

THE EFFECTS OF RECIPROCAL TEACHING COMPREHENSION-MONITORING
STRATEGY ON 3rd GRADE STUDENTS' READING COMPREHENSION

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Reciprocal teaching comprehension-monitoring is a reading comprehension instructional procedure that combines four instructional strategies: predicting, summarizing, questioning, and clarifying to enhance students' comprehension of text (Palincsar & Brown, 1984; Palincsar, David, & Brown, 1989). The procedure is a dialogue between the teacher and the students. During reciprocal teaching instruction, the teacher and students take turns leading the dialogue in order to enhance the students' comprehension-monitoring skills. The research on reciprocal teaching has included meta-analyses, group designs, qualitative designs, and single-subject research designs (Rosenshine & Meister, 1994; Galloway, 2003). These studies have identified gaps in the literature to include the measurement of treatment fidelity and treatment acceptability, as well as the psychometric properties of the instruments used to measure daily reading comprehension growth. These gaps were investigated in this study.

The purpose of this study was to investigate the effects of reciprocal teaching comprehension-monitoring with a group of fifteen 3rd grade students reading at grade level. Specifically, this study investigated the use of curriculum-based measurement maze probes (CBM-maze probes) to formatively assess the reading comprehension growth of the students. Additionally, this study implemented treatment integrity procedures and investigated the acceptability of reciprocal teaching and the CBM-maze probes through a treatment acceptability rating scale. A multiple baseline across groups with three phases (baseline, intervention, follow-up) was employed. Overall, visual analysis of the data suggested reciprocal teaching was an effective intervention in increasing reading comprehension abilities in students as measured by

the CBM-maze probes. All three groups exhibited continual growth on the daily comprehension measures across all three phases. Implications for practice, cautions in interpreting the results, and future directions are discussed.

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	iii
LIST OF TABLES	vi
LIST OF FIGURES	vii
CHAPTER 1: INTRODUCTION	1
Statement of the Problem	
Rationale	
Current Study	
Research Questions	
Assumptions	
Limitations	
Definition of Terms	
CHAPTER 2: LITERATURE REVIEW	9
The Reading Process	
Reading Comprehension Assessment	
Formative Assessment	
Curriculum-based Measurement	
Reading Interventions	
Guided reading	
Reciprocal Teaching Comprehension-monitoring Strategy	
Integrative Summary	
CHAPTER 3: METHOD	31
Participants and Setting	
Materials	
Procedures	
Experimental Design	
Data Analysis	
Procedural Integrity	
Social Validity	
CHAPTER 4: RESULTS	40
Reciprocal Teaching Data	
Research Question 1	
Social Validity	
Research Question 2	
Research Question 3	

CHAPTER 5: DISCUSSION.....53
 Research Questions and Conclusions
 Reciprocal Teaching Comprehension-monitoring Strategy
 CBM-maze Probe
 Prevention and Intervention
 Evidence-based Practice
 Implications for Practice
 Cautions in Interpreting the Current Study’s Results
 Future Directions
 Summary

APPENDICES.....69

REFERENCES100

LIST OF TABLES

Table	Page
1. National Average Scale Scores on the NAEP Reading Assessment	3
2. Davis' Eight Potential Factors	13
3. Essential Components of Guided Reading	17
4. Individual Participant Descriptive Information	32
5. Sample Questions During Reciprocal Teaching	36
6. Group Descriptive Statistics	44
7. The Number of Data Points Needed to Conclude That There Was a Reliable Treatment Effect Using the CDC Lines Method.....	46
8. Reciprocal Teaching Intervention Effect Sizes for Individual Groups and Combined Groups	48
9. Children's Acceptability Rating Scale Results	51

LIST OF FIGURES

Figure	Page
1. Group Mean Words Correct on CBM-maze Probes Across Baseline, Intervention, and Follow-up Phases.....	43
2. Conservative Dual-criteria Graphs with Criterion Lines	47

CHAPTER 1

INTRODUCTION

Reading is a skill that can enhance an individual's standard of living and functioning in today's society. Chomsky (1959) suggests that reading and language processes have phylogenetic roots. Conversely, Skinner (1957) proposes language acquisition and comprehension can be explained through ontogenetic principles of behavior (i.e., reinforcement) as discussed in his book *Verbal Behavior*. Some developmental psychologists have attributed the phylogeny of the reading process to be comprised of biological factors such as attention, perception, memory, and language (Shaffer, 2002; Sternberg, 2003). Educational psychologists have also suggested environmental experiences such as culture, socio-economic status, and education respectively contribute to the ontogeny of reading (Chall, 1989; Moats, 1999; Shaffer, 2002; Sternberg, 2003). These biological and social-cultural constructs are a form of nature versus nurture in learning to read as proposed by Sternberg (2003) and Schunk (2004). Historically, reading education in the United States has paralleled this nature versus nurture phenomenon through the whole language movement and skill-based (phonics) instruction in reading (Pressley, 2002). These opposing views have impacted the way reading education has been taught in that some educators have approached reading instruction using a discovery method approach while others have employed more direct and explicit instructional methods.

These debates in reading instruction, whether they be bottom-up versus top-down (Cheyney & Cohen, 1999), sight word (whole language) versus phonics (Chall, 1989; Pressley, 2002), or behavioral versus social-constructivist approaches, have been controversial, confusing, and at times in conflict in the research literature (Stahl & Miller, 2006). The empirical literature base in reading instruction has been significantly advanced by the works of Steven A. Stahl

(McKenna, 2006). A meta-analysis, co-authored by Stahl and Miller (2006), critically analyzed the whole language approach and its effectiveness in producing readers, and set the stage for applying scientific processes to the area of reading. Stahl further contributed to the scientific study of reading by being the principal contributor to the major dimensions identified by the National Reading Panel report (National Institute of Child Health and Human Development, 2000). This report produced the “five big ideas of reading” as labeled by Edward Kame’enui from the University of Oregon (McKenna, 2006, p. 3); these ideas include phonemic awareness, phonics, fluency, vocabulary, and comprehension. The integration of these components comprises the reading process (Chall, 1989; Dougherty Stahl & McKenna, 2006; Pressley, 2002; Vaughn & Linan-Thompson, 2004).

A great deal of research has been conducted in the areas of phonemic awareness, phonics, and fluency (Fuchs, Fuchs, Hosp, & Jenkins, 2001). Inclusively, attention has been given to examining the prevention and intervention of these three areas (Daly, Chafouleas, & Skinner, 2005; Eckert, Ardoin, Daisey, & Scarola, 2000; Eckert, Ardoin, Daly, & Martens, 2002). The domains of vocabulary (Stahl & Fairbanks, 2004) and reading comprehension (Paris & Stahl, 2005) appear to be less targeted in both the areas of prevention and intervention. While phonemic awareness, phonics, and fluency are prerequisite skills for efficient reading (LaBerge & Samuels, 1974), vocabulary and comprehension allow for the processing of the information read and deriving of meaning from what was read (Pearson & Dole, 1987; Pearson & Hamm, 2005).

Statement of the Problem

The education of students is a state-based responsibility. Federal initiatives to “achieve social goals through public education” (p. 17) can be traced back to the Elementary and

Secondary Act of 1965 (Conley, 2003). In 1983, the report *A Nation at Risk* was published criticizing American education and its educational outcomes (Moats, 1999). Consequently, it became a precursor to state accountability measures and educational reform actions by both the states and the federal government (Conley, 2003). Other reports, such as those published by the National Assessment of Educational Progress (NAEP), have provided summative assessments of students' performance in the areas of reading, math, and science based on a national sample. Table 1 provides the current 2005 NAEP data in the area of reading. These data indicate minimal gains in average scale scores (1 point higher than 2003) on the 4th grade reading assessment (Perie, Grigg, & Donahue, 2005). The average 4th grader scoring at the 50th percentile attained a scale score of 219 from a possible 0 to 500 points. In contrast, 8th grader's average scale score of 263 was 1 point lower. According to the NAEP reading assessment, "Average scores in 2005 were 2 points higher than in the first assessment year, 1992, at both grades 4 and 8" (Perie, Grigg, & Donahue, 2005, p. 4).

Table 1

National Average Scale Scores on the NAEP Reading Assessment

	1992	1994	1998	2002	2003	2005
Fourth Grade	217	214	215	219	218	219
Eighth Grade	260	260	263	264	263	262

Note. Adapted from (Perie, Grigg, & Donahue, 2005); possible range of scores 0-500.

These data suggests marginal growth in reading over a 17 year span. Previous data published by the National Institute of Child Health and Human Development (NICHD) have also supported the minimal growth in reading over the past 15 years (National Institute of Mental Health and Human Development, 2000). Additionally, Moats (1999) reports that 20% of

elementary students lack fluency in reading, making it difficult for them to enjoy the process of reading. Chall (1989) goes on to suggest there has been a decline in reading performance since the first NAEP test was administered, and this decline has resulted in a large number of remedial reading courses being offered at colleges and universities for entering freshman with below average reading skills. Consequently, the federal government has funded several national panels to investigate evidence-based practices, prevention and intervention of basic academic skills (i.e., reading and math), and scientifically-based reading research to include the National Center for Educational Statistics, Office of Educational Research and Improvement (Snow, Burns, & Griffin, 1998), National Reading Panel, and National Center on Student Progress Monitoring. Based on these statistics and federal initiatives, one can safely assume that students are not performing at high levels on national grade-level assessments that measure reading performance.

Rationale

The purpose of state and federal accountability assessments in the area of reading is to measure overall reading comprehension. NAEP (2005) states that its reading assessment was designed to measure “students’ understanding of the individual texts, as well as their ability to integrate and synthesize ideas across the texts” (p. 2). In essence, this is a broad reading ability, specifically geared towards reading comprehension (Pressley & Block, 2002). Large efforts have been made at the national level to foster basic literacy skills (Shinn, Good, Knutson, & Tilly, 1992), and to relate the success of these skills to the effectiveness of high-stakes reading assessments at the state level (Stage & Jacobsen, 2001). Research in the area of prevention and intervention with reading comprehension has been sparse and needs to be expanded. This expansion should include research-based programs and interventions (National Reading Panel,

2001) aimed at fostering reading comprehension while supporting an evidence-based approach to monitor students' progress (Berninger & Shapiro, 2007).

Current Study

The purpose of this study is to examine the effects of a reciprocal teaching comprehension-monitoring strategy on 3rd grade student's reading comprehension abilities. More specifically, this study will examine the comprehension rates of students using curriculum-based formative measures across three groups of students who have been exposed to reciprocal teaching. Third grade was chosen specifically because it is the first year in which students are assessed using state accountability exams in reading (NCLB, 2001). Moreover, most students at this grade and age are becoming fluent decoders and are beginning to refine their reading comprehension skills (Chall, 1996b; Stage & Jacobsen, 2001) as they learn to read for meaning and enjoyment (Moats, 1999). Therefore, reciprocal teaching comprehension-monitoring strategy can serve as a preventive measure, as well as an intervention measure to increase overall reading comprehension by providing comprehension-monitoring strategies.

Research Questions

1. What are the effects of reciprocal teaching comprehension-monitoring strategy on the comprehension rates of 3rd grade students as formatively measured by CBM-maze probes?
2. To what degree does the teacher find reciprocal teaching comprehension-monitoring strategy a beneficial intervention for reading comprehension, and what is her perception of the CBM-maze probe?

3. To what degree do students find reciprocal teaching comprehension-monitoring strategy beneficial to their reading comprehension, and what are their perceptions of the CBM-maze probes?

Assumptions

The following assumptions will be made for this study:

1. The teacher implementing the reciprocal teaching comprehension-monitoring strategy has sufficient training in reciprocal teaching, based on prior in-service trainings provided by her school district (3 day in-service) to conduct the intervention.
2. The teacher has not implemented the complete intervention package, reciprocal teaching comprehension-monitoring strategy (i.e., predicting, clarifying, summarizing, and questioning) to date in her classroom.

Limitations

The first limitation to this experiment is the sample size of 15 students, which makes it difficult to generalize the results to a wider population. Secondly, for this experiment, the utilization of single-subject research will seek to identify functional relations through the manipulation of the independent variable. The research design being employed, a multiple baseline design across groups may not provide as strong a case in experimental control as does the reversal design (e.g., ABABAB) where the intervention is withdrawn. Furthermore, reading comprehension skills are also irreversible, so that when an individual has acquired those skills, it is unlikely that s/he will discontinue their use because of this loss of immediate environmental reinforcement. The student's success in reading no longer needs the reinforcement given by the teacher. Therefore, the behavior of reading would be mediated by internal reinforcement by the student, rather than an external reinforcement from the teacher. Finally, since the teacher has

been educated in the use of reciprocal teaching, she may have used components of the comprehension-monitoring strategy (i.e., questioning, summarizing) embedded within her teaching thus far. This may have exposed the students to components of the intervention in a non-systematic manner.

Definition of Terms

The following is a list of terms used within this experiment.

Balanced-literacy instruction: The combination of skill-based and meaning-based approaches to teaching the reading process.

Curriculum-based measurement (CBM): A standardized method for assessing basic skills (i.e., reading math, spelling, and writing).

Effect size (ES): Standardized mean difference that measures the magnitude of the treatment effect.

Formative assessment: The use of frequent or repeated measures to monitor instruction and learning.

Guided reading: A small group instructional strategy that is used to build decoding skills and assist in deriving meaning of text.

Metacognition: The ability to reflect on our own cognitive processes (Palincsar & Brown, 1982); also referred to as a private event in behavior analysis literature (Skinner, 1957)

Phonics: A skill-based approach to reading instruction based on phoneme-grapheme instruction.

Oral reading fluency (ORF): The rate per minute at which an individual reads words correctly aloud (Daly, Chafouleas, Skinner, 2005).

Reading comprehension: The cognitive process used for understanding text as a whole (Sternberg, 2003); making meaning and sense of text (Palincsar & Brown, 1984)

Reciprocal teaching: A packaged intervention composed of comprehension-monitoring strategies (predicting, summarizing, questioning, and clarifying) used to increase reading comprehension abilities.

Scaffolding: Providing supports to facilitate the learner's development and build on prior knowledge to internalize new information.

Treatment package: A group of interventions that are combined as a set to form an overall treatment (e.g., predicting, summarizing, questioning, clarifying).

Whole language: A meaning-based philosophy of teaching reading that integrates listening, speaking, reading, and writing.

CHAPTER 2

LITERATURE REVIEW

This review of the literature relating to reciprocal teaching is broken into sections beginning with a foundation of the reading process and the current research base in support of balanced literacy instruction. Following this, a brief summary of reading comprehension assessments is presented. The second part describes formative assessment with specific analysis of curriculum-based measures in reading from a historical perspective. This section includes the maze procedure as a general outcome measure of silent reading comprehension. The third part begins with a description of the guided reading process as a form of small-group instruction and concludes with a review of the reciprocal teaching comprehension-monitoring strategy as it relates to the current study. The reciprocal teaching studies are reviewed according to their research design (e.g., meta-analysis, group designs, qualitative designs, and single-subject designs).

The literature search pertaining to reciprocal teaching was conducted systematically using inclusionary and exclusionary criteria. First, an electronic search via EBSCOhost® an online reference system (EBSCO publishing, Ipswich, MA, www.ebscohost.com) was conducted to identify empirical studies between the years of 1984 and 2007. The year 1984 was chosen because this was the first year Palincsar & Brown (1984) reported their initial research on reciprocal teaching in a peer-reviewed journal. Terms such as “reciprocal teaching,” “comprehension instruction,” “reading comprehension instruction,” “Palincsar,” and “metacognition in reading” were used to identify potential studies. Studies pertaining directly to reciprocal teaching that utilized the four comprehension monitoring

strategies (e.g., predicting, summarizing, clarifying, and questioning) were then chosen for review. Lastly, the reference sections of those studies were searched for additional studies.

The Reading Process

Crowder & Wagner (1992) suggest reading may be a “fuzzy concept” (p. 3) to understand; it is a complex process (Sternberg, 2003). Eye fixations/ movement and reading speed play an important part in reading. An average adult reads about 250 words a minute and is able to read for deep meaning at that speed (Crowder & Wagner, 1992). The faster one reads, the less meaning one can derive from the text read. Reading also involves language, memory, thinking, intelligence, and comprehension (Chall, 1996a; Sternberg, 2003). These abilities, although distinct from each other, are interdependent when one reads. For example, lack of rich language and vocabulary may impact the depth of comprehension of a text (Pearson & Hamm, 2005). Similarly, a depletion in working memory abilities can also impact comprehension negatively (Daneman & Carpenter, 1980). A simpler view of the reading process was explained by Hoover and Gough (1990). These authors suggested that the reading process consisted of two components: decoding and comprehension. To them, decoding encompasses phonemic awareness, phonics, and reading fluency, while comprehension and vocabulary are thought of as one component.

This simple concept of decoding and comprehension was elaborated on by LaBerge and Samuels (1974). From the perspective of cognitive psychology, they proposed a theory of automaticity, which explained decoding as a combination of reading speed and accuracy. This fluency in decoding allows for cognitive resources to process information and efficiently make meaning from text (Hashey & Connors, 2003). Therefore, fluent readers have the ability and attention to comprehend what they read. Conversely, poor decoders, who lack fluency, will use

their available cognitive resources to decode instead of using those resources to comprehend text fully (LaBerge & Samuels, 1974); this lack of fluency yields superficial comprehension and gaps in understanding.

