution training. Attribution training positively impacts measures of cognitive strategies.

Additional studies involving reciprocal tutoring and didactic teaching generated large effect sizes. Study 12 (Masteropieri et al., 2001) produced an effect size, Δ = 1.07, when reciprocal tutoring was implemented, and the sixth study (Graham & Wong, 1993) had an effect size, Δ = 0.98 when didactic teaching was the intervention. Didactic teaching focuses students attention on the task, provide a basis for decision making concerning the categorization of comprehension test questions, and reminds students to check their answers (Graham & Wong, 1993). Further experimental studies involving explicit rule-based instructional strategy, paragraph summarizing, story retelling, collaborative reading strategy, and self-

regulated strategy development strategy revealed medium effect sizes. Study 14 (Rabren, Darch, & Eaves, 1999) had an effect size of $\Delta = 0.72$. The eighth study (Jenkins, Heliotis, Stein, & Haynes, 1987) produced an effect size of $\Delta = 0.68$ for paragraph summarizing and an effect size of $\Delta = 0.60$ for story retelling. Both interventions produce some effect on students with learning disabilities. The collaborative reading strategy in study 15 (Vaughn et al., 2000) generated an effect size of 0.61, which is considered a medium effect on the reading comprehension skills of students with learning disabilities who are dyslexic. According to the researchers who conducted the study, collaborative strategic reading has proven to enhance the reading comprehension of students without disabilities (Vaughn et al., 2000). In study 10 (Johnson, Graham, & Harris, 1997) an effect size of $\Delta = 0.75$ was revealed, which indicates that the intervention has a positive impact on students with learning disabilities; the effect size is near 0.80, which is considered significant.

The smallest effect sizes were identified in the seventh study (Holmes, 1985) and tenth study (Johnson, Graham, & Harris, 1997). Study 7 (Holmes, 1985) had an effect size of $\Delta = 0.31$, which used an intervention referred to as structured inferencing strategy. Study 10 (Johnson, Graham, & Harris, 1997) produced an effect size of $\Delta = 0.12$ when using self-regulated strategy development instruction plus goal setting as an intervention, and the researchers stated that explicit instruction in goal setting and self-instruction did not augment the comprehension performance of students with learning disabilities.

DISCUSSION

An examination of the effects of visual and auditory/language dependent strategies produced positive outcomes for student with learning disabilities or reading disabilities. Interventions involving metacognitive strategies benefited students with learning disabilities, who lack the ability or inner language to plan a thinking/learning activity. When students are taught how to use cognitive strategies (e.g. visually or auditory/language dependent strategies) to improve their reading comprehension, significant gains are evident. The meta-analysis of the reading comprehension interventions affirms this finding. When the categories are divided into subcategories of visually dependent strategies and auditory/language dependent strategies, the effect sizes are significant according to Cohen's (1988) guidelines. According to Moore and McCabe (2003), a meta-analysis is a collection of statistical techniques designed to combine information from different but similar studies, and the basic design is combine the effect sizes from the previous studies to produce a summary measure. The calculation of the effect size for the meta-analysis of this study

followed the procedures identified by Moore and McCabe (2003). The meta-analysis of effect sizes for visually dependent strategies was $\Delta = 0.94$ with a 90% confidence interval of (0.55, 1.33). The meta-analysis of effect sizes for auditory/language dependent strategies was $\Delta = 1.18$ with a 90% confidence interval of (0.88, 1.48), which is considered significant.

The results from this synthesis of cognitive instructional strategies revealed the critical importance of teaching students with learning disabilities how to effectively implement specific strategies to augment reading comprehension. The synthesis substantiated that almost any type of instructional strategy considerably impacts the reading comprehension of students with learning disabilities compared to traditional or standard instruction.

IMPLICATIONS FOR PRACTICE

A plethora of research has been conducted on reading comprehension over the past two decades, and the findings have conveyed notable implications for best practices. Each of the previous studies addressed in this paper described a multitude of interventions that contributed to the knowledge base of instructional strategies for reading comprehension. Impressive gains in reading for students with learning disabilities are possible (Torgesen et al., 2001; Vaughn et al., 2002) especially if the instructional process utilizes strategy instruction to assist the students with organizing the material. As revealed in the results of this study, strategy instruction strongly impacts the reading comprehension of students with learning disabilities based on the notion that that students with learning disabilities are inactive learners with metacognitive deficits (Deshler, Ellis, & Lenz, 1996); therefore, they benefit greatly from training in such strategies as activating prior knowledge and organizing and summarizing text (Mastropieri & Scruggs, 1997).