Reading can be conceptualized in developmental stages as proposed by Chall (1996). In this conception, reading is seen as a progression in relation to age. Stage 0 (ages birth – 6) consists of verbal language acquisition and the understanding of print as a medium for reading. This stage is characteristic of phonemic awareness (i.e., rhyming words). Elaborate phonemic awareness and phonics are part of Stage 1 (ages 6 -7). At this stage children are deciphering print as a code to reading. Building reading fluency and automatic decoding make up Stage 2 (ages 7-8), which is called confirmation by Chall (1996). In stage 3 (ages 9-14), reading is used as a vehicle to learn new information while children become more efficient at reading. These three stages can be termed “learning to read” (Chall, 1996, p. 29). Multiple view points, critical comprehension, and perspective-taking are characteristics of Stage 4 (ages 14-18) behaviors. The culmination is Stage 5 (ages 18-above), where individuals have the ability to analyze and synthesize information they have read. These stages are dynamic and build on each other; the last three stages are termed the “reading to learn” stages. Therefore, being successful at Stage 5 requires fluency and rich vocabulary, paralleling, to an extent, LaBerge and Samuels’ (1974) theory of automaticity.

Reading Comprehension Assessment

Reading comprehension assessment has been a phenomenon of the 20th century (Pearson & Hamm, 2005). The first published assessment of comprehension appeared in 1915 and was entitled the Kansas Silent Reading Test (p. 15). Around this time (1917), E. L. Thorndike was also writing about what he surmised was going on in the minds of students as they read (Pearson

& Hamm, 2005). As oral reading changed to silent reading in American classrooms, comprehension assessment began to flourish. Interestingly, even Binet used reading comprehension items in his test of intelligence (Sternberg, 2003). These early reading comprehension assessments involved oral reading fluency and tasks that included “fill in the blanks, verbal logic problems, and following directions” (Pearson & Hamm, 2005, p. 17).

The advancement of psychometric properties aided in the refinement of reading comprehension, with such statistical procedures as factor analysis. Between 1940 and 1970, Davis (1972) produced several studies documenting possible factors that compose the reading comprehension construct. Table 2 presents eight factors based on a multiple regression. Davis (1968), as cited in Pearson & Hamm (2005), concluded that reading comprehension was not a unitary factor. The cloze technique developed by Wilson Taylor around this time was also introduced as an alternative to multiple choice items, as well as to reduce subjectivity (Pearson & Hamm, 2005). In this assessment, every 5th word is deleted from a passage, and the examinee is asked to fill in the omitted word in the blank. The exact replacement is scored as a correct response. Twenty years later, the movement of mastery learning introduced criterion-referenced tests (CRT), which impacted reading comprehension assessments. Current reading comprehension assessments in schools are mostly CRT and include “longer text passages, more challenging questions, and different question formats” (Pearson & Hamm, 2005, p. 51). Following the current trend, reading assessments conducted by the National Assessment of Educational Progress (NAEP) and state accountability assessments, are composed of multiple choice questions (choosing the most correct answer) and constructed responses (written responses; National Center for Educational Statistics, 2005).

Table 2

Davis' Eight Potential Factors (Pearson & Hamm, 2005, p. 22)

Remembering word meaning	Drawing inferences from the content
Word meaning in context	Recognizing the author's tone, mood and purpose
Understanding content stated explicitly	Recognizing literacy techniques
Weaving together ideas in the content	Following the structure of the content

Formative Assessment

“Effective teaching requires ongoing evaluation of student performance” (Deno, Espin, & Fuchs, p. 213). In formative evaluation, systematic ongoing assessment of student achievement is undertaken to enable teachers to adapt students’ instruction to their learning needs (Hamilton & Shinn, 2003). Conversely, in summative evaluation, data are gathered after instruction has been completed in order to evaluate the success of the instructional program (Deno, Espin, & Fuchs, 2004). One form of formative assessment is progress monitoring, which is a scientifically-based practice that is used to assess student progress. The model is composed of three components: a precise goal or objective, measurement of that goal or objective, and using the resultant data to inform instructional practices (Fuchs & Deno, 1991).

Curriculum-based Measurement

Curriculum-based measurement (CBM) is an assessment technique which is a form of progress monitoring. CBM is a repeated sampling of performance on a skill that assesses change in proficiency (Deno & Fuchs, 1987; Fuchs & Fuchs, 1986; Fuchs & Deno, 1991). From its inception, CBM was intended to be a barometric reading or measurement of “vital signs” (Deno, 1985, p. 221) in growth of basic academic skills. CBM’s historical roots can be traced back to

the methodology of behavior analysis (Lovitt, 1967) and to curriculum-based assessments (Burns, Tucker, Frame, Foley, & Hauser, 2000; Deno & Mirkin, 1977). The technical adequacy of CBM in the basic areas of reading, writing, arithmetic, and spelling has been researched and validated (Deno, 2003; for full discussion see Shinn, 1989). Oral reading fluency (ORF), also known as CBM in reading (Deno, Mirkin, & Chiang, 1982), has been the most widely researched and utilized CBM measure thus far. Reading CBM's technical adequacy, treatment validity, and feasibility have proven that it is a technically strong measurement system (Deno, Fuchs, Marston, and Shin, 2001; Fuchs & Fuchs 1986). Validity studies have yielded correlation coefficients ranging from .60 to .80 between commercial tests and CBM (Marston, 1989). Additionally, test-retest, alternate form, and interrater reliability have estimated ranges between .82 and .99 (Good & Jefferson, 1998) for reading CBMs.

CBM-maze. While Curriculum-based measurement in reading (CBM-R) has focused on oral reading fluency, the curriculum-based measurement maze (CBM-maze) has focused on silent reading and comprehension rate (Guthrie, Siefert, Burnham, & Caplan, 1994). The CBM-maze probes passages are a multiple choice cloze task with the first sentence left in its original form. After that, every seventh word is replaced with three multiple choice answers in parentheses (Hamilton & Shinn, 2003). The original word from the story and two distracters make up the answer choices (Parker, Hasbrouck, & Tindal, 1992). Fuchs & Fuchs (1992) reported criterion-related validity with norm-referenced tests of comprehension to be between .77 and .85. Moreover, Jenkin & Jewell (1993) reported correlations with CBM-R of .80 to .90. Adequate reliability has also been established and reviewed by Parker Hasbrouck & Tindal (1992).

The source of CBM probes in reading has been researched as well. Deno, Espin, & Fuchs (2004) make reference that CBM probes are derived from the student's actual curriculum. For example, if a student is being instructed from of a 3rd grade basal series, the CBM progress monitoring probes would be derived from the text or stories of that specific basal. Studies by Hintze & Shapiro (1997); Hintze, Shapiro, Conte, & Basile (1998); and Powell-Smith & Powell-Smith & Bradley-Klug (2001) have revealed that students score lower on ORF measures using literature-based passages than controlled reading passages (i.e., passages not derived from the curriculum). The comparison of controlled passages versus literature-based passages has also been extended to CBM-maze probes by Brown-Chidsey, Johnson, & Fernstrom (2005). Their findings were consistent with those of the previous researchers in that scores on maze probes using controlled passages yielded statistically different scores from literature-based passages for students across the year.

General outcome measure. Fuchs & Deno (1991) and Deno, Espin, & Fuchs (2004) have proposed that CBM probes are a form of a general outcome measure (GOM) or a repeated sampling of the overall curriculum (i.e. a controlled ORF passage). In contrast, a mastery measurement probe uses task analysis and has criterion-referenced properties as it relates to measurement principles. Therefore, GOM is “an assessment of proficiency on the global outcomes towards which the entire curriculum is directed” (Fuchs & Deno, 1991, p. 492). For example, a teacher can create a pool of 3rd grade CBM-R probes sampling the whole curriculum. On any given assessment, the student may receive a probe from the beginning, middle, or end of the year. It is expected that by the end of the year the student's ORF rate on the CBM-R for that grade level will increase as s/he has been exposed to instruction on the curriculum over the year.

Through the use of single-case research design, GOMs can be plotted in order to identify environmental variables affecting behavioral change (Deno, Espin, & Fuchs, 2004).

Reading Interventions

Guided Reading

“Guided reading is a process in which the teacher supports each reader’s development of effective reading strategies for processing novel texts at increasingly challenging levels of difficulty” (Fountas & Pinell, 1996, p. 2). It is a support within a balanced reading program that includes other reading and writing activities (Pressely, 2002). Guided reading groups are usually composed of small groups of children (5-8) with similar reading levels and reading abilities. These groups are meant to be dynamic in that students may participate in different guided reading groups based on their need for specific reading strategies. In essence then, the goal of guided reading is to foster independent reading skills, while employing reading strategies successfully within a meaning-based approach to literacy (Fountas & Pinell, 1996; Kouri, Selle, & Riley, 2006). Table 3 presents the instructional components and sequences of guided reading as suggested by Fountas and Pinell (1996).

According to Fountas & Pinell (1996), during the guided reading process the teacher and students engage in activities before, during, and after reading. Before reading activities encompass introductions to the text by the teacher and the activation of prior knowledge, while student conversation about the text is facilitated (Fawson & Reutzel, 2000). During reading, the teacher listens to the students read and observes reading behaviors, noting students’ strategy use. In this phase, the students are reading the text silently or softly to themselves and may request teacher help when needed in order to solve problems. In the final phase, or after reading, the teacher talks about the story with the students, invites personal responses, and assesses the

students' understanding of what they read (Jaquinta, 2006). The students also discuss the story after reading, check predictions made, and possibly revisit the text at points of problem solving as guided by the teacher (Whitehead, 2002).

Table 3

Essential Components of Guided Reading (Fountas & Pinell, 1996, p.4)

A teacher works with a small group.

Children in the group are similar in their development of a reading process and are able to read about the same level of text.

Teachers introduce the stories and assist in children's reading in ways that help to develop independent reading strategies.

Each child reads the whole text.

The goal is for children to read independently and silently.

The emphasis is on reading increasingly challenging books over time.

Children are grouped and regrouped in a dynamic process that involves ongoing observation and assessment.

The guided reading process has been promoted extensively in the last 20 years in K-12 education and has been included in reading programs such as basal series (Fawson & Reutzel, 2000) and "Reading Recovery" programs (Clay, 1993). Yet, in the experimental literature, guided reading appears to have few studies documenting its effectiveness as a reading intervention. Of these studies, Kouri, Selle, & Riley (2006) implemented the guided reading process with children who exhibited speech impairments. Two groups of 2nd and 3rd grade students were compared. One group had speech/language delays (SLD) and the other was a group of typically developing (TD) peers. On the dependent measures of comprehension and word analysis feedback, the TD groups fared equally well on both meaning-based (guided

reading) and phonics-based approaches to feedback. Interestingly, the results for the SLD group indicated significant differences between the meaning approach (guided reading) and phonics approach, with the phonetic approach yielding higher comprehension rates and fewer cueing prompts during oral reading feedback. Kouri, Selle, & Riley (2006) suggest that although the phonetic approach and meaning-based approach yielded similar gains for TD, the phonetic approach may be a more effective approach for word analysis and oral reading for the SLD population due to their relatively weak phonemic awareness abilities.

Dialogue and discourse during the reading process are an important part of processing information and making sense of what has been read (Block, Schaller, Joy, & Gaine, 2002). Teacher-pupil dialogue during the guided reading session (small group lessons) was analyzed via audio recording by Skidmore, Perez-Parent, & Arnfield (2003). Within a six-month period, five urban schools in the south of England were visited on three separate sessions to record the guided reading sessions of the literacy block instruction. A group of students (10 and 11 year-old students) was seen for all sessions, which lasted approximately 20 to 30 minutes (Skidmore, Perez-Parent, & Arnfield, 2003). An analysis of the dialogue recorded across sessions suggested that the teacher dominated the discourse during the guided reading process, while the students followed the teacher's cues. The questions asked by the teacher were not authentic in nature, and the teacher engaged in most of the talking. It appears that rich discourse and discussion through the use of imagery, social and physical perspective-taking, and more student-led involvement may increase the quality of guided reading sessions (Whitehead, 2002).

Guided reading has roots in the whole language movement and meaning-based approach to reading, with a focus on oral reading as well (Fountas & Pinnell, 1996; Iaquina, 2006). Reciprocal teaching is also aimed at fostering comprehension by providing students with self-

monitoring strategies. Todd and Tracey (2006) sought to investigate the efficacy of guided reading and reciprocal teaching on vocabulary acquisition and reading comprehension in four students who were at-risk for reading failure in a 4th grade inclusive classroom. Using a single subject design (multiple baseline across students) to measure vocabulary acquisition and reading comprehension, it was found that three of the participants made gains when compared to baseline data, while one participant made no gains in either vocabulary acquisition or reading comprehension. In this experiment, guided reading was predominantly teacher-directed, as suggested in the study conducted by Skidmore, Peres-Parent, & Arnfield (2003). In contrast, for reciprocal teaching, the dialogue was a joint effort between teacher and student, using modeling and practicing of the four cuing strategies (i.e., predicting, summarizing, questioning, and clarifying). Todd and Tracey (2006) indicated that, overall, reciprocal teaching had a greater effect on the vocabulary acquisition and comprehension of students.

Guided reading has extensive literature describing the process and rationale for its use. The National Reading Panel (2002) has suggested that this is a valid research-based approach to teaching early reading skills. Similarly, Pressley's (2002) balanced reading approach includes the guided reading process within its framework. In essence then, guided reading can be thought of as a small group process during which students of similar levels learn reading strategies using a child-centered constructivist approach (Fountas & Pinnell, 1996; Iaquinta, 2006). Because it is a whole language-based approach to teaching reading, more emphasis is placed on individual students' prior knowledge, which appears to be a less direct approach to teaching reading (Cheney & Cohen, 1999). Conversely, reciprocal teaching seems to be a more interactive approach between teacher and student, and student and student, utilizing explicit modeling and practicing of comprehension strategy skills (Palincsar, David, & Brown, 1989). Oczkus (2003)

has suggested that reciprocal teaching techniques can be infused during guided reading groups, enabling the process to fit within a balanced literacy framework. Moreover, both approaches are geared towards comprehension to one extent or another, with guided reading having a stronger emphasis on oral reading as well (Fountas & Pinnell, 1996).

Reciprocal Teaching Comprehension-monitoring Strategy

In the area of reading comprehension interventions, reciprocal teaching has been proven to increase the reading comprehension abilities of students (Lederer, 2000). According to Palincsar, David, and Brown (1989) reciprocal teaching is:

an instructional procedure designed to enhance students' comprehension of text. The procedure is best characterized as a dialogue between teacher and students. The term 'reciprocal' describes the nature of interactions since one person acts in response to another. The dialogue is structured by the use of four strategies: questioning, summarizing, clarifying, and predicting. The teacher and students take turns assuming the role of the leader (p 5).

This procedure was initially modeled after an experiment by Manzo (1968) that used reciprocal questioning as an intervention with some success (Palincsar & Brown, 1984). Palincsar (1982) expanded this reciprocal questioning intervention by having students take turns generating summaries, questions, predicting, and clarifying confusing portions of the text. The reciprocal nature within reciprocal teaching is rooted on Vygotsky's theory of development (Palincsar, 1986; Palincsar & Klenk, 1992). Vygotsky theorized that children learn as adults model a task. By gradually scaffolding that task for the children, adults enable children to perform the task themselves (Schunk, 2004; Shaffer, 2002).

The process underlying reciprocal teaching is the dialogue that takes place between teacher and student, and student and student (Hacker & Tenent, 2002; Lederer, 2000; Palincsar, 1986; Palincsar & Brown, 1984). Initially, the teacher provides direct instruction and modeling

of the four strategies while gradually releasing the role of teacher to the students (Greenway, 2002). For example, explicit instruction is given on summarization through modeling. The student then reads a portion of the text. After reading, s/he then performs the role of teacher and summarizes what was read for the others in the group, with guidance from the teacher if needed (Pearson & Dole, 1987). Although reciprocal teaching as an intervention has been implemented with a whole class of 20 students or more (Myers, 2005; Oczkus, 2003), Palincsar, David, and Brown (1989) suggest that reciprocal teaching take place in small groups of six to eight students, which allows for more student interaction and practice with each task. The length of time for the reciprocal teaching intervention can vary by the students' ages. At the primary level, 20 minutes of instruction using reciprocal teaching seems to be sufficient (Myers, 2005; Palincsar, David, & Brown, 1989), while adolescents and adults with longer attention spans can attend to the process for 30 to 40 minutes at a time (Fung, Wilkinson, & Moore, 2003; Palincsar, 1982; Palincsar & Brown, 1984; Palincsar, David, & Brown, 1989).

Meta-analyses. Reciprocal teaching as an intervention has been researched for over 20 years. Out of this research, two meta-analyses of reciprocal teaching have been conducted to investigate the effectiveness of the process. Rosenshine and Meister (1994) provided the first analysis of the studies. The researchers were able to identify 16 published and unpublished studies relating to the reciprocal teaching technique. Their basic findings concluded that effect sizes ($ES = .88$) were greater for studies where teacher-made assessments were used as dependent measures of reading comprehension rather than standardized tests. On the dependent measures that used standardized norm-referenced measures to assess growth in reading comprehension though, the effect sizes showed less gains ($ES = .32$). Overall, Rosenshine and Meister (1994) found that when the four strategies (i.e., questioning, summarizing, clarifying,

and predicting) were explicitly taught before engaging in the reciprocal teaching procedure (as in Palincsar, David, & Brown, 1989; Pearson & Dole, 1987) students' comprehension abilities increased more than when the strategies were taught as the reciprocal teaching intervention was in process. Other recommendations included improving the dialogue during reciprocal teaching (Hacker & Tenent, 2002) and the use of questioning and summarizing as the more effective of the four strategies (Rosenshine, Meister, & Chapman, 1996).