Two important findings emerged from the synthesis: (a) auditory/language dependent strategies have a greater impact on the reading comprehension skills of students with learning disabilities compared to visually dependent strategies and (b) questioning strategies involving self-instruction and paragraph restatements along with text-structure-based strategies yield the most significant outcomes. Bender (2004) states that many students with learning disabilities do not plan their educational tasks in a straightforward manner; therefore, teachers must accept responsibility for training students the implementation of metacognitive strategies to complete educational tasks. Students with learning disabilities or reading disabilities must be trained explicitly in the implementation of metacognitive instructional strategies, which

involves questioning the purpose and structure of the text along with activating prior knowledge to organize the material to aid in reading comprehension. The Division of for Learning Disabilities (2002) reaffirmed this statement by:

> Research indicates that these treatment interventions are effective only when they are implemented accurately, consistently, and intensively. Such implementation is facilitated, in turn, by appropriately high expectations for student performance and by several contextual factors, including reasonable case loads, lower-pupil-teacher ratios, and a general school environment that values instruction and recognizes that ongoing progress monitoring (in contrast to high-stakes testing) is a key indicator of the academic achievement of students with learning disabilities. In general, students with learning disabilities require intensive, iterative (recursive), explicit instruction to achieve academic success (Mastropieri, Scruggs, & Graetz, 2003).

General and special education teachers lack the knowledge pertaining to the implementation of strategy instruction concerning reading comprehension, and the local schools are responsible for providing continuing education through professional development to practicing teachers. In addition, Colleges and Universities are responsible for preparing pre-service candidates by teaching them the procedures for effectively implementing strategy instruction in classrooms. The success of improving reading achievement levels for students with learning disabilities is contingent upon the implementation of strategy instruction. Practitioners in education must appreciate the value of experimental studies produced by researchers, and ultimately, teachers are accountable for using best practices in education.

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Table 1

Mastropieri, Sruggs, and Thomas's Effect Sizes on Reading Comprehension Strategies

Skill Training and Reinforcement	*Text Enhancement*	*Questioning Strategies*
Effect Size: .62	Effect Size: .92	Effect Size: 1.33
Reinforcement	Illustrations	Activating Prior Knowledge
Vocabulary Instruction	Representational Illustrations	Summarization and Main Idea Strategies
Corrective Feedback	Imagery	Summarization Training Plus Self-Monitoring and Attribution
Repeated Readings	Spatial Organization	Elaborative Interrogation
Direct Instruction	Mnemonic Illustrations	Text-Structure-Based Strategies
	Adjunct Aids	Multicomponent Strategies or Training Packages
		Multipass
		Reciprocal Teaching
		POSSE
		Story Grammar Problem Solving Meta-Comprehension Training

Table 2

Swanson's Reading Comprehension Instructional Components and Interventions

Instructional Components	*Direct Instruction*	*Strategy Instruction*
Directed Response/Questioning	Breaking down a task into steps	Advance organizers
Control difficulty of processing demands of task	Administering probes	Help with organization
Elaboration	Administering feedback repeatedly	Strategies for elaboration
Modeling by the teacher of steps	Providing a pictorial or diagram representation	Generative learning
Group instruction	Allowing for independent practice and individually paced instruction	General study strategies
Strategy cues	Breaking the instruction down into simpler phases	Metacognition
	Instructing in a small group	
	Teacher modeling a skill	
	Providing set materials at a rapid pace	
	Providing individual child instruction	
	Teacher asking questions	
	Teacher presenting the novel materials	

Table 3

Swanson and De La Paz's Comprehension Strategies for Teaching Reading

Summarizing Expository TextStructure	*Comprehending Story*	*Self-Questioning*	*Text Lookbacks and Question-Answer*
Gist Summaries	Story Maps	Student Generated Questioning	Text Lookbacks
Rule-Governed Summaries			Question-Answer Relationships
Hierarchical Summaries		Self-Monitoring	

Table 4.

Summary of the Interventions: Visually Dependent Strategies

Study/Participants	Intervention	Measure	Findings (Effect Size)
1. Bos, Anders, Filip, & Jaffe (1989) 50 students with learning disabilities in high school	T: Semantic feature analysis C: Dictionary instruction D/I: Two 50-minute practice sessions and two 50-minute experimental sessions over two weeks	Researcher developed multiple-choice comprehension test	T vs. C (posttest) ES = 1.52
2. Rose (1986) 32 students with learning disabilities in elementary school	T: Text enhancements (illustrations) C: No illustrations D/I: One 50 minute session	Researcher developed multiple-choice comprehension test	T vs. C (posttest) ES = 0.50
3. Solan, Shelley-Tremblay, Ficarra, Silverman, & Larson (2003) 30 below average readers in elementary school	T: Visual attention therapy C: No therapy D/I: 12 one-hour sessions for 12 weeks	Formal assessment on reading comprehension	T vs. C (posttest): ES = 0.80