More recently, in an unpublished dissertation by Galloway (2003), an extensive review of the current literature on reciprocal teaching was conducted using traditional meta-analysis. Additionally, these data were analyzed with recently developed standards for evaluating evidence-based interventions in school psychology (Berninger & Shapiro, 2007). Based on the procedures employed by this study, the researcher found moderate effect sizes for interventions using reciprocal teaching. The significant differences between teacher-made tests and norm-referenced tests found by Rosenshine and Meister (1994) were not found by Galloway (2003). In studies that included a follow-up to the intervention, the effect size was large, suggesting students may have continued to use reciprocal teaching comprehension-monitoring strategy independently (an irreversible skill). While treatment fidelity in early studies was neglected, Galloway (2003) found that there is some evidence of treatment fidelity in more recent studies. Galloway concluded there still is a need to document in the literature the implementation of the reciprocal teaching procedure. Both of the meta-analytic studies described above provide support for the effectiveness of reciprocal teaching. Some limitations of the studies continue to be the sample size in the analysis, and the fidelity to which the reciprocal teaching intervention was implemented in the analyzed studies.

Group designs. Reciprocal teaching to improve the standardized reading comprehension performance of poor readers was studied by Lysynchuk, Pressly, and Vye (1990). In this study, 72 grade four and grade seven students in Canada participated in 13 sessions of reciprocal teaching reading instruction. Of the 72 students, 36 were assigned to the reciprocal teaching intervention, while the others worked in small groups, with the teacher offering assistance if needed in decoding and passage understanding (i.e., the guided reading model). Thirteen sessions were administered to both groups, with daily dependent measures being taken (i.e., retelling and questions), as well as pre and post standardized reading measures (i.e., Gates-MacGinitie Reading Comprehension Test). For both informal and formal assessments, the reading comprehension of the experimental group of poor decoders was higher than the control group of poor decoders. On the other hand, no improvements were seen on vocabulary acquisition and maintenance in either group.

Reciprocal teaching has also been implemented in content area reading (Bottemley & Osborn, 1993). In this study, 4th and 5th grade students (N= 473) were treated with the reciprocal teaching intervention using their science and social studies texts. This study specifically used whole-class instruction (Oczkus, 2003) versus small group instruction (Palincsar, David, & Brown, 1989). As suggested by Rosenshine and Meister (1994), the explicit teaching of the four reciprocal teaching strategies was taught before embarking on the 20-session intervention. Various assessments (i.e., beginning of year, after the 20 day intervention, and end of year) were used to monitor the students' reading comprehension growth. On these assessments, there was a significant difference between pre and post tests based on the ANOVAs conducted.

Klinger and Vaughn (1996) used reciprocal teaching as an intervention for poor decoders with learning disabilities (LD), but who were also English language learners (ELL) at the middle

school level. A small sample size of 26 students was treated with 15 sessions of reciprocal teaching. For these sessions, students were randomly assigned to one of two groups (i.e., reciprocal teaching with cooperative tutoring or reciprocal teaching with cross-age tutoring). Three sessions were used for strategy instruction, while the remaining 12 sessions implemented reciprocal teaching. The instruments used as dependent measures included the Gates-MacGinitie standardized reading tests and teacher-made comprehension questions on reading passages as developed by Palincsar and Brown (1984). The results indicated no statistical significance between groups on either of the comprehension measures. Overall though, the reciprocal teaching intervention appeared to improve the reading comprehension of students with LD/ELL and supported modeling and social interaction as means to learning as proposed by Vygotsky (Schunk, 2004).

Reciprocal teaching is based on meta-cognitive strategy instruction (Hashey & Connors, 2003; Palincsar, 1986; Palincsar & Brown, 1984; Palincsar & Klenk, 1992). The use of reciprocal teaching within inclusive social studies classrooms was investigated by Lederer (2000). The sample included 128 students in the intermediate grades (4th, 5th, and 6th), of whom some were identified as learning disabled. At each grade level, two classrooms were inclusive, (i.e., general education and special education students) and the other two were non-inclusive (i.e., general education students only). In this study, the experimenter/researcher administered approximately 15 reciprocal teaching sessions across the three grade levels. The results indicated that the experimental group scored higher than the control group at all grade levels. Additionally, the results suggested that reciprocal teaching was an effective whole class intervention. A few limitations of the study were addressed by Lederer. One was the lack of random assignment of

the students, and the other was the use of an experimenter-designed assessment--both validity issues discussed by Galloway (2003) and Rosenshine and Meister (1994).

Qualitative designs. The use of qualitative research methods lend themselves well in the investigation of problems where participation, observation, and inquiry of meaning are of interest (Shank, 2006). To this end, the reciprocal teaching process can be richly described as a phenomenon through the use qualitative research techniques. Hacker and Tenent (2002) sought to investigate the manner in which teachers constructed their knowledge of reciprocal teaching (based on Hashey & Connors, 2003) as they implemented the intervention. Over a three-year period, 17 teachers from two elementary schools that implemented reciprocal teaching were followed. The obstacles and modifications they made to the program were examined through their daily implementation of reciprocal teaching. The data collected across teachers on the practices and modifications of reciprocal teaching were synthesized in order to develop a theory on how to implement the intervention effectively in the classroom. Three elements of reciprocal teaching were examined: strategy use, richness of dialogue, and scaffolded instruction. Teachers utilized questioning the most and a fair number added writing as an augmentation to the four strategies. The discourse the teachers had with the students was the most problematic of the three elements, in that the dialogue was superficial and was not rich; this finding was also supported by Whitehead's (2002) investigation of a guided reading intervention. Finally, scaffolding was evident across all teachers and took many forms, such as whole class instruction, explicit teaching (Pearson & Dole, 1987), direct guidance, and reading partnerships (Hacker & Tenent, 2002).

The facilitation of reciprocal teaching process through consultation by an educational psychologist (school psychologist) in England was investigated by Greenway (2002). While this

study employed a quasi-experimental design to measure the effects of reciprocal teaching, the qualitative analysis of the consultation process was a central feature investigated as it related to the effectiveness of reciprocal teaching; this study could be classified as a mixed-methods design (Shank, 2006). Based on a one group pre/post test design, the groups reached statistical significance (Greenway, 2002) when reciprocal teaching was implemented with students ages 10 and 11 in an urban school. An analysis of the consultation process with the educational psychologist as a change agent, yielded the finding that the development of a checklist for evaluating dialogues facilitated the implementation and evaluation of the reciprocal teaching intervention; this finding was also supported by Galloway (2003). Additionally, the consultation process, with respects to consultees' beliefs and school politics, suggested that the politics of school can work against successful research, with priorities often changing, due to issues of lack of administrative support and personality conflicts (Greenway, 2002).

Hashey and Connors (2003) suggested that students benefited from reciprocal teaching beginning in the 3rd grade because of their experience with decoding skills. In an action research project with kindergarten students, Myers (2005) experimented using the reciprocal teaching technique to increase oral comprehension of her students. Using puppets as a medium, the four comprehension-monitoring strategies were introduced as: the Princess Storyteller, Clara the Clarifier (puppet), Quincy Questioner (puppet), and the Wizard (Myers, 2005). The reciprocal teaching intervention was infused during whole class read-alouds in order to maintain classroom management. Interviews, retelling, and questioning (as suggested by Rosenshine, Meister, & Chapman, 1996) were the dependent measures used to assess four students in the class. By the end of the three-month research project, "students were able to reflect on themselves as learners and monitor their comprehension" (Myers, 2005, p. 320).

As a whole, these qualitative studies support the notion that the dialogue during reciprocal teaching needs to be rich in order for students to generalize comprehension skills meaningfully. Moreover, while Oczkus (2003) suggests that reciprocal teaching is flexible (as described by Hacker & Tenent, 2002) and does not need to follow a prescribed set of rules, there is research to support the need for treatment integrity and fidelity (e.g., Galloway, 2003; Rosenshine & Meister, 1994), which aids in replication, generalization, and the systematic rigor of the intervention.

Single-subject experimental designs. Palincsar, David, and Brown (1989) have suggested that reciprocal teaching may be more beneficial as small group instruction. In the initial reciprocal teaching study, Palincsar and Brown (1984) employed a single-subject research design to investigate the effects of reciprocal teaching with a small group of students ($N=12$). To date several researchers have utilized single subject designs to measure the effects of reciprocal teaching with small groups of students in applied settings.

A multiple-baseline across groups design was employed by Kelly, Moore and Tuck (2001) to gauge the effects of reciprocal teaching. Eighteen poor readers in 4th and 5th grades were selected to participate in the study in an urban elementary school in New Zealand. Three groups were formed—two receiving the reciprocal teaching intervention ($n= 6$ each) and one receiving their regular reading instruction ($n= 6$). The results showed that both groups receiving the reciprocal teaching intervention made significant gains in reading comprehension based on daily teacher-made comprehension tests. These gains were not seen for the third group, which received its regular reading instruction. Treatment integrity was addressed by gathering data on the use of the four strategies by teacher and student during the reciprocal teaching intervention.

These data indicated an increase in teacher-directed strategy use during baseline rather than during the intervention phase.

English language learners (ELL) have benefited from the use of reciprocal teaching to foster comprehension (Klinger & Vaughn, 1996; Myers, 2005). Others have also investigated the effects of reciprocal teaching on ELL's using expository texts (Bottemley & Osborn, 1993; Lederer, 2000; Palincsar, 1982; Palincsar & Brown, 1984). The effects of reciprocal teaching were analyzed for 12 students in 6th and 7th grade who were ELL (Mandarin/Chinese and English) in three suburban schools in Auckland, New Zealand (Fung, Wilkinson, & Moore, 2003). The dependent measures included a standardized, norm-referenced pre/post test and daily repeated measures in the form of teacher-made comprehension tests. Think aloud tasks were also examined to measure comprehension processes and transfer abilities. A nonconcurrent multiple-baseline design (Christ, 2007) across three groups was used, with baseline, intervention, and follow-up phases. Each group received 5 days of baseline and an average of 15 days of reciprocal teaching during intervention; the third phase included 3 days of follow-up with no intervention immediately after the intervention phase. The reciprocal teaching intervention was conducted bilingually, introducing concepts in Chinese (Mandarin) and then English. On both researcher-developed assessments and standardized assessments, the students made gains. Additionally, the quality of the dialogue showed evidence of producing change in students' reading comprehension processes such as the type of questions asked and quality of summaries given (Fung, Wilkinson, & Moore, 2003).

Le Fevre, Moore, and Wilkinson (2003) applied a modified reciprocal teaching intervention with students who had limited decoding and comprehension skills. Two single-subject experiments, one with an ABC design (featuring baseline, Condition 1, Condition 2,

follow-up, and maintenance), and one using a multiple baselines across groups of students (as suggested by Palincsar & Brown, 1984) evaluated reciprocal teaching. Study one assessed six students in 3rd grade in an urban school in Auckland, New Zealand. Students were first assessed with no treatment during baseline. Then during Condition 1, the traditional reciprocal teaching intervention was applied. Condition 2 consisted of tape-assisted reciprocal teaching where students listened to the story via a tape recorder and followed the conventional reciprocal teaching method. There was no change from baseline (14%) to condition 1 (15%) on the percentage of comprehension questions answered correctly based on daily repeated measures. Conversely, during Condition 2 (tape-assisted), improvement was noted, with students attaining a mean performance of 47% correct on the daily comprehension test. The second study was composed of 18 students in the same age range and social setting from three different schools. This second study was conducted to provide some generalizability based on the previous experiment. The results on the daily short answer comprehension tests showed systematic improvement on performance, as well as significant gains when compared to baseline data.

Integrative Summary

A systematic approach was used in this literature review to provide support for the rationale for this study. The initial discussion of the reading process as dynamic (Crowder & Wagner, 1992) and developmental (Chall, 1989, 1996b) in nature permits one to arrive at the conclusion that reading comprehension is a multifaceted process that requires fluency in decoding skills, as well as knowing how to tap into prior knowledge and apply meta-cognitive skills (Pearson & Hamm, 2005). The review of formative assessments provides convincing evidence for the use of curriculum-based measures (CBM), specifically in the form of CBM-maze probes, as valid and reliable standardized measures (Brown-Chidsey, Davis, & Maya,

2003; Brown-Chidsey, Johnson, & Fernstrom, 2005) of reading comprehension; these measures can be administered daily in place of a teacher-made test that may lack validity and reliability. Finally, a foray into reading interventions (e.g., guided reading and reciprocal teaching) sets the stage for the intervention being implemented in this research. While guided reading may be intended to foster decoding skills (Fountas & Pinell, 1996), this type of small group instruction, which is usually in place during a balanced literacy program (Pressley, 2002), provides the structure to incorporate reciprocal teaching easily into the every-day literacy block (Hashey & Connors, 2003; Oczkus, 2003). Some of the gaps in the literature as referred to by Rosenshine & Meister (1994) and Galloway (2003) are addressed in the discussion section of this dissertation. These include treatment integrity, social validity (teacher and student), and the innovation of measuring reciprocal teaching through the use of curriculum-based measures. Therefore, this research seeks to evaluate the reciprocal teaching comprehension-monitoring strategy intervention using frequent standardized formative assessment measures such as CBM-maze probes, while adhering to the fidelity and integrity in implementing the intervention.

CHAPTER 3

METHOD

Participants and Setting

The subjects for this study were a convenience sample of 15 students from a 3rd grade class in a large urban school district in the Southeastern United States. Third grade was chosen because reading comprehension is a skill that is first measured via the state accountability examination at this grade level, and the teacher in the classroom had some training in reciprocal teaching through district in-service workshops. All students in the target class were given a parental permission form to take home and were asked to bring it back the next day with a parent's signature indicating permission to participate in the study (see appendix I); all the student permission forms were returned signed by the parents. The teacher and students also completed a consent form; all the consent forms were signed indicating voluntary participation in the study.

Descriptive information for the students in the sample is provided below in Table 4, which displays each participant's characteristics as suggested by the UCLA Marker Variable System (Keogh et al., 1987). These marker variables were compiled in order to allow for possible comparisons across different groups of students and aid in the interpretation of results.

Table 4

Individual Participant Descriptive Information

Student	Age (years)	Ethnicity	Free/Reduced Lunch	Bilingual	ORF/ DIBELS	Reading level/STAR
Group 1						
S1/F	10	H	Y	Y	89	3.2
S2/M	9	AA	N	N	69	2.9
S3/F	9	H	Y	Y	101	3.3
S4/M	9	H	Y	Y	70	3.2
S5/F	10	H	Y	Y	82	3.2
Group 2						
S6/F	9	H	Y	Y	104	3.3
S7/F	9	H	Y	Y	119	3.6
S8/F	9	H	Y	Y	94	3.4
S9/M	9	H	Y	Y	102	3.4
S10/M	9	H	Y	Y	99	3.2
Group 3						
S11/F	10	H	Y	Y	95	3.2
S12/F	10	H	Y	Y	99	3.3
S13/M	10	H	Y	Y	112	4.3
S14/M	10	H	Y	Y	140	3.3
S15/M	10	H	Y	Y	112	4.5

Note. M = Male, F = Female; H = Hispanic, C = Caucasian, AA = African American, A = Asian, O = Other; oral reading fluency (ORF); Dynamic Indicators of Basic Early Literacy Skills (DIBELS); STAR, standardized norm-referenced computer adaptive reading comprehension test; Both ORF and Reading levels are based on latest assessment.

The teacher who implemented the reciprocal teaching intervention had a master's degree and a total of 11 years of teaching experience in both regular and special education settings. She was state certified in special education, primary education (PreK- Grade 3), and in English for speakers of other languages (ESOL), and was thus highly qualified as deemed by *No Child Left Behind* (NCLB, 2001). The teacher was bilingual and spoke both English and Spanish fluently.

The reciprocal teaching intervention occurred during guided reading sessions, a component of the two-hour language arts block already in place at the school. The reading block was based on a balanced literacy approach (Pressley, 2002). The block was divided into whole group instruction, guided reading (small group instruction), phonics/spelling instruction, and writing instruction. At the beginning of the year, students were divided by the teacher into small instruction groups based on their oral reading fluency (ORF) and reading levels (i.e., standardized norm-referenced comprehension measure; STAR reading test); they received guided reading either daily or once or twice a week depending on the skills being addressed. The intact groups, as originally formed by the classroom teacher, who received daily guided reading instruction, were used for the reciprocal teaching intervention.

Materials

Classroom reading materials. The students were instructed from a 3rd grade basal series titled *Houghton Mifflin Reading* (Houghton Mifflin, 2005). This series is a comprehensive reading/language arts program that includes diverse genres of literature, thematic trade books, and a leveled independent reading book. The program is research-based and addresses the five areas recommended by the National Reading Panel (2001).

Reading GOM. For the intervention, reading comprehension growth was measured using curriculum-based measurement maze probes (CBM-maze probes). The probes consisted of 300-word original stories developed with a 3rd grade readability level (www.AIMSwb.com). Alternate form reliability for the passages ranged from .83 to .90 (Howe & Shinn, 2002). Criterion validity and concurrent validity for the CBM-maze probes were reported in the acceptable range (.60 to .83) by Howe & Shinn (2002). The CBM-maze technical manual also reported Lexile levels. Their Lexile levels were between 440 and 690 for the 3rd grade maze probes. Lexile levels are based on a research-proven system that matches a student's reading level to the text using a common metric (e.g., standard scores or normal curve equivalents; Crowder & Wagner, 1992). For example, if the student's Lexile level is 550 and the book s/he is reading has a Lexile level of 550, it is expected that the student will be able to comprehend 75% of the text.

Procedures

Experimental Design

A single-subject multiple baseline across groups was utilized (Hayes, Barlow, & Nelson-Gray, 1999; Richards, Taylor, Ramasamy, & Richards, 1999). This type of design does not require the withdrawal of a treatment to show experimental control. The design is useful when the behavior of interest is not reversible, as is the case with reading comprehension (Neuman & McCormick, 1995). Experimental control is shown when the baseline phase for the second data series is held constant to the first data series in the intervention phase. "The results document experimental control demonstrating covariation between change in behavior patterns" (Horner et al., 2005, p. 169). Finally, staggering the entrances across tiers of the intervention provides a convincing argument of a functional relationship between the dependent variable (CBM-Maze

probes) and independent variable (reciprocal teaching). Three phases were instituted: baseline, intervention, and follow-up, with the unit of analysis being the mean of each group (correct word choices on the daily CBM-maze probes).

Baseline. The baseline phase lasted 3 days for the first group. The second and third groups received 4 days and 10 days of baseline respectively. During baseline, the regular classroom instruction took place. Students' progress was measured daily using the CBM-maze probes throughout baseline.

Reciprocal teaching intervention. This phase included the reciprocal teaching treatment (Palincsar & Brown, 1984) and lasted between 12 and 18 sessions for all three treatment groups. Prior to baseline and intervention, the teacher explicitly taught the four reciprocal teaching strategies using direct instruction and scripted worksheets (Teacher Education Center: M-DCPS, 1996). This was done before baseline in order to avoid treatment interference and to make sure the students understood each of the four strategies prior to engaging in reciprocal teaching (Palincsar, David, & Brown, 1989). After baseline, the teacher began the treatment by modeling the technique using "think alouds" while scaffolding the procedure for the students. The reciprocal teaching procedure was modeled by the teacher selecting a paragraph from the basal reader and making some predictions based on the title or illustration in order to generate a discussion; this was implemented to activate students' prior knowledge. The paragraph was read aloud or chorally (teacher and students) while the students followed along. The teacher then modeled using the four strategies, summarizing, questioning, clarifying, and predicting (see Table 5). This procedure was conducted at the beginning of every session for all groups for approximately eight sessions. The teacher gradually released this responsibility to the students, and had them play the role of teacher or leader. In order to provide a cueing system for the

students, and to facilitate the rotation of roles/leaders when it was a student's turn to be the teacher, a cue card that had each strategy (i.e., questioner; see Appendix B) printed on front and sample questions printed on the back was placed in front of each student (Oczkus, 2003). Each student rotated the cue cards throughout the daily sessions in order for all the students to have a turn applying the four different strategies.

Table 5

Sample Questions During Reciprocal Teaching

Clarifying	What does _____ mean? What is a _____?
Questioning (teacher like questions)	Who or what is this lesson about? What do we know about _____? What are the clues that tell us _____?
Summarizing	What is the main idea of this passage? What is it mostly about? What information in this passage tells you that?
Predicting	What do you think the next part will be about?

The teacher then called on a student to read the next paragraph aloud while the others followed silently; this procedure was done both chorally (all students) and silently (individually). This student was the teacher and led the discussion using the above reciprocal teaching procedures of predicting, questioning, summarizing and clarifying. The teacher guided the student leader in discussing the paragraph read and provided differential feedback and praise (e.g., What questions do you think a teacher might ask? I would summarize this by saying... Was this statement clear to you?). This served as a scaffold, by which the students eventually were able to lead the discussion with minimal guidance from the teacher. The teacher facilitated the process throughout all the interventions sessions for all three groups.

On a daily basis during the reciprocal teaching intervention, CBM-maze probes were administered to progress monitor reading comprehension growth (Horner et al., 2005). The probes were administered using a standardized format at the end of each session. All students in each group were administered the comprehension probes.

Follow-up. This phase occurred directly after the intervention was completed to assess achievement in reading, as well as measure how well the students maintained their comprehension rates without the intervention in place. Each group was given three days of follow-up. CBM-maze probes were administered for each session during this phase using a standardized format.

Data Analysis

Analysis of the data was completed through descriptive statistics and visual inspection of the graphed data (Kennedy, 2005). For the descriptive statistics means, ranges, and standard deviations were calculated. A visual inspection of the data was approached by analyzing the level (mean), trend (slope), and variability in the data (Kennedy, 2005).

In order to gauge further the effectiveness of the treatment using visual inspection, the conservative dual-criteria (CDC) model for analyzing interventions proposed by Fisher, Kelly, and Lomas (2003) was applied. These authors propose a structured criterion for visually analyzing single-subject data based on a refined split-middle method or trend line (for a full description see Fisher, Kelly, & Lomas, 2003). Basically, a trend line is derived from the baseline data and superimposed over the intervention data (see Figure 2). Additionally, the authors developed a second regression line based on the baseline mean and superimposed it over the treatment data to control for Type I and Type II errors. In order to have effects attributable to the treatment, a prescribed number of data points have to be above both lines. Fisher, Kelly, and

Lomas (2003) and Colon (2006) found that using this method to visually inspect data was appropriate for detecting clear but subtle intervention effects.

Finally, an effect size for single case research was also calculated as suggested by Daly, Chafouleas, & Skinner (2005) and Busk & Serlin (1992) to determine the magnitude of the effects of the intervention when compared to baseline. It was calculated by subtracting the average baseline mean from the average treatment mean and divided by the product of the standard deviation of the baseline (Daly, Chafouleas, & Skinner, 2005).

Procedural Integrity

To insure the intervention was implemented with fidelity a procedural integrity checklist was completed by the teacher on a daily basis during baseline, intervention, and follow-up phases of the study (23 sessions in total). The checklist consisted of the procedural steps (14 in total) in administering the CBM-maze probes and the reciprocal teaching intervention (see Appendix D). The teacher checked off each step completed on the procedural integrity checklist at the end of the sessions. During the baseline and follow-up phase she completed only the CBM-maze probe administration portion (bottom half). During the intervention phase she completed the whole checklist. The results from the procedural integrity checklist yielded data that indicated the teacher completed all of the steps with 100% accuracy for all phases of the experiment. An independent observer (the school principal) completed the checklist for five random sessions (21%) throughout the experiment as well. It was calculated that interobserver agreement yielded 99% accuracy in procedural steps for the five random sessions (a total of 69 out of 70 steps were completed by the teacher). An analysis of the procedural integrity protocols indicated the principal scored one step (i.e., rotation of reciprocal teaching jobs) missing on one session during the intervention phase.

Interscorer agreement. Interscorer agreement was calculated for 21% of the comprehension measure (CBM-maze probes) to verify the accuracy of scores. I separately scored five random sessions of CBM-maze probes for all groups. The percentage agreement was calculated by computing agreements minus disagreements and then multiplying by 100. Any discrepant scores were adjusted before entering data into the database for calculations. The results indicated 100% agreement for the five days of CBM-maze probes.

Social Validity

Both students and teacher completed a social validity scale upon completion of the study to evaluate the acceptability of the intervention and progress monitoring procedures (CBM-maze probes). These scales addressed Research Questions 2 and 3. The teacher completed a modified version of an intervention acceptability scale by Daly Chafouleas & Skinner (2005). This Likert scale consisted of items rated from 1 = *strongly disagree* to 5 = *strongly agree*, with an open comments section. The student scale was derived in a modified form from of the Children's Intervention Rating Scale (Witt & Elliott, 1985), which had a reported average alpha coefficient of .86. It contained items on a Likert scale that were rated by *no*, *maybe*, and *yes* (McCallum, Skinner, Turner, & Saecker, 2006). Tabulations and descriptive statistics were used to report these data respectively.

CHAPTER 4

RESULTS

This chapter presents the results of this study according to each research question. The data input was entered by me and another doctoral student in order to ensure the data were accurate and problem-free before running any calculations. There were no discrepancies found in the calculations or the graphs by either of us.

For Research Question 1, the results are presented via graphical representation and descriptive statistics. Traditional visual inspection and the conservative dual-criteria lines (CDC lines) were used to analyze data for intervention effectiveness (see Figure 1, p. 43; Figure 2, p. 47). Additionally, effect sizes for single-subject designs were calculated to aid in the determination of the magnitude of the effectiveness of the intervention. Results related to Research Questions 2 and 3 were reported as tabulations and means and addressed the social validity of the intervention through the treatment acceptability rating scales.

Reciprocal Teaching Data

Research Question 1

What are the effects of reciprocal teaching comprehension-monitoring strategy on the comprehension rates of 3rd grade students as formatively measured by CBM-maze probes?

Visual analysis. Figure 1 depicts the graphed data for the three groups. Mean words correct on the curriculum-based measurement maze probes (CBM-maze probes) per group constituted the dependent variable across baseline, intervention (reciprocal teaching), and follow-up phases. Within-phase patterns for Group 1 depicted a stable baseline for the three data points and a mean level of 10.5 ($SD = 4.4$) words correct. There was no evident trend during baseline,

and the magnitude of the slope was close to zero. During the intervention phase, the mean level increased to 15.74 ($SD = 8.98$) words correct, with mild variability in the data points. The data showed an initial decrease in trend, but then a rapid increase in trend. This phase ended with higher levels of correct word choices by students, and no conclusive trend based on the last three data points. The follow-up phase for Group 1 had a mean level of 19.73 ($SD = 7.78$) words correct. The three data points for this phase showed an increasing trend. Between-phase patterns for Group 1 showed a steady increase in mean words correct across all three phases (see Table 6). There was no immediate change in level or trend between baseline and intervention, and intervention and follow-up phases (Kennedy, 2005); this indicated no clear mean shift between any of the phases. Mild overlap in data points was seen between baseline and intervention and intervention and follow-up phases. The percentage of nonoverlapping data points when moving from baseline to intervention was 88% and 0% when moving from intervention to follow-up. Most of the data points during intervention did not fall within a range of the baseline data points. During follow-up, all the data points fell within a range of the intervention data points.

Group 2 attained a mean level of 13.8 ($SD = 3.24$) words correct for the four sessions within the baseline phase. There was moderate variability in the data points, with an initial increase in level, but ending with a decrease in trend. During intervention, group two's mean level was 18.01 ($SD = 5.8$) words correct. There was moderate variability in the data. The first half of the intervention phase depicted a rapid decrease back to baseline levels of responding (sessions 5-11; mean level 14.31, $SD = 3.35$). The second half of the intervention phase depicted a rapid increase in trend and a higher mean level than the first half, and ended with a stable and flat trend (sessions 12-20; mean level 20.89, $SD = 7.70$). The follow-up phase showed a mean level of 20.27 ($SD = 5.82$) words correct and a moderate increase in trend. An analysis of

between-phase patterns showed a clear and convincing mean shift between baseline and the first data point in intervention. A generally slow increase in mean words correct was noted across all three phases. High overlap in data points was seen between baseline and intervention and intervention and follow-up phases. The percentage of nonoverlapping data points when moving from baseline to intervention was 69%, and 0% when moving from intervention to follow-up. The majority of the data points during intervention fell within a range of the baseline data points. During follow-up, all the data points fell within a range of the intervention data points.

Group 3 attained a mean baseline level of 15.64 ($SD = 3.32$) words correct. During baseline phase, this group exhibited high variability in the data. A clear decreasing trend was noted between sessions five and seven, with an overall general decreasing trend in baseline. In the intervention phase, this group attained a mean level of 20.15 ($SD = 2.92$) words correct. This phase had mild variability in the data, with an initial rapid increase in trend followed by a slow decrease in trend. The follow-up phase was characterized by a mean level of 23.2 ($SD = 3.89$) words correct, with no clear trend in the data. An analysis of between-phase patterns showed a slow rise in mean words correct across phases and no immediate change in level across any of the three phases—baseline, intervention, or follow-up. High overlap in data points was seen between baseline and intervention and intervention and follow-up phases. The percentage of nonoverlapping data points when moving from baseline to intervention was 45%, and contrasted with 0% when moving from intervention to follow-up. The majority of the data points during intervention fell within a range of the baseline data points. During follow-up, all the data points fell within a range of the intervention data points.

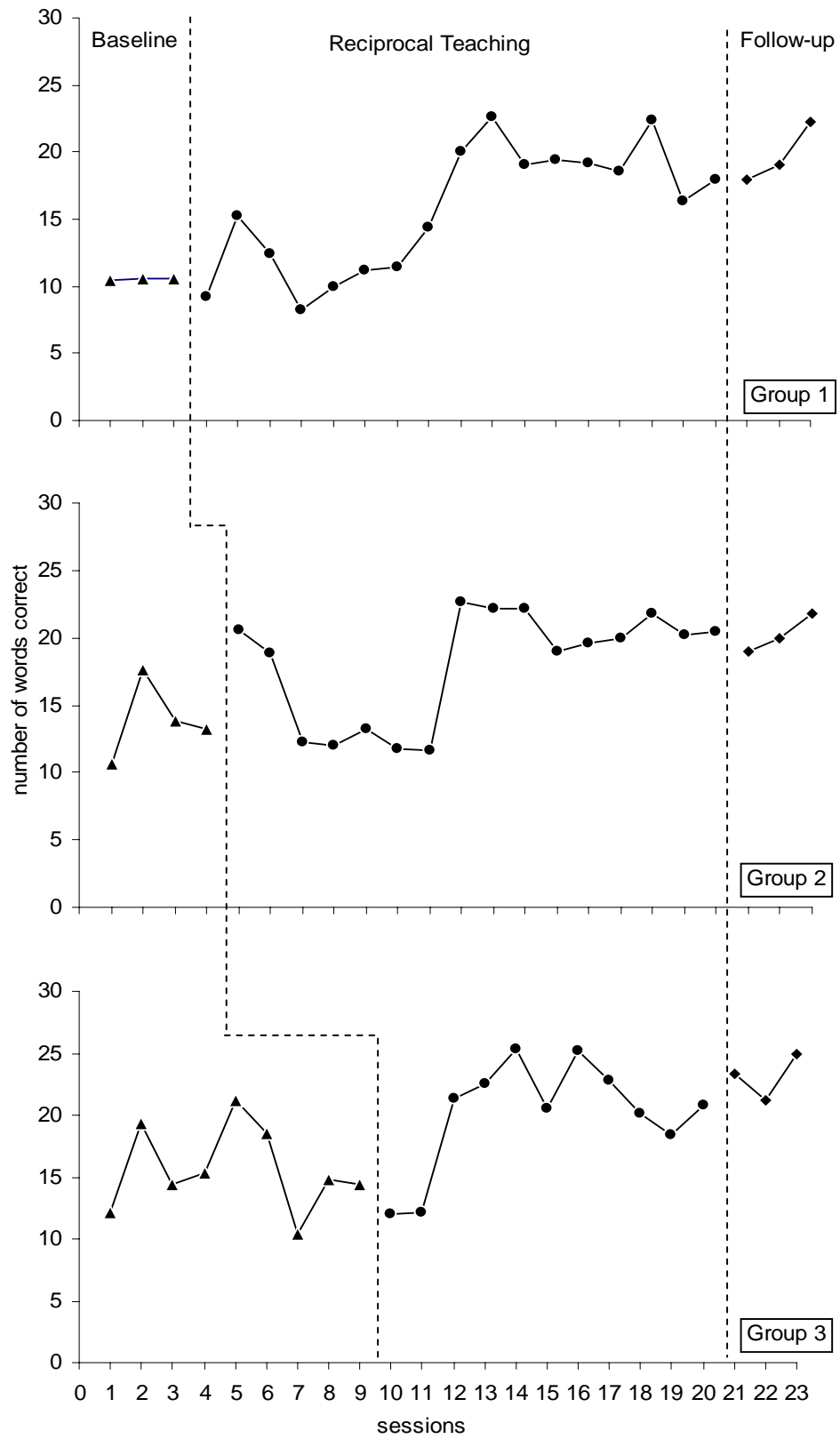


Figure 1. Group mean words correct on the CBM-maze probes across baseline, intervention, and follow-up phases.

Table 6 provides the descriptive statistics for the three groups and includes means, standard deviations, and ranges. A visual inspection indicated some variability in individual participants' scores as evidenced by the ranges, but an increasing trend in words correct was evident across all phases for the three groups. Specifically, Group 1 exhibited the highest variability in scores (correct word choices) across all three phases, with session 13 having the highest variability of scores (ranges 2, 34). It appears that one participant in this group scored one standard deviation or lower from the group mean in several sessions. The data for Groups 2 and 3 appear to have less variability across individual participants than the data for Group 1 when comparing ranges. In addition, the standard deviations for Group 3 indicate that this group had less variability when compared to the other two groups.

Table 6

Group Descriptive Statistics

Session	Group 1			Group 2			Group 3		
	<i>X</i>	(<i>SD</i>)	[range]	<i>X</i>	(<i>SD</i>)	[range]	<i>X</i>	(<i>SD</i>)	[range]
1	10.4	(4.4)	[4,15]	10.6	(3.2)	[9,15]	12.2	(2.4)	[9,17]
2	10.6	(5.9)	[2,15]	17.6	(3.8)	[13,26]	19.4	(4.5)	[16,23]
3	10.6	(5.4)	[3,16]	13.8	(3.3)	[14,16]	14.4	(2.3)	[11,17]
4	9.2	(4.1)	[3,13]	13.2	(2.7)	[10,16]	15.4	(2.1)	[12,18]
5	15.2	(8.8)	[4,27]	20.6	(5.7)	[15,28]	21.2	(4.6)	[18,25]

(table continues)

Table 6 (continued).