Table 5

Summary of the Interventions: Auditory/Language Dependent Strategies

Study/Participants	Intervention	Measure	Findings (Effect Size)
4. Bakken, Mastropieri, & Scruggs (1997) 54 students with learning disabilities in middle school	T1: Text struture-based T2: Paragraph restatement C: Traditional instruction D/I: Three sessions of 31, 31 and 32 minutes for a total of 94 minutes for three days	Researcher developed multiple-choice comprehension test	T1 vs. C (posttest) ES = 2.39 T2 vs. C (posttest) ES = 3.65
5. Chan (1991) 20 students with learning disabilities in elementary school	T: Self-questioning strategy C: No strategy D/I: Five 40 minute sessions for five days	Researcher developed multiple-choice comprehension test	T vs. C (posttest) ES = 1.72
6. Graham & Wong (1993) 45 poor readers in elementary school	T1: Self-instructional training T2: Didactic teaching C: No training D/I: Three 25 minute sessions a week for three weeks	Researcher developed multiple-choice comprehension test	T1 vs. C (posttest) ES = 1.50 T2 vs. C (posttest) ES = 0.98

(Table 5 continued)

Study/Participants	Intervention	Measure	Findings (Effect Size)
7. Holmes (1985) 24 students with learning disabilities in elementary school	T1: Structured inferencing strategy T2: Materials only T3: Structuring inferencing strategy plus materials C: No strategy or materials D/I: Three twenty-minute practice sessions and eight-twenty minute experimental sessions	Formal assessment on reading comprehension	T1 vs. C (posttest) ES = 0.31 T2 vs. C (posttest) ES = 0.91 T3 vs. C (posttest) ES = 1.36
8. Jenkins, Heliotis, Stein, & Haynes (1987) 32 students with learning disabilities in elementary school	T1: Paragraph summarizing T2: Story retelling C: No strategy D/I: Three untimed sessions	Researcher developed generated main idea comprehension test	T1 vs. C (posttest) ES = 0.68 T2 vs. C (posttest) ES = 0.60
9. Jitendra, Hoppes, & Ping Xin, (2000) 33 students with high incidence disabilities (learning disabilities) in middle school	T: Summarization strategy C: No strategy D/I: Fifteen 30 minute sessions for 15 days	Researcher developed multiple-choice comprehension test	T vs. C (posttest) ES = 2.71

(Table 5 continued)

Study/Participants	Intervention	Measure	Findings (Effect Size)
10. Johnson, Graham, & Harris (1997) 52 students with learning disabilities in elementary school	T1: Self-regulated strategy development (SRSD) instruction T2: Strategy plus goal setting instruction T3: Strategy plus self-instruction C: Strategy plus goal setting and self-instruction D/I: Eight 45 minutes sessions for four to six weeks	Researcher developed multiple-choice comprehension test	T1 vs. C (posttest) ES = 0.75 T2 vs. C (posttest) ES = 0.12 T3 vs. C (posttest) ES = 0.43
11. Klinger & Vaughn (1993) 26 students with learning disabilities in middle school	T: Reciprocal teaching with cross-age tutoring C: Reciprocal teaching with cooperative learning D/I: Fifteen 35-40 minute sessions for 12 school days	Formal assessment on reading comprehension	T1 vs. C (posttest) ES = 0.79

(Table 5 continued)

Study/Participants	Intervention	Measure	Findings (Effect Size)
12. Mastropieri, Scruggs, Beranek, Spencer, Mohler, Boon, & Talbott (2001) 20 students with mild disabilities (learning disabilities) and 4 students with mild mental retardation in middle school	T: Reciprocal tutoring strategy C: No tutoring, traditional instruction D/I: Daily 50 minute sessions for five weeks	Researcher developed open-ended comprehension questions	T1 vs. C (posttest) ES = 1.07
13. Miranda, Villaescusa, & Vidal-Abarca (1997) 60 students with learning disabilities in elementary school	T1: Self-instruction strategy T2: Self-instruction strategy plus explicit attribution training C: No strategy or training D/I: Two 50-minute sessions for ten weeks	Formal assessment on reading comprehension	T1 vs. C (posttest) ES = 1.33 T2 vs. C (posttest) ES = 1.16
14. Rabren, Darch, & Eaves (1999) 40 students with learning disabilities in elementary school	T: Explicit rule-based instructional strategy C: Basal reader, no additional strategy D/I: Daily 45 minute sessions for two weeks	Researcher developed comprehension questions based on story retelling	T1 vs. C (posttest) ES = 0.72

(Table 5 continued)

Study/Participants	Intervention	Measure	Findings (Effect Size)
15. Vaughn, Chard, Bryant, Coleman, Tyler, Linan-Thompson, & Kouzekanani (2000) 16 students with learning disabilities (dyslexic) in elementary school	T: Collaborative reading strategy (CRS) C: Partner reading strategy (PRS) D/I: Two or three (45 minute CRS sessions and 25 minute PRS sessions) over 12 weeks	Formal assessment on reading comprehension	T1 vs. C (posttest) ES = 0.61