Session	Group 1			Group 2			Group 3		
	<i>X</i>	(<i>SD</i>)	[range]	<i>X</i>	(<i>SD</i>)	[range]	<i>X</i>	(<i>SD</i>)	[range]
6	12.4	(5.9)	[3,12]	18.8	(3.8)	[13,23]	18.6	(3.7)	[14,22]
7	8.2	(4.0)	[6,15]	12.2	(2.9)	[9,16]	10.4	(2.5)	[8,16]
8	10	(3.4)	[6,15]	12	(1.9)	[8,17]	14.8	(3.9)	[12,18]
9	11.2	(3.4)	[2,15]	13.2	(3.3)	[7,17]	14.4	(3.8)	[9,18]
10	11.4	(5.4)	[6,20]	11.8	(2.2)	[8,15]	12	(2.6)	[9,15]
11	14.4	(5.5)	[6,30]	11.6	(3.6)	[10,14]	12.2	(1.5)	[10,16]
12	20	(12.4)	[6,30]	22.6	(8.0)	[21,25]	21.4	(1.5)	[15,27]
13	22.6	(14.5)	[2,34]	22.2	(7.8)	[18,26]	21.6	(3.0)	[20,28]
14	19	(19.0)	[8,29]	22.2	(6.2)	[18,25]	25.4	(4.2)	[22,30]
15	19.4	(9.9)	[9,33]	19	(7.3)	[16,21]	20.6	(1.7)	[18,22]
16	19.2	(13.2)	[3,35]	19.6	(9.6)	[13,24]	25.2	(3.8)	[22,28]
17	18.6	(11.3)	[6,35]	20	(8.2)	[17,23]	22.8	(2.6)	[20,28]
18	22.4	(10.8)	[10,34]	21.8	(7.9)	[16,27]	20.2	(3.6)	[12,29]
19	16.4	(10.36)	[3,30]	20.2	(7.63)	[15,27]	18.4	(4.26)	[12,22]
20	18	(10.77)	[3,29]	20.4	(6.83)	[16,26]	20.8	(3.33)	[17,23]
21	18	(6.24)	[9,23]	19	(5.40)	[18,27]	23.4	(5.65)	[18,27]
22	19	(7.91)	[10,29]	20	(5.72)	[17,25]	21.2	(2.07)	[17,25]
23	22.2	(9.20)	[10,31]	21.8	(6.36)	[19,29]	25	(3.95)	[19,29]

Visual inspection using the CDC lines method. Figure 2 displays a graphical representation of the group means (words correct on CBM-maze probes) for baseline and intervention using the conservative dual-criteria model. The two lines represent regression lines based on baseline data. Group 1 attained 12 of 17 data points above the two lines during intervention. Group 2 attained 6 out of 16 data points above both lines, and Group 3 attained 9 out of 11 data points above the two lines. Based on the criteria specified by Fisher, Kelly and Lomas (2003), Group 1 and Group 3 exhibited a reliable treatment effect. Table 7 provides a summary of these data.

Table 7

The Number of Data Points Needed to Conclude That There Was a Reliable Treatment Effect Using the CDC Lines Method

	Treatment phase	Number needed above both criterion lines	Number actually above both lines	Meets Criteria
Group 1	17	12	12	Yes
Group 2	16	12	6	No
Group 3	11	9	9	Yes

Note. Adapted from Fisher, Kelley & Lomas (2003) p. 399

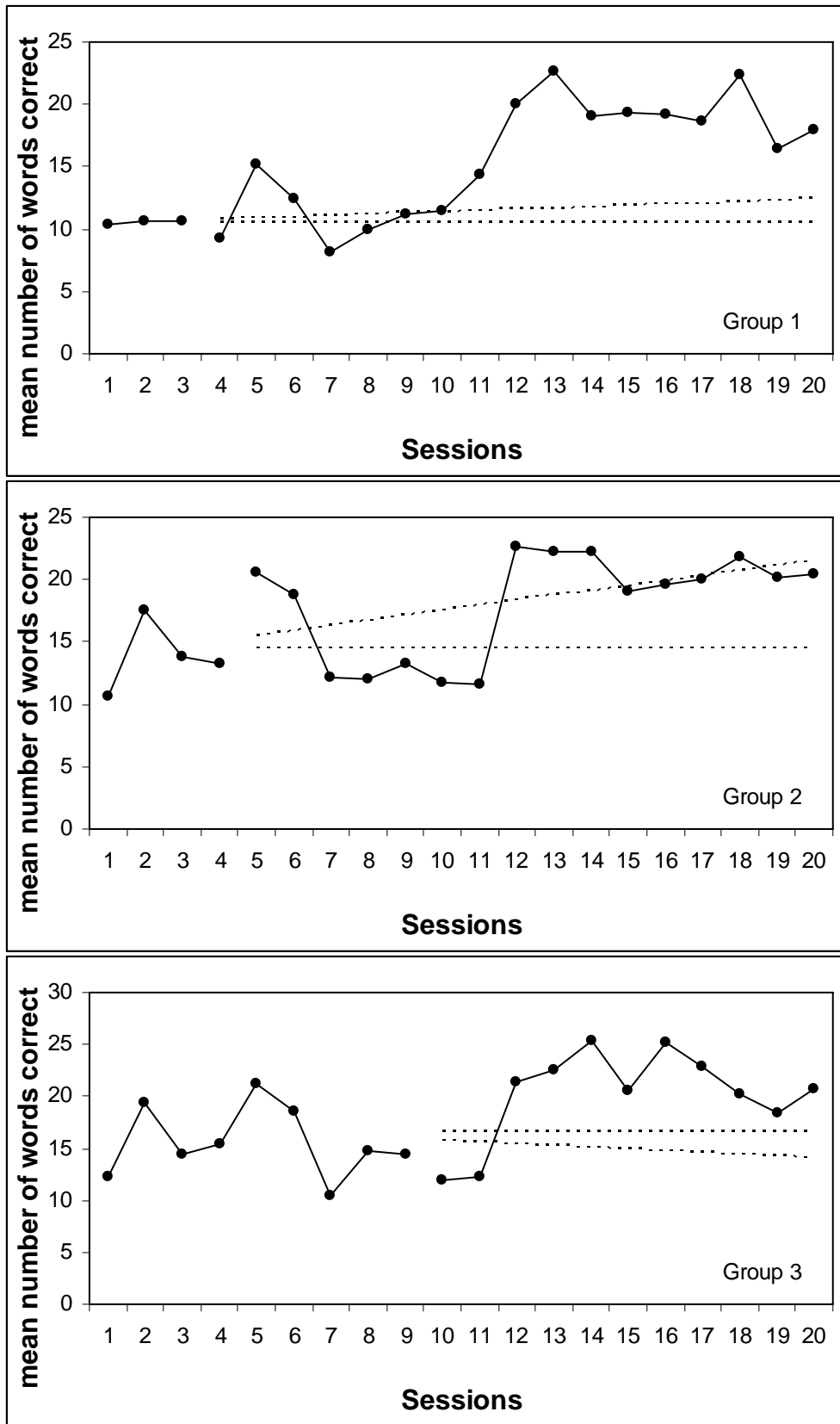


Figure 2. Conservative dual-criteria graphs with criteria lines.

Effect Sizes. The magnitude of the intervention effects was also investigated through effect sizes for single-subject designs (Daly, Chafouleas, Skinner, 2005). Kromrey & Foster-Johnson (1996) suggest that effect size (ES) statistics for single-subject designs provide a viable method for interpreting the relationship between baseline and intervention phases when there is variability in the data. Table 8 provides a summary of the reciprocal teaching intervention effect sizes for both individual groups as well as all three groups combined. Additionally, the effect sizes for the follow-up phase were calculated to analyze comprehension rates (e.g., words correct on CBM-maze probes) immediately after discontinuing the intervention. Across all groups, large effect sizes were noted, ranging from 1.0 to 43.40 (Cohen, 1992). More specifically, for the intervention phase, Group 1 attained an extremely large ES of 43.40, while Groups 2 and 3 attained effect sizes of 1.30 and 1.36 respectively. The combined group ES was 3.48 for the intervention phase. In the follow-up phase, effect sizes were larger than for the intervention phase, ranging from 2.17 to an extremely large ES of 76.67. The combined group ES for the follow-up phase was 2.22. Overall, large effect sizes were noted in the three groups for the intervention and follow-up phases suggesting the magnitude of the intervention was strong.

Table 8

Reciprocal Teaching Intervention Effect Sizes for Individual Groups and Combined Groups

	Average Baseline	Average Intervention	Average Follow-Up	Standard Deviation Baseline	Effect Size Intervention	Effect Size Follow-Up
Group 1	10.53	15.74	19.73	0.12	43.40	76.67
Group 2	13.8	18.01	20.27	2.89	1.46	2.24
Group 3	15.64	20.15	23.2	3.48	1.29	2.17
Combined Group	13.33	17.97	21.06	3.48	1.33	2.22

Social Validity

The social validity of this experiment was investigated through a treatment acceptability rating scale completed by the teacher and a treatment acceptability rating scale completed by the students (see Appendices G and H). These rating scales also addressed Research Questions 2 and 3 for the reciprocal teaching intervention. Individual tabulations and mean ratings for the scales are presented below with respect to each research question.

Research Question 2

To what degree does the teacher find reciprocal teaching comprehension-monitoring strategy a beneficial intervention for reading comprehension and what is her perception of the CBM-maze probe?

The teacher completed a modified version of a treatment acceptability rating scale for reading interventions derived by Daly, Chafouleas, & Skinner (2005). Appendix G provides a sample of the questions. On the eight questions concerning the reciprocal teaching intervention, the teacher gave a mean rating of 4.63 on a scale from 1 to 5, where 1 was *strongly disagree* and 5 was *strongly agree*. Questions 1, 5, and 7 received a rating of 4 and questions 2, 3, 4, 6, and 8 received a rating of 5 respectively.

The last three questions were related to the CBM-maze probe comprehension measure. The questions utilized the same Likert scale as above. The teacher responded to all three questions with a rating of 5. No comments were written in the comments section provided at the end of the rating scale.

Research Question 3

To what degree do students find reciprocal teaching comprehension-monitoring strategy beneficial to their reading comprehension, and what are their perceptions of the CBM-maze probes?

The students who participated in the reciprocal teaching intervention (used as an academic classroom intervention) completed a rating scale adapted from McCallum, Skinner, Turner, & Saecker (2006). Table 8 provides a summary of the tabulations for the three response categories (*no*, *maybe*, and *yes*) and their converted means. To facilitate the interpretation of the results for this scale, the categories of *no*, *maybe*, and *yes* were converted to Likert-type scores of 1, 2, and 3 respectively. This enabled the calculations of means for each question. The first five questions addressed the reciprocal teaching intervention, and the last three addressed the CBM-maze probe comprehension measure.

Overall, the students rated the reciprocal teaching intervention positively. With respect to reading performance, all 15 students endorsed a perceived increase in reading abilities, as noted in questions two, three, and four. The actual reciprocal teaching intervention (referred to in questions 1-5) was rated primarily with *yes* and *maybe* ratings, with only two students giving a rating of *no* for question one and for question five. The questions pertaining to the CBM-maze probe (i.e., questions 6-8) were also mostly rated in the *yes* and *maybe* categories, with one student giving a rating of *no* in response to question 6. The teacher asked those students who answered *no* to the reciprocal teaching questions and CBM-maze probes why they felt that way. One student responded that it was hard for him to ask teacher-like questions and that he did not have enough time to finish the complete CBM-Maze probe. The other student did not have a response. The converted mean scores ranged from a 2.33 to 3.00 for the reciprocal teaching

intervention and the CBM-maze probe comprehension measure, suggesting overall positive outcomes.

Table 9

Children's Intervention Rating Scale Results

	No	Maybe	Yes	Converted Means
1. Using reciprocal teaching was fun.	2	5	8	2.4
2. I became better at reading comprehension because of reciprocal teaching.	0	0	15	3
3. I get more questions correct now than I did before.	0	0	15	3
4. I understand what I read now more than I did before.	0	3	12	2.33
5. My friends would like to learn reciprocal teaching.	2	3	10	2.53
6. I like taking CBM-maze probes.	1	0	14	2.86
7. CBM-maze probes are a good way to see how much I understand what I read.	0	3	12	2.33
8. My friends would like to take CBM-maze probes.	0	3	12	2.33

This chapter presented the results of this study using the research questions as a guiding framework. In the following chapter, Chapter 5, an analysis of the results will be discussed in relation to reciprocal teaching as a comprehension-monitoring strategy and the use of CBM-maze probes as a form of progress monitoring reading comprehension abilities. The results will be compared to previous research on reciprocal teaching. In addition, reciprocal teaching will be discussed as an evidence-based practice in the area of reading comprehension.

CHAPTER 5

DISCUSSION

This chapter provides a summary of the results for each research question addressed in this study. A discussion of reciprocal teaching as a reading comprehension intervention is presented with emphasis on the research design utilized and the effectiveness of the intervention in relation to previous research. In addition, the utility of the curriculum-based measurement maze probes (CBM-maze probes) to progress monitor reading comprehension growth will also be discussed. Following, a brief analysis of this study, as a form of evidence-based practice and a form of prevention and intervention of reading difficulties will be addressed. Finally, implications for educational practice, cautions for interpreting study results, and possible future directions for research are presented.

The purpose of this study was to investigate the effects of reciprocal teaching comprehension-monitoring strategy with 3rd students. The dependent measures used to assess reading comprehension growth formatively were CBM-maze probes. Additionally, the social validity of the intervention was addressed with intervention acceptability rating scales completed by the teacher and students.

Research Questions and Conclusions

Three research questions were addressed in this study. These questions, and the corresponding conclusions, are presented below.

1. What are the effects of reciprocal teaching comprehension-monitoring strategy on the comprehension rates of 3rd grade students as formatively measured by CBM-maze probes?

Overall, visual analysis of the data suggests reciprocal teaching was an effective intervention in increasing reading comprehension growth as measured by the CBM-maze probes (see Figure 1). Mean levels of words correct exhibited continual growth across all 23 sessions as evidenced by the graphs and descriptive statistics. Additionally, further analysis of the data using the conservative dual-criteria (CDC lines) method indicated that two of the three groups met the criteria for a reliable treatment effect (see Table 7). The magnitude of the intervention was measured with effect sizes for single-subject research (Busk & Serlin, 1992; Kromery & Foster-Johnson, 1996). The effect sizes were large for both the intervention and follow-up phases (see Table 8) and consistent with those found in the literature on effective reading interventions (Daly, Chafouleas, & Skinner, 2005).

2. To what degree does the teacher find reciprocal teaching comprehension-monitoring strategy a beneficial intervention for reading comprehension, and what is her perception of the CBM-maze probe?

The results of the Teacher Acceptability Rating Scale suggested that the teacher found reciprocal teaching to be an efficient and acceptable intervention for increasing reading comprehension. On a scale from 1 (*strongly disagree*) to 5 (*strongly agree*), her mean rating was 4.63 for items one through eight suggesting high acceptability for the intervention. On the three questions addressing the CBM-maze probes, the teacher gave a rating of 5 (*strongly agree*) for all the items suggesting she perceived the CBM-maze probes were easy to administer and were reliable measures for assessing students' reading comprehension.

3. To what degree do students find reciprocal teaching comprehension-monitoring strategy beneficial to their reading comprehension, and what are their perceptions of the CBM-maze probes?

The results of the Children's Intervention Acceptability Rating Scale suggested that most students found reciprocal teaching a fun instructional activity. Most questions were rated in the *yes* category with two *no*'s for questions 1 and 5 and a few *maybe*'s on questions one, four, and five (see Table 9). On the three questions addressing the CBM-maze probes, most students gave ratings of *yes* with three *maybe*'s, and one *no*. This suggests the students liked taking the CBM-maze probes, and they perceived the probes were a good way to measure their understanding of what they read. Additional interpretation for the scale was conducted by converting the categories of *no*, *maybe*, and *yes* to ratings of 1, 2, and 3 respectively. The converted means for the eight items ranged from 2.33 to 3.00 supporting satisfaction with the reciprocal teaching intervention and CBM-maze probes.

Reciprocal Teaching Comprehension-monitoring Strategy

The results of this study continue to show promise for reciprocal teaching as an instructional strategy to promote reading comprehension. As suggested by Palincsar, David, & Brown (1989), small groups of students appear to be the optimal target when using this instructional strategy. In studies by Fung, Wilkinson, & Moore (2003), Le Fevre, Moore, & Wilkinson (2003), and Palincsar & Brown (1984), small groups of students (6 to 10) were used to deliver reading instruction via reciprocal teaching. The effects of reciprocal teaching were measured utilizing single-subject research designs (i.e., multiple baseline designs). All three studies found a steady increase in reading comprehension growth when formatively measured using daily comprehension assessments. The results of this study are similar to the three studies mentioned above in that there was steady growth in reading comprehension as measured by the daily comprehension assessments (i.e., CBM-maze probes) while employing the same type of research design. In addition, in the current study and in the previous studies, the students

maintained significantly higher levels of performance on the daily comprehension assessments during follow-up and maintenance phases (see Figure 1).

A multiple baseline design across subjects was used in the aforementioned studies, as well as the present study. While the logic behind the research design is (a) to have a clear and convincing mean shift between baseline and intervention (i.e. reciprocal teaching) and (b) to stagger entrances into the intervention for each group after a steady baseline has been established (Kennedy, 2005), those ideal results were only seen for one out of four groups (i.e., Group 1) in the Palincsar & Brown (1984) study and one out of three groups (i.e., Group 2; see Figure 1) in the present study. Additionally, the variability in the data for this study and the three other studies made it difficult to visually analyze the data and establish a functional relation had occurred utilizing visual inspections methods exclusively. In all three studies, Fung, Wilkinson, & Moore (2003), Le Fevre, Moore, & Wilkinson (2003), and Palincsar & Brown (1984), statistical procedures (*t*-tests and *ANOVAs*) were used to support intervention effectiveness due to the issues discussed above. In general, these studies employed three to four groups of students receiving intervention within a multiple baseline design, with eight to ten students in each group (approximately 30 students in total). The number of students in those studies made it possible to meet the minimal criteria in subjects to run statistical tests to aid further interpretation of their results. In the current study, a group size of 15 students was exposed to reciprocal teaching without random assignment. Due to the small sample size in this study and lack of randomization, statistical tests were not employed to aid in the interpretation of the results. Instead, traditional visual inspection, the CDC lines method, and effect sizes for single-subject research were systematically applied to investigate the effects and magnitude of reciprocal teaching.

In the current study, three different methods of data analysis were employed to measure the effectiveness of the reciprocal teaching intervention. The first step in analyzing the data was through visual inspection using mean levels, trends, and within- and between-phase analyses (Kennedy, 2005). Secondly, the CDC lines criteria method was employed (Fisher, Kelley, Lomas, 2003). Finally, effect sizes were calculated (Busk & Serlin, 1992). While the visual inspection method has historically been the traditional way to assess the effects of an intervention in single-subject research (Busk & Serlin, 1992; Parsonson & Baer, 1978), the results of previous studies (e.g., Le Fevre, Moore, & Wilkinson, 2003) have shown variability in the data, making it difficult to solely interpret the results using traditional visual inspection. Hence, researchers have used additional techniques such as qualitative measures (Palincsar & Brown, 1984) and statistical analyses (Palicsar & Brown, 1984; Fung, Wilkinson, & Moore, 2003; Le Fevre, Moore, & Wilkinson, 2003) to provide convincing evidence in reporting study results.

For this study, the additional use of (a) the conservative dual-criteria method for visual inspection of data suggested by Fisher, Kelley, & Lomas (2003) and (b) effect sizes for single-subject research (Kromrey & Foster-Johnson, 1996; Daly, Chafouleas, & Skinner, 2005) were employed to support the data analysis. Daly, Chafouleas, & Skinner (2005) suggest synthesizing a combination of sources of information such as procedural integrity, effect size, percentage of nonoverlapping data points, and social validity to identify overall treatment effectiveness. Taken as a whole, the data for this study suggest the reciprocal teaching intervention was an effective method in increasing reading comprehension rate as measured by the CBM-maze probes. This is specifically supported through (a) the continual rise in scores (i.e., words correct on the CBM-maze probes) across all three phases (see Table 6), (b) consistently higher mean levels (words

correct) during intervention and follow-up when compared to baseline levels (see Figure 1), (c) two out of three groups meeting criteria using the CDC lines method (see Figure 2), and (d) effect sizes with magnitudes one standard deviation above the baseline mean (see Table 8). Moreover, the teacher's and students' perceptions of the reciprocal teaching intervention suggested moderately high intervention acceptability as evidenced by their ratings (teacher 4.63 out of 5; students 2.4 out of 3; for converted means see Table 9). Therefore, the data provide a convincing demonstration that a clinical and practical change occurred in reading comprehension with significant magnitudes due to the intervention (Kratochwill, Elliot, & Busse, 1995; Kromrey & Foster-Johnson, 1996; Daly, Chafouleas, & Skinner, 2005).

The results for Group 2 in the current study deserve individual discussion as the data do not mirror the trends in data for previous research. While a stable baseline was not achieved for this group, the last three data points in this baseline phase show a decreasing trend. After session four, when reciprocal teaching was introduced, there was a clear shift in mean words correct on the CBM-maze probes, but then a rapid decrease back to stable baseline levels of responding for a few sessions. This variability in the data could be a reason why Group 2 failed to meet the CDC lines criteria in attributing an effective treatment. The data during the second half of the intervention phase and during the follow-up phase (12 data points in total), showed stable higher mean levels of responding when compared to the baseline phase and the first half of the intervention (11 data points in total). In addition, the effect sizes during intervention and follow-up for Group 2 indicated magnitudes between one and two standard deviations above the baseline mean ($ES = 1.26$ and 2.44 respectively). Therefore, there is convincing evidence to support the effectiveness of the reciprocal teaching intervention for producing higher rates of responding on the CBM-maze probes even in Group 2.

Finally, a comparison of the trends in data from the current study, to the trends in the data from the Fung, Wilkinson, & Moore (2003) study, suggest the same type of growth during the intervention phase, specifically with moderate variability in the data as seen for Group 2 and Group 3 in the current study and Group 2 in the Fung, Wilkinson, & Moore study. Only one group of the three groups in the Fung, Wilkinson, & Moore (2003) study exhibited a stable baseline, as was the case for this study as well. In addition, in both of these studies, the group means in the follow-up phases indicated higher performance on the daily comprehension measures for the three groups.

CBM-maze Probes

One of the innovations of this study was the use of standardized repeated measures (i.e., CBM-maze probes) to assess daily comprehension growth. The measures used in this study to formatively assess students' growth rates were research-based and have shown adequate reliability and validity (Howe & Shinn, 2002; Hosp, Hosp, & Howell, 2007). In contrast, the studies by Palincsar & Brown (1984); Fung, Wilkinson, & Moore (2003); and Le Fevre, Moore, & Wilkinson (2003) utilized teacher-made comprehension measures (i.e., a reading passage with 10 short-answer questions) to measure daily comprehension growth and did not report any psychometric properties. An analysis of the data from this study, in comparison to the data in the studies by the previous researchers, shows similar growth rates across phases. This suggests both types of comprehension measures seem to be viable ways of measuring reading comprehension growth formatively. One difference in the measures, though, is that CBM-maze probes are quicker to administer (e.g., 3 minutes), are easily scored (Brown-Chidsey, Davis, & Maya, 2003), provide national norms for comparison (Hosp, Hosp, & Howell, 2007), and have ready-made, easily accessible multiple forms (Howe & Shinn, 2002). Therefore, CBM-maze probes

appear to be a quick and efficient assessment for classroom teachers to use when monitoring students' reading comprehension growth- daily, weekly, monthly, or for quarterly benchmarking. In the present study, the teacher's perception of CBM-maze probes usefulness in assessing reading comprehension was positive. The teacher felt the probes were an effective, easy-to-administer, reliable measure of reading comprehension. The students' perceptions of the CBM-maze probes in measuring reading comprehension were also positive and moderately high. These results suggest that the teacher may be more inclined to use the CBM-maze probes to progress monitor students' reading comprehension growth in the future.

Prevention and Intervention

In the past 30 years, instructional models aimed at preventing failure of basic academic skills (i.e., reading and math) in students at the elementary level have been implemented across the United States (e.g., Minneapolis Public Schools; for a full discussion see Fuchs, Mock, Morgan, & Young, 2003). National reports, such as the one published by the National Reading Panel (2001), have emphasized the need to implement preventive and proactive reading education in response to declining reading scores (Chall, 1996a; Moats, 1999; NAEP, 2005). In addition, federal grants have been offered by the U.S. government to assist state boards of education to take these preventive steps in reading education (e.g., Reading First, NCLB, 2002). The current study was designed to support this preventive approach. This prevention was accomplished through two ideas. One idea was the use of explicit instruction of comprehension-monitoring strategies through reciprocal teaching provided to typical third graders (students reading at grade level; see Table 4). The second idea involved strategically selecting 3rd grade, when students are transitioning from "learning to read" to "reading to learn" (Chall, 1996b, p. 29), for the intervention. In contrast, previous studies, such as Palicsar & Brown (1984),

implemented reciprocal teaching as an intervention for struggling readers (below average) at the junior high level. What this suggests is that reciprocal teaching can be used at varying grade levels as a preventive strategy during reading instruction for average students, as well as an intervention for students at-risk for reading failure.

Evidence-based Practice

The re-authorization of the Elementary and Secondary Act (NCLB, 2002) includes the promotion of scientifically-based research and evidence-based instructional practices. The emphasis is on applying scientifically-based research as a means of positively impacting student learning, so that instructional methods that have been proven to be effective are used consistently in real-world classrooms. Some of the characteristics of scientifically-based research include (a) systematic, rigorous methods based on observations or experiments, (b) the use of systematic data analysis, and (c) publication in peer-reviewed journals (NCLB, 2002). Researchers such as Horner et al. (2005) have indicated that single-subject research is a scientific methodology that supports evidence-based practices. Reciprocal teaching comprehension-monitoring strategy meets these criteria as an evidence-based instructional approach to teaching reading comprehension, as shown by the literature review in this study. The current study was modeled after those tenets and included a systematic experimentation with reciprocal teaching, as well as systematic data analysis procedures such as visual inspection, CDC lines method, and effect sizes. Furthermore, the experiment was designed around previous research in peer reviewed journals and sought to extend the research by utilizing different dependent variables (i.e., CBM-maze probes) while addressing treatment integrity and social validity.

Horner et al. (2005) have suggested that evidence-based practices have five criteria:

1. The practice is operationally defined.
2. The context and outcomes associated with a practice are clearly defined.
3. The practice is implemented with documented fidelity.
4. The practice is functionally related to change in valued outcomes.
5. The practice is validated across a sufficient range of contexts, researchers and participants (pp. 167-168).

The interventions used in the current study and the previous studies appear to meet these criteria as evidence-based practices in reading comprehension instruction. The use of single-subject research in this study was a tool to support evidence-based practices (Hosp, Hosp, Howell, 2007; Brown-Chidsey & Steege, 2005) and scientifically-based research (NCLB, 2002).

Implications for Practice

The current study has several practical implications, including the utility of reciprocal teaching and explicit strategy instruction in reading comprehension as a model for evidence-based practices in the classroom. With respect to instruction in the area of reading comprehension, this study provides an intervention that can be implemented with elementary students of varying abilities and for varying purposes. Across all the studies summarized in the literature review, there was a range of learners from kindergarten (Myers, 2005) to adults (Manzo, 1969).

The results of the current study and the literature on reading comprehension suggest explicit teaching of comprehension strategies can provide a scaffold for students to begin to internalize the strategies taught and to apply them on their own (Duffy, 2002). In essence, the implication for teachers who teach reading comprehension at any level is that initial, explicit instruction through modeling of comprehension strategies (i.e., predicting, clarifying, summarizing, questioning) can assist students in self-monitoring and applying the strategies when reading silently.

Progress monitoring is a form of evidence-based practice (Hosp, Hosp, Howell, 2007). It allows teachers and researchers to monitor instruction formatively and make changes to instruction based on the data collected (Fuchs & Fuchs, 2004). Inclusively, the instructional decision made from progress monitoring data can be seen a form of practice-based evidence in teaching. This notion of practice-based evidence assists teachers in reflecting on their teaching practices and how these practices impact student learning and outcomes. Therefore, progress monitoring can engage teachers in becoming action researchers in their classrooms, and guide them to make data-based decisions.

The current study employed research-based CBM-maze probes as comprehension measures within a progress monitoring framework. The use of a multiple baseline across groups of students allowed the researcher and classroom teacher to evaluate the effectiveness of the reciprocal teaching intervention. The application of this type of evaluation of instruction is appropriate in applied settings such as those in education, where instruction may need to be adjusted in response to the data (Horner et al., 2005; Kennedy, 2005).

The research design of the current study also supports evidence-based practices with the identification of clearly defined dependent and independent variables (Brown-Chidsey & Steege, 2005). For example, in the current study reading growth (i.e., slopes) on the CBM-maze probe was the dependent variable. The slopes for the intervention phase were 0.67, 0.50, and 0.59 for Groups 1, 2, and 3 respectively. Based on previous research findings for the growth rates of CBM-maze probes (Fuchs & Fuchs, 2004), the slopes during the intervention were above the expected growth rates of “0.40” (p. 33) words correct per week. Therefore, the data showed instruction was progressing with higher than expected growth rates, indicating appropriate instruction. If any of the slopes were lower than 0.40 though, this would be a signal to the

teacher that the instruction taking place might need to be modified. This scenario illustrates a form of data-based decision making.

Another implication for practice is the ability to qualitatively analyze the data gathered. This could be done for the whole group, as well as for individual students. A qualitative analysis of individual students' responses to one of the CBM-maze probes (e.g., passage10, session 18) for this study is presented below. In this probe, the second sentence on the third line continued onto the fourth line as follows:

...(**things, fastest, little**) roller coaster. When she visited the (**baby, and, ice**) cream shop, she chose a new (**flavor, joke, visit**) each time.

Out of the 15 students, it appeared that 8 students first circled the word "baby" in the first sentence above, but then crossed it out and circled the word "ice." This suggests that students may have initially chosen one answer that made sense in the first sentence, but after continuing to read the passage went back and chose the correct answer that made more sense in the sentence. This type of error analysis of the CBM-maze probes can provide qualitative information to inform the teacher's instructional practices, as well as evidence of strategy use.

Overall, these implications point to the usefulness of evidence based-practices in teaching. One way to build a school culture that implements evidence-based practices is to have school psychologists, such as the researcher in this study, provide ongoing professional development in research-based effective instructional practices (e.g., reciprocal teaching). School psychologists are specifically trained in data-based decision making and in the identification and use of effective instructional practices (Ysseldyke, et al. 2006), making them a viable resource in the school building for assistance in interpreting data and in designing effective instructional programs (Merrell, Ervin, & Gimpel, 2006).

Cautions in Interpreting the Current Study's Results

The following are cautions in interpreting the results of the current study.

1. This study used a convenience sample of an intact classroom. Although randomization is not a pre-requisite for single-subject research, the groups of students the teacher already had in place may not have been the optimal combination. An example of this can be seen in the individual student data (see Appendix E), where Student 1 was consistently below his peers on the CBM-maze comprehension measure. This affected the mean scores used to evaluate the intervention, perhaps yielding conflicting results.
2. While Palincsar, David & Brown (1989) suggest 20 sessions of reciprocal teaching to be the optimal number of sessions to see adequate growth in the reading comprehension abilities of students, this study only employed an average of 15 sessions (range 11-17) for the intervention phase due to time constraints of the school year ending. This also impacted the research design, where a stable baseline was desired before introducing the intervention (i.e., reciprocal teaching). A stable baseline was exhibited by Group 1 but not Groups 2 and 3. Therefore, it was more difficult to visually analyze the data and conclude a functional relation between baseline and intervention phases solely using traditional visual inspection.
3. This study included a Procedural Integrity Checklist that has not been used to document the treatment integrity of reciprocal teaching as suggested in the literature (Galloway, 2003). This innovation is an advance in sustaining the treatment efficacy of reciprocal teaching, but it has a disadvantage with respect to the reciprocal teaching process. Because the reading process is complex (i.e., background knowledge, vocabulary, decoding fluency as described in Pressley, 2002), the opportunistic situations that may

occur during the dialogue in reciprocal teaching may not happen due to strict adherence to the Procedural Integrity Checklist. For example, if one student in the group is having trouble using the questioning strategy in a particular session, it may be better for him/her to practice that strategy only for a few sessions. Inclusively, one may want to spend more time with that student building prior knowledge to facilitate his/her questioning techniques. With the current Procedural Integrity Checklist, that would not have been possible since the students rotated teacher roles (i.e., clarifier, predictor, summarizer, and questioner) after reading a paragraph or short section of the text.

4. The research design in this study employed a multiple baseline across groups of students, with a baseline phase, an intervention phase, and a follow-up phase that was immediately implemented after the intervention was withdrawn (Fung, Wilkinson, & Moore, 2003). There is a potential threat to the external validity of the design with respect to the phases implemented. Again, because the school year was ending, I was not able to plan a 4th maintenance phase. This phase would have allowed checking for the generalization of behaviors (i.e., words correct on the CBM-maze probes) a few weeks or months after the intervention was concluded. In the studies conducted by Palincsar & Brown (1984) and Le Fevre, Wilikinson, & Moore (2003), this maintenance phase was instituted to determine if the mean levels of responding on the comprehension assessments continued at levels commensurate with the previous follow-up phase. Inclusively, implementing this phase a few months after, and assessing for the use of the reciprocal teaching strategies by the students and the teacher, as well as their comprehension rates on the CBM-maze probes, would be an alternate method to assess the social validity of the intervention (R. G. Smith, personal communication, April 2007).

5. Finally, one last caution stems from the lack of analysis of the dialogue that takes place during the reciprocal teaching process (Hacker & Tenent, 2002). This analysis can support treatment integrity data by counting the frequency of comments made by the teacher versus the frequency of comments by the students (Palincsar & Brown, 1984; Kelley, Moore, & Tuck, 1994). Since an analysis of the dialogue during the reciprocal teaching intervention was not undertaken in the current study, the quality of the discourse between the teacher and students could not be assessed. Hence, a more in-depth discussion of the reading comprehension process could have been presented if the dialogue during the intervention phase had been systematically collected and analyzed as previous researchers have done (Palincsar & Brown, 1984; Fung, Wilkinson, & Moore, 2003).

Future Directions

Future studies should include the replication of the current study's procedures using CBM-maze probes as the dependent measures, as this has been the first time these comprehension measures have been used in conjunction with reciprocal teaching. The replications should also be conducted across varying ages and ability levels in order to determine the generalizability of results. More specifically, the effects of reciprocal teaching comprehension-monitoring strategy could be implemented with students with giftedness. The literature on reciprocal teaching has not addressed this population. Researchers should also investigate utilizing different types of progress monitoring measures, such as oral reading fluency probes (Hosp, Hosp, & Howell, 2007) or reading comprehension rate probes (for a detailed description see Neddenriep et al., 2007) to compare how dynamic each of these are in detecting growth rates for reading comprehension interventions as compared to CBM-maze

probes. While reciprocal teaching utilizes a the four strategies (1) predicting, (2) clarifying, (3) summarizing, and (4) questioning as a packaged intervention, the current and previous research has not addressed which of the four strategies is most effective in increasing reading comprehension abilities (Rosenshine & Mesiter, 1994). A possible future study could investigate how each strategy in isolation or in varying combinations (i.e. clarifying and summarizing only) impacts reading comprehension growth in students. Finally, researchers should continue to investigate small group instruction (5-8 students) versus whole class instruction (20-30 students) using reciprocal teaching to see whether the different group sizes have a significant impact on the growth rates of reading comprehension abilities in students. Inclusively, the use of a multiple baseline across whole classes, with the mean class score as the unit of analysis could be employed to measure the effects of reciprocal teaching when implemented as a whole class intervention. This type of research design is not used very often in single-subject research (R. G. Smith, personal communication, 2006; Kennedy 2005). The utility of employing single-subject research designs (i.e., multiple baselines) in applied settings such as a classroom provides a vehicle for teachers to become active researchers in their classrooms and begin to apply practice-based evidence in their teaching.

Summary

Reciprocal teaching as a comprehension monitoring strategy was initially researched by Ann Marie Palincsar as early as 1982. The first published article on reciprocal teaching appeared in a peer reviewed journal in 1984 (Palincsar, David, & Brown, 1989). To date, more than 20 years later, there exist over 20 articles in the literature on reading comprehension that use reciprocal teaching as a vehicle to increase comprehension abilities. The current study sought to add to this literature by (a) investigating the effectiveness of reciprocal teaching as measured by

CBM-maze probes, (b) adding a procedural integrity protocol for the intervention, and (c) investigating the social validity of the intervention. A synthesis of the results of the current study suggests that the reciprocal teaching intervention had overall meaningful effects of significant magnitude for all groups. Basically, the intervention was able to assist students in increasing their reading comprehension abilities as measured by the CBM-maze probes. Although the results of this study showed a positive effect, they should be interpreted with caution and within the limitations specified herein.

APPENDIX A:
EXPLICIT TEACHING PROCEDURES FOR THE FOUR STRATEGIES OF RECIPROCAL
TEACHING

Introduction to Predicting

Ask the students, "What does it mean to predict?"

Read this paragraph:

The weather forecasters on television look at clouds on the radar and try to predict what the weather will be like today, tomorrow, and a few days ahead. They don't just guess, they find clues that tell them what the weather will be like. They also combine those clues with what they already know to make those predictions.

Just like those weather forecasters, we are going to learn how to predict from the passages that we hear or read. We are going to look and listen for clues and combine them with what we already know to tell us what will happen next. Predicting can help us become better readers and writers. As we read, we can see if our predictions come true.

Ask the students to think of what they already know and to respond:

1. What do you predict you will see when you visit a pet store?
2. What kinds of shows do you predict will be on Saturday morning television?
3. Your friend asks you to go to a movie called "Monsters of the Deep". What do you predict the movie will be about?

Ask: Where can you make predictions in a story?

Suggested responses:

The most important prediction should come as you read the title or a headline. Other predictions may happen when you read chapter headings or subtitles, when the author of the story asks a question, or when a character in a story is about to do something.

Introduction to Clarifying

What happens when you are confused about the information the writer is trying to tell you?
(Students respond.)

Sometimes you have to stop reading in order to get a clear picture in your mind about the ideas the writer is trying to get across. Good readers are not always fast readers. Sometimes you have to slow down and even stop to clarify or make clear what you are reading. When watching a video, you can hit the **PAUSE** button and **REWIND** if you miss something. If you miss something when reading, you have to hit the **PAUSE** button, go back, and **REREAD** until it makes sense.

Does anyone know what the word "clarify" means? (Students respond.)

Ask: What do you do when you come across a word you don't know while you are reading?
What do you do when you don't understand what the text is trying to tell you? (Students respond.)

There are four strategies you can use to help you figure out the meanings of words that you don't understand. They are:

1. Look for little words in big words.
2. Look for word parts such as bases (roots), prefixes, and suffixes.
3. Look for commas that follow unfamiliar words. Sometimes when an author uses a word that maybe unfamiliar to the reader, he/she will follow it with a comma, give the definition, use another comma and then continue on with the sentence. The definition of the word will be between the commas. Sometimes the author may use the word "or".
4. Keep reading. The word that you are stuck on may not be important to the meaning of the sentence, or as you read you will get a general idea of the meaning even though you can't give a dictionary definition.

Introduction to Asking Teacher-like Questions

Why do good readers ask themselves questions about what they have just read? (Students respond.)

Right. After you have predicted and clarified, you should ask good questions about what you have read for at least two reasons. One reason is to test yourself to see if you really understand what you have read. The other reason is to identify what is important to remember in the story or the passage.

Let's talk about what makes a "good" teacher-like question. You have already asked clarifying questions about parts you don't understand. Now you should ask questions to help you understand the larger meanings of the lesson.

Read this passage:

Many years ago, in the days when people lived outdoors or in caves, there were no tame dogs. In fact, all the animals of the world were wild. One of those wild animals was the wolf. Wolves roamed through the fields and forests shy and suspicious of humans. Yet from these wild wolves (and maybe from jackals and foxes too) have come all the different dogs that are pets today.

Ask: What kinds of questions can you think of to test your understanding of this passage? (Students respond.)

Good questions ask who, what, when, where, why, and how. They also ask you to compare two or more things, tell why something is important, or give the order in which things happen. **Good teacher-like questions are based on the information given in the text.**

Introduction to Summarizing

Call on a few students to give the title of their favorite television show and one sentence that tells what it is about. Explain that they have just made a summary. Ask: From what you have said, can you come up with a definition for a summary?

Suggested response: To tell the most important ideas in one or two sentences. A good summary does not include details or information that is not important.

Some practice exercises:

Listen to this list of words: German shepherd, poodle, collie
What one word describes this list? (dogs)

Now listen to this list: rabbit, dog, cat, horse, cow
What one word describes this list? (animals)

Here's another list: cars, buses, trains, ships, planes
What one word describes this list? (transportation)

You may have to generate more lists if students still do not get the idea.

APPENDIX B:
RECIPROCAL TEACHING SAMPLE CUE CARD

Note. Adapted from Reciprocal teaching at work: Strategies to improve reading comprehension,
L. D. Oczkus, 2003, Newark, DE: International Reading Association.

Questioner

- Ask your group members one or two questions that can be answered from the text
- Ask your question first, and then call on a volunteer to answer your question
- Ask for other volunteers to ask their questions
- Use “How” and “Why” questions
- Try not to use “Yes” and “No” questions

APPENDIX C:
SAMPLE CBM-MAZE PROBE

Jason and Max picked next Friday to carry out their special mission. Friday was a week away. They (**agreed, had, branches**) so many things to accomplish. In (**plan, order, at**) to reach their final goal, the (**next, branches, boys**) made a plan for each day (to, of, each) the week. They had to work (**hard, creek, big**) every day to finish each task. (**Pile, Could, Had**) they do it all?

On Monday, (**creek, big, they**) agreed to meet and put plan (**near, wood, A**) into action. Plan A was to (**gather, work, day**) as many fallen branches as they (**could, on, had**) carry. They hauled the wood from (**neat, a, the**) edge of the cornfield and stacked (**agree, it, they**) in a big pile at the (**plan, edge, hauled**) of the forest.

On Tuesday, the (**rocks, by, boys**) met near the lazy creek and (**put, climb, wood**) plan B into motion. They dug (**up, near, the**) rocks the size of footballs from (**and, night, the**) creek's bottom. By dusk, they had (**rode, arranged, to**) the rocks in a neat circle (**a, next, up**) to the pile of branches they (**their, found, had**) hauled the night before.

On Wednesday, (**plan, the, work**) C was to climb into the (**attic, umbrellas, they**) above Jason's garage. They searched around (**Max, in, with**) flashlights and both found backpacks. They (**spoke, under, wore**) their packs as they rode their (**without, bikes, garage**) to the edge of the forest (**to, end, for**) complete the day's work.

On Thursday (**they, it, work**) rained. They had to drop the (**up, plan, forest**) for the day. Still, Jason and (**went, backpack, Max**) met at the end of their (**bikes, driveways, on**) under umbrellas. They quietly spoke. They (**rained, decided, tent**) their mission would work without plan (**0, fire, was**).

When the sun went down on (**only, Friday, evening**), they met at the edge of (**the, out, and**) forest. There sat their tent. They'd (**stacked, tasks, set**) it up on Wednesday evening. The (**circle, special, wood**) was ready to go into their (**campfire, many, night**) ring. Their next step was to (**big, build, climb**) a warm fire.

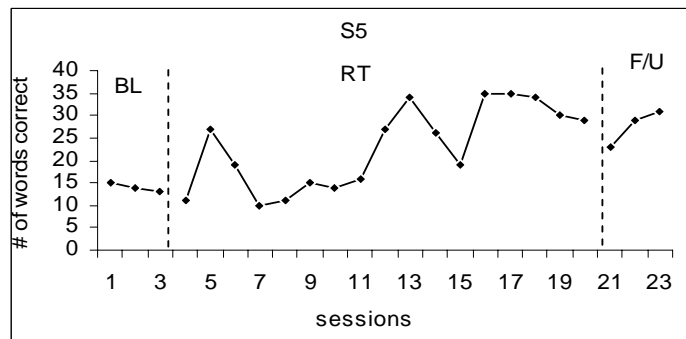
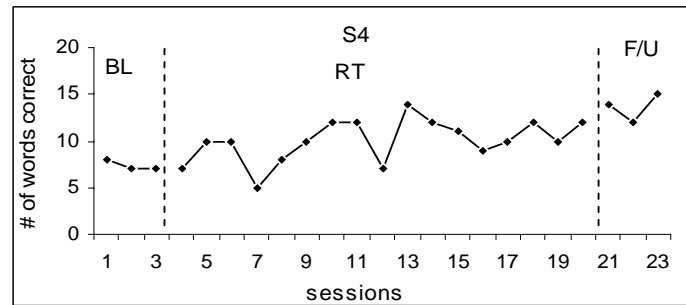
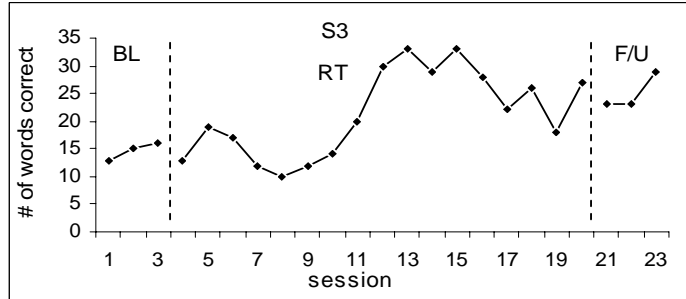
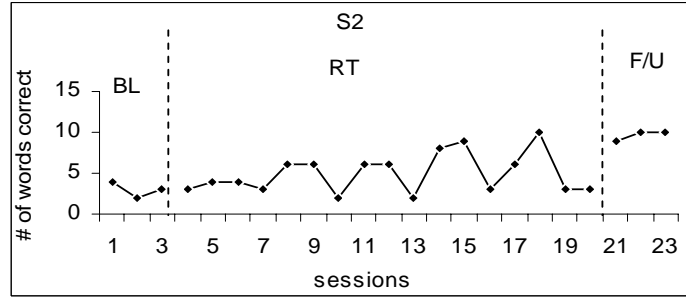
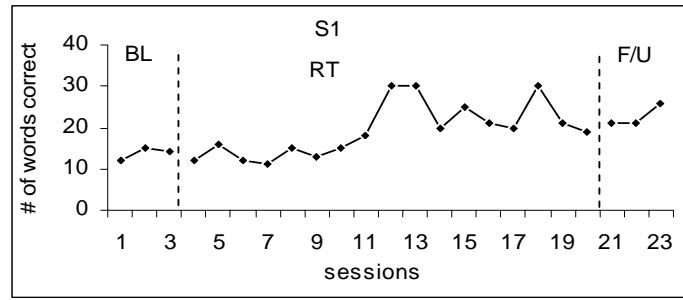
Note. Adapted from http://www.aimsweb.com/uploaded/files/sample_maze.pdf

APPENDIX D:
LIST OF CBM-MAZE PROBES USED

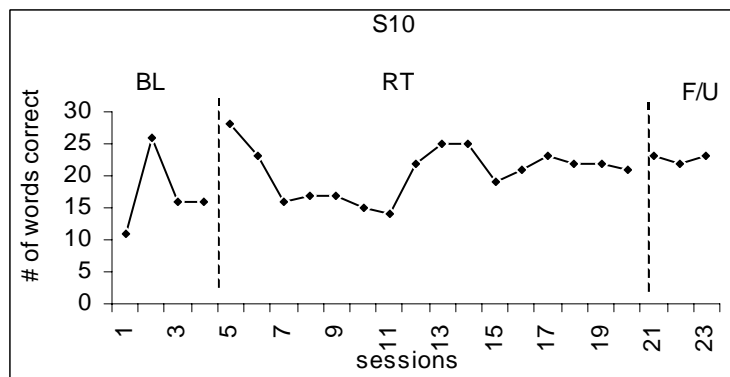
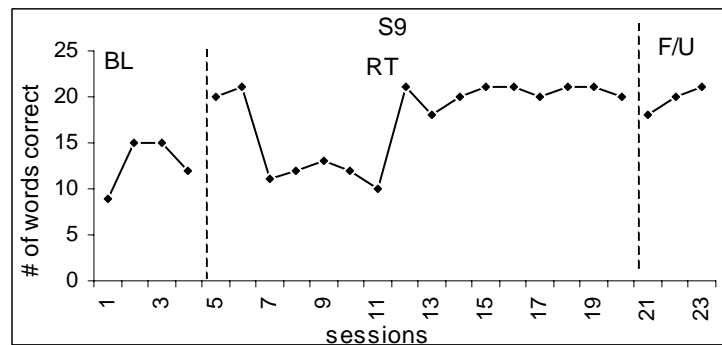
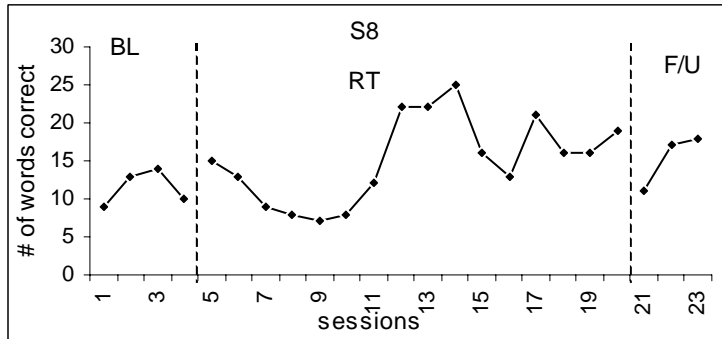
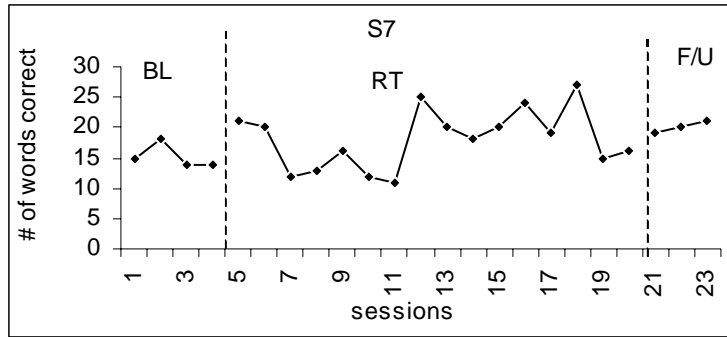
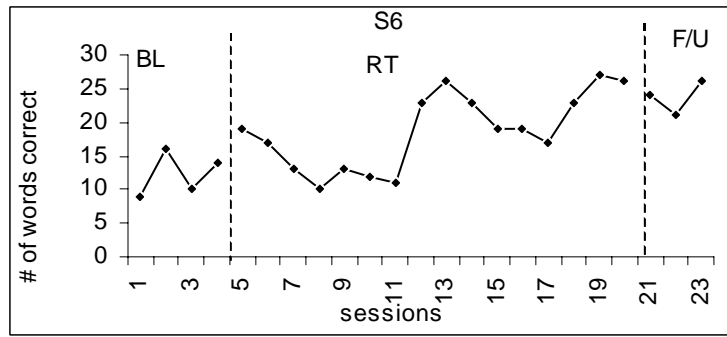
List of CBM-Maze Probes

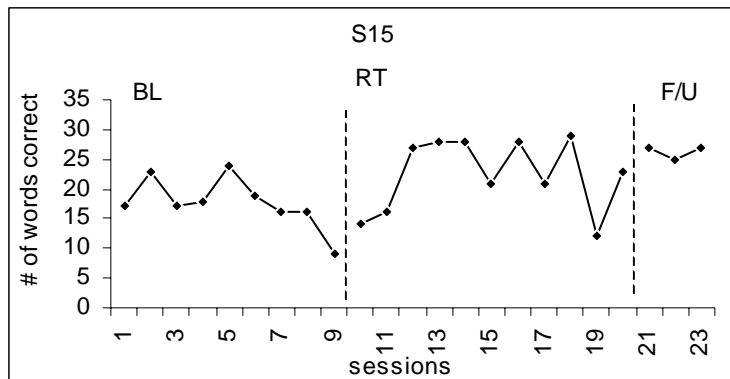
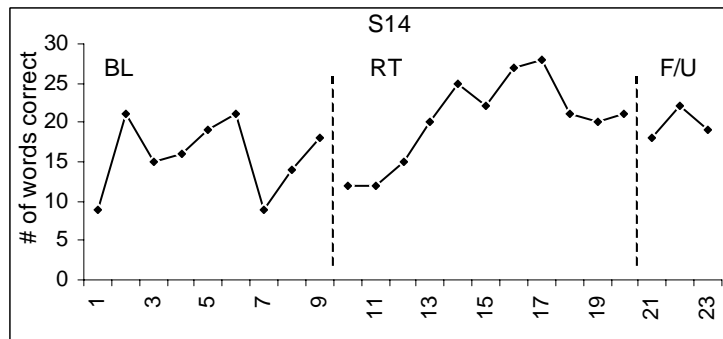
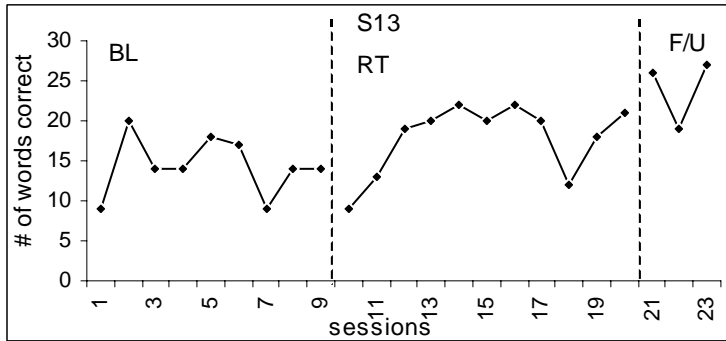
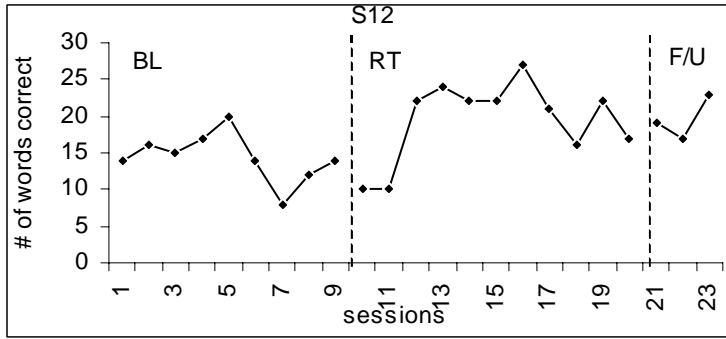
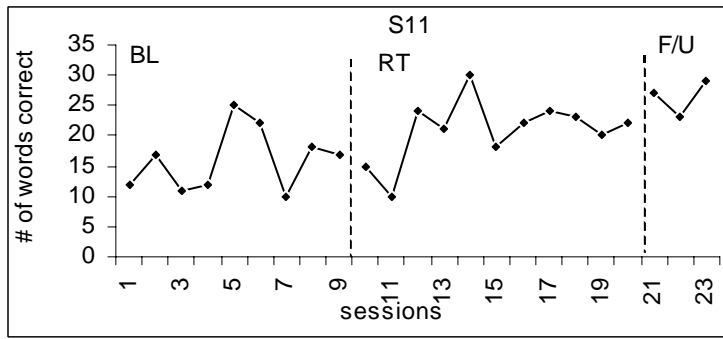
1. Passage 33 “Where are you going”
2. Passage 28 “The peacock thought”
3. Passage 31 “Once there was”
4. Passage 29 “The sun was out”
5. Passage 26 “The huge ball of”
6. Passage 25 “Ted loved going”
7. Passage 24 “Sam was a snake”
8. Passage 23 “Ray barns loves”
9. Passage 22 “Out of all”
10. Passage 19 “Mr. Black had”
11. Passage 20 “Mr. Tan lived”
12. Passage 15 “Kim loved to play”
13. Passage 14 “Three-year-old John”
14. Passage 17 “Mike was the”
15. Passage 13 “Billy was sitting”
16. Passage 05 “Andy was just”
17. Passage 04 “Albert was a”
18. Passage 10 “Even though Marcus”
19. Passage 32 “Mama frog carried”
20. Passage 30 “The wolf pack”
21. Passage 27 “All the other”
22. Passage 21 “Nora lived in”
23. Passage 18 “One day while”

APPENDIX E:
INDIVIDUAL STUDENT GRAPHS



Note. BL = baseline; RT = reciprocal teaching; F/U = follow-up





APPENDIX F:
PROCEDURAL INTEGRITY CHECKLIST

Procedural Integrity Checklist

Day 1

Reciprocal teaching procedures

- _____ Call groups up to kidney table for reciprocal teaching instruction
- _____ Distribute reading material
- _____ Distribute reciprocal teaching (RT) cue cards
- _____ Cross-check that students have rotated RT jobs
(i.e., summarizer, predictor, clarifier, questioner)
- _____ Begin RT with teacher modeling (20 minutes sessions per group)
- _____ Facilitate students taking turns using RT strategies
- _____ End session after 20 minutes

Assessment procedures

- _____ Place maze probes face down in front of students
- _____ Set timer to zero
- _____ Read maze probe assessment instructions
- _____ Start timer
- _____ Stop timer at 3 minutes by saying “time’s up”
- _____ Collect probes

APPENDIX G:
TEACHER ACCEPTABILITY RATING SCALE

Teacher Acceptability Rating Scale

	Strongly Disagree 1	2	3	4	Strongly Agree 5
1. The intervention was an acceptable way to increase students reading comprehension.	1	2	3	4	5
2. I would recommend this intervention to other teachers.	1	2	3	4	5
3. I am willing to use this intervention again in the future.	1	2	3	4	5
4. I like the procedures used in this intervention.	1	2	3	4	5
5. The intervention will produce lasting improvements in the students' reading comprehension.	1	2	3	4	5
6. The students enjoyed the intervention.	1	2	3	4	5
7. The intervention was a time-efficient way to teach reading comprehension.	1	2	3	4	5
8. Overall, the intervention was beneficial to the students.	1	2	3	4	5
9. CBM-maze probes are effective and reliable in measuring students' reading comprehension.	1	2	3	4	5
10. CBM-maze probes are easy to administer and score.	1	2	3	4	5
11. I would recommend CBM-maze probes to other teachers as a way to measure their students' reading comprehension abilities.	1	2	3	4	5

Comments:

APPENDIX H:
CHILDREN'S INTERVENTION ACCEPTABILITY RATING SCALE

Children's Intervention Acceptability Rating Scale

	No	Maybe	Yes
1. Using reciprocal teaching was fun.	No	Maybe	Yes
2. I became better at reading comprehension because of reciprocal teaching.	No	Maybe	Yes
3. I get more questions correct now than I did before.	No	Maybe	Yes
4. I understand what I read now more than I did before.	No	Maybe	Yes
5. My friends would like to learn reciprocal teaching.	No	Maybe	Yes
6. I like taking CBM-maze probes.	No	Maybe	Yes
7. CBM-maze probes are a good way to see how much I understand what I read.	No	Maybe	Yes
8. My friends would like to take CBM-maze probes.	No	Maybe	Yes

APPENDIX I:
CONSENT FORMS

University of North Texas Institutional Review Board

Parent/Student Informed Consent Form

Before agreeing to your child's participation in this research study, it is important that you read and understand the following explanation of the purpose and benefits of the study and how it will be conducted.

Title of Study: The effects of reciprocal teaching comprehension-monitoring strategy on 3rd grade students.

Principal Investigator: Israel A. Sarasti, Psy.S., a graduate student in the University of North Texas (UNT) Department of Education.

Purpose of the Study: You are being asked to allow your child to participate in a research study. This study can help your child understand what they read better. The method that will be used uses conversation between the teacher and student. Previous research with children and adults has shown that the conversation and discussion done after reading a story can increase understanding of what was read.

Study Procedures: Your child will be asked to read a story in a small group of five students. Ms. Amargos will then teach them how to use the four reading strategies in the small reading groups she already has in place. The students will then take turns being the teacher and talking about what they read. The students will take a daily 2-minute timed reading quiz. This will help monitor how well they understand what they read. The instruction will take about 20 minutes daily of your child's time for 3 weeks. Your child will fill out a short five question satisfaction survey at the end of the 3 weeks.

Foreseeable Risks: No foreseeable risks are involved in this study.

Benefits to the Subjects or Others: We expect the project to benefit your child by increasing his/her ability in reading comprehension, not only for language arts class, but for social studies, science, and even math class. Additionally, the strategies may help the students understand the reading passages asked in standardized tests (i.e., FCAT). You will receive a summary sheet at the end showing your child's progress on the daily quizzes. Ms. Amargos will pair up each student's name with his/her pseudo name (i.e., S1=Mary, S2=John, etc.) before she sends the summary home to parents.

Procedures for Maintaining Confidentiality of Research Records: The confidentiality of your child's individual information will be maintained in any publications or presentations regarding this study. Their name or any traceable identifying information will not be used in the recording and coding of the data. Instead, Ms. Amargos will provide me with data by referring to student 1 (S1), student 2 (S2), student 3 (S3) etc. on the daily comprehension quiz and demographic data (such as age, ethnicity, bilingual, SES, reading level). Ms. Amargos will keep the signed consent forms and a copy of the data in her class files. She will also mail me a photo copy of the data for me to analyze.

Questions about the Study: If you have any questions about the study, you may contact Israel A. Sarasti, Psy.S. at telephone number 305.439.7315, or the faculty advisor, Dr. James Laney professor UNT Department of Education, at telephone number 940.565.2602.

Review for the Protection of Participants: This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

Research Participants' Rights: Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- You understand the possible benefits and the potential risks and/or discomforts of the study.
- You understand that you do not have to allow your child to take part in this study, and your refusal to allow your child to participate or your decision to withdraw him/her from the study will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your child's participation at any time.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as the parent/guardian of a research participant and you voluntarily consent to your child's participation in this study.
- You have been told you will receive a copy of this form.

Printed Name of Parent or Guardian

Signature of Parent or Guardian

Date

For the Principal Investigator or Designee: I certify that I have reviewed the contents of this form with the parent or guardian signing above. I have explained the possible benefits and the potential risks and/or discomforts of the study. It is my opinion that the parent or guardian understood the explanation.

Signature of Principal Investigator or Designee

Date

Student Assent Form

You are being asked to be part of a research project being done by the University of North Texas Department of Education.

This study involves a teaching method that may help you understand what you read better. You will read a book or story. Then you will learn how to discuss what you read. Ms. Amargos will show you how to discuss what you read in small groups of five students.

You will be asked to use these strategies during guided reading instruction. Ms. Amargos will teach you how to use the four strategies first. Then, she will let you take turns with the other students in your group being the teacher and asking questions. For example, you can be the teacher and ask other students questions or summarize what you just read for the group.

This method will take 20 minutes daily for 15 days. At the end of each session you will take a short 2 min. quiz to see how well you understand what you read. At the end of the 15 days you will fill out a short 5 question survey telling me if you liked this method or not. You will also get a summary of your progress on the daily quizzes to take home and show you parents.

If you decide to be part of this study, please remember you can stop participating any time you want to.

If you would like to be part of this study, please print and sign your name below.

Printed Name of Student

Signature of Student

Date

Signature of Principal Investigator or Designee

Date

University of North Texas Institutional Review Board

Teacher Informed Consent Form

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose and benefits of the study and how it will be conducted.

Title of Study: The effects of reciprocal teaching comprehension-monitoring strategy on 3rd grade students.

Principal Investigator: Israel A. Sarasti, Psy.S., a graduate student in the University of North Texas (UNT) Department of Education.

Purpose of the Study: You are being asked to participate in a research study which involves teaching strategies that can increase reading comprehension. This study can help your students understand what they read better. The method that will be used uses conversation between the teacher and student. Previous research with children and adults has shown that the conversation and discussion done after reading a story can increase understanding of what was read.

Study Procedures: You will be asked to conduct this comprehension strategy during your language arts block. The instruction will take place specifically during small group instruction (guided reading groups). You can use the groups you already have in place. You will teach the students the four strategies explicitly, and let the students in the group take turns being the teacher and asking questions. You can facilitate the process while the students become familiar being teacher, as well as to maintain classroom management. The students will take a short 2 minute quiz at the end of each day. The intervention will take about 1 hour of your time daily for 3 weeks which is already part of your language arts block. You will also be asked to fill out a short 8 question survey on how you liked this teaching method.

Foreseeable Risks: No foreseeable risks are involved in this study.

Benefits to the Subjects or Others: We expect the project to benefit you and your students by increasing their ability in reading comprehension, not only for language arts class, but for social studies, science, and even math class. The intervention will also provide you with some more teaching strategies to increase reading comprehension that can be used in your future career as a teacher. Additionally, the strategies may help the students understand the reading passages asked in standardized tests (i.e., FCAT). I will provide a graph of the data at the end showing the group's progress and individual student's progress using the pseudo-names assigned at the beginning of the study. For example, each student's data will be coded using S1= Jon, S2=Mary, S3=Joe etc. by you using the reading groups you already have in place. The group's average and individual scores on the daily reading quizzes will be provided for you at the end of the study. This will monitor how well students understand what they read.

Procedures for Maintaining Confidentiality of Research Records: The confidentiality of your students' individual information will be maintained in any publications or presentations regarding this study. Their name or any traceable identifying information will not be used in the

recording and coding of the data. Instead, you can provide me with the data by referring to student 1 (S1), student 2 (S2), student 3 (S3) etc. on the daily comprehension quiz. You can also keep the signed consent forms and a copy of the data in your class files. You can then mail me a photo copy of the data for me to analyze.

Questions about the Study: If you have any questions about the study, you may contact Israel A. Sarasti, Psy.S. at telephone number 305.439.7315, or the faculty advisor, Dr. James Laney professor UNT Department of Education, at telephone number 940.565.2602.

Review for the Protection of Participants: This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

Research Participants' Rights: Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- Israel A. Sarasti, Psy.S. has explained the study to you and answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.
- You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as a research participant and you voluntarily consent to participate in this study.
- You have been told you will receive a copy of this form.

Printed Name of Participant

Signature of Participant

Date

For the Principal Investigator or Designee: I certify that I have reviewed the contents of this form with the participant signing above. I have explained the possible benefits and the potential risks and/or discomforts of the study. It is my opinion that the participant understood the explanation.

Signature of Principal Investigator or Designee

Date

APPENDIX J:
IRB APPROVALS



Office of Program Evaluation
Executive Director
Dr. Jerome L. Levitt

Miami-Dade County School Board
Mr. Agustin J. Barrera, Chair
Dr. Martin Karp, Vice Chair
Mr. Renier Diaz de la Portilla
Ms. Evelyn Langley Greer
Ms. Perla Tabares Hanman
Dr. Robert B. Ingram
Ms. Ana Rivas Logan
Dr. Marta Pérez
Dr. Solomon C. Sinsón

Dr. Rudolph F. Crew
Superintendent
of Schools

April 13, 2007

Israel A. Sarasti
3940 SW 102 Avenue, Apt. 213F
Miami, FL 33165-4597

Dear Mr. Sarasti:

I am pleased to inform you that the Research Review Committee of the Miami-Dade County Public Schools (MDCPS) has approved your request to conduct the study, "The Effects of Reciprocal Teaching Comprehension-Monitoring Strategy on Third Grade Students." The approval is granted with the following conditions:

1. Participation of a school in the study is at the discretion of the principal. A copy of this approval letter must be presented to the principal.
2. The participation of all subjects is voluntary.
3. The anonymity and confidentiality of all subjects must be assured.
4. Parent permission forms must be secured for all participating students prior to the beginning of the study.
5. The study will involve approximately 15 MDCPS students in grade 3 at a single school.
6. Teacher participation is voluntary.
7. Disruption of the school's routine by the data collection activities of the study must be kept at a minimum. Data collection activities must not interfere with the district's testing schedule.

It should be emphasized that the approval of the Research Review Committee does not constitute an endorsement of the study. It is simply a permission to request the voluntary cooperation in the study of individuals associated with the MDCPS. It is your responsibility to ensure that appropriate procedures are followed in requesting an individual's cooperation, and that all aspects of the study are conducted in a professional manner. With regard to the latter, make certain that all documents and instruments distributed within the MDCPS as a part of the study are carefully edited.

The approval number for your study is 1351. This number should be used in all communications to clearly identify the study as approved by the Research Review Committee. The approval expires on June 30, 2008. During the approval period, the study must adhere to the design, procedures and instruments which were submitted to the Research Review Committee. If there are any changes in the study as it relates to the MDCPS, it may be necessary to resubmit your request to the committee. Failure to notify me of such a change may result in the cancellation of the approval.

If you have any questions, please call me at (305) 995-7501. Finally, remember to forward an abstract of the study when it is complete. On behalf of the Research Review Committee, I want to wish you every success with your study.

Sincerely,



Joseph J. Gomez, Ph.D.
Chairperson
Research Review Committee

JJG:fp

APPROVAL NUMBER: 1351

APPROVAL EXPIRES: 6-30-08

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RESEARCH AND TECHNOLOGY TRANSFER
Office of Research Services

May 4, 2007

Israel Sarasti
Department of Teacher Education and Administration
University of North Texas

Re: Human Subjects Application No. 07-159

Dear Mr. Sarasti:

As permitted by federal law and regulations governing the use of human subjects in research projects (45 CFR 46), the UNT Institutional Review Board has reviewed your proposed project titled "The Effects of Reciprocal Teaching Comprehension-monitoring Strategy on Third Grade Students." The risks inherent in this research are minimal, and the potential benefits to the subject outweigh those risks. The submitted protocol and consent form are hereby approved for the use of human subjects in this study. **Federal Policy 45 CFR 46.109(e) stipulates that IRB approval is for one year only, May 4, 2007 to May 3, 2008.**

Enclosed is the consent document with stamped IRB approval. Please copy and **use this form only** for your study subjects.

It is your responsibility according to U.S. Department of Health and Human Services regulations to submit annual and terminal progress reports to the IRB for this project. Please mark your calendar accordingly. The IRB must also review this project prior to any modifications.

Please contact Shelia Bourns, Research Compliance Administrator, or Boyd Herndon, Director of Research Compliance, at extension 3940, if you wish to make changes or need additional information.

Sincerely,



Scott Simpkins, Ph.D.
Chair
Institutional Review Board

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