INSTRUCTION IN METACOGNITIVE STRATEGIES TO INCREASE DEAF AND HARD OF HEARING STUDENTS’ READING COMPREHENSION

by

Kendra M. Benedict

Copyright © Kendra M. Benedict 2012

A Dissertation Submitted to the Faculty of the

DEPARTMENT OF DISABILITY AND PSYCHOEDUCATIONAL STUDIES

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY
WITH A MAJOR IN SPECIAL EDUCATION

In the Graduate College

THE UNIVERSITY OF ARIZONA

2012
As members of the Dissertation Committee, we certify that we have read the dissertation
prepared by Kendra M. Benedict

entitled Instruction in Metacognitive Strategies to Increase Deaf and Hard of Hearing Students'
Reading Comprehension

and recommend that it be accepted as fulfilling the dissertation requirement for the
Degree of Doctor of Philosophy

__________________________________________________________________________ Date: November 15, 2012
Shirin Antia

__________________________________________________________________________ Date: November 15, 2012
Carl Liaupsin

__________________________________________________________________________ Date: November 15, 2012
Jolenea Ferro

Final approval and acceptance of this dissertation is contingent upon the candidate’s submission
of the final copies of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend
that it be accepted as fulfilling the dissertation requirement.

__________________________________________________________________________ Date: November 15, 2012
Dissertation Director: Shirin Antia
STATEMENT BY AUTHOR

This dissertation has been submitted in partial fulfillment of requirements for an advanced degree at the University of Arizona and is deposited in the University Library to be made available to borrowers under rules of the Library.

Brief quotations from this dissertation are allowable without special permission, provided that accurate acknowledgment of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the copyright holder.

SIGNED: Kendra M. Benedict
ACKNOWLEDGMENTS

Without the love and never-ending support of my husband, Ben, and our amazing children, Maya (11), Abby (9), and Nate (6), completing this dissertation would not have been possible. For every time you told me not to give up, I thank you. Not a day goes by that I do not marvel at the absolute fortune of having the four of you in my life. Ben, you are more than I ever could have dreamed of in a husband. Maya, Abby, and Nate, you bring me more joy in a day than one person deserves to have in a lifetime. Ben, Maya, Abby, and Nate, I love you!
DEDICATION

To three generations of educators, each of whom I am lucky enough to call family.

Aunt Bea

Judy Shirley, my mom

Cynthia and Allen Benedict, my in-laws

Aunt Pam and Uncle Ed

Aunt Betsy and Uncle Dave

Aunt Judy and Uncle Lee

Holly, my sister-in-law

To my father, Fred Shirley, who taught me the importance of dignity, honor, and respect, especially for the greatest country in the world.

To my brothers, Kevin and Kent, who taught me how to laugh.
TABLE OF CONTENTS

LIST OF TABLES ......................................................................................................................... 10

LIST OF FIGURES ....................................................................................................................... 11

ABSTRACT .................................................................................................................................. 12

CHAPTER 1: INTRODUCTION .................................................................................................... 14

  Statement about the Issue ........................................................................................................ 14
  Purpose Statement and Research Questions ............................................................................. 19

CHAPTER 2: LITERATURE REVIEW .......................................................................................... 21

  Factors that Influence Reading Comprehension ....................................................................... 21
  Instructional Practices in Reading for Hearing Students ............................................................. 22
  Instructional Practices in Reading for D/HH Students ............................................................... 24
    Reviews of Literacy Research .................................................................................................. 24
    Intervention Research in Reading Comprehension ................................................................ 28
  Integrated Instruction in Reading Comprehension and Metacognitive Strategies ................. 33
  Limitations of Past Research ................................................................................................... 36

CHAPTER 3: METHOD ............................................................................................................... 39

  Research Design ...................................................................................................................... 39
  Participants and Setting ........................................................................................................... 40
    Initial Participant Assessment ................................................................................................. 41
    Final Participant Selection ..................................................................................................... 41
    Teacher Participant Profiles .................................................................................................. 42
    Student Participant Profiles .................................................................................................. 43
  Materials .................................................................................................................................... 46
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recording Equipment</td>
<td>46</td>
</tr>
<tr>
<td>Assessment and Instructional Passages</td>
<td>47</td>
</tr>
<tr>
<td>Manipulatives</td>
<td>48</td>
</tr>
<tr>
<td>Dependent Variables</td>
<td>48</td>
</tr>
<tr>
<td>Measurement</td>
<td>49</td>
</tr>
<tr>
<td>Participant Selection Measures</td>
<td>49</td>
</tr>
<tr>
<td>Review of Records</td>
<td>49</td>
</tr>
<tr>
<td>Word Reading Fluency</td>
<td>50</td>
</tr>
<tr>
<td>Primary Reading Comprehension Measure</td>
<td>50</td>
</tr>
<tr>
<td>Retelling Procedure</td>
<td>51</td>
</tr>
<tr>
<td>Supplemental Reading Comprehension Measures</td>
<td>51</td>
</tr>
<tr>
<td>Informal Reading Inventory</td>
<td>52</td>
</tr>
<tr>
<td>Maze Reading Procedure</td>
<td>53</td>
</tr>
<tr>
<td>Reading Behavior Measures</td>
<td>54</td>
</tr>
<tr>
<td>Informal Interviews and Observations</td>
<td>55</td>
</tr>
<tr>
<td>Direct Observation</td>
<td>56</td>
</tr>
<tr>
<td>Interobserver Agreement Reliability</td>
<td>56</td>
</tr>
<tr>
<td>Independent Variable</td>
<td>57</td>
</tr>
<tr>
<td>The Strategy</td>
<td>58</td>
</tr>
<tr>
<td>Components</td>
<td>59</td>
</tr>
<tr>
<td>Teacher Training</td>
<td>60</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS - continued

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedures</td>
<td>61</td>
</tr>
<tr>
<td>Baseline Phase</td>
<td>62</td>
</tr>
<tr>
<td>Intervention Phase</td>
<td>62</td>
</tr>
<tr>
<td>Follow-up Phase</td>
<td>64</td>
</tr>
<tr>
<td>Treatment Integrity</td>
<td>64</td>
</tr>
<tr>
<td>Social Validity</td>
<td>66</td>
</tr>
<tr>
<td>Data Analysis Procedures</td>
<td>67</td>
</tr>
<tr>
<td>CHAPTER 4: RESULTS</td>
<td>68</td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>70</td>
</tr>
<tr>
<td>Student A</td>
<td>72</td>
</tr>
<tr>
<td>Primary Reading Comprehension Measure</td>
<td>72</td>
</tr>
<tr>
<td>Supplemental Reading Comprehension Measures</td>
<td>73</td>
</tr>
<tr>
<td>Student B</td>
<td>73</td>
</tr>
<tr>
<td>Primary Reading Comprehension Measure</td>
<td>73</td>
</tr>
<tr>
<td>Supplemental Reading Comprehension Measures</td>
<td>74</td>
</tr>
<tr>
<td>Student C</td>
<td>74</td>
</tr>
<tr>
<td>Primary Reading Comprehension Measure</td>
<td>74</td>
</tr>
<tr>
<td>Supplemental Reading Comprehension Measures</td>
<td>75</td>
</tr>
<tr>
<td>Reading Behavior</td>
<td>76</td>
</tr>
<tr>
<td>Student A</td>
<td>79</td>
</tr>
<tr>
<td>Student B</td>
<td>80</td>
</tr>
</tbody>
</table>
TABLE OF CONTENTS - continued

Student C ........................................................................................................................................... 81
Treatment Integrity Data .................................................................................................................. 82
Social Validity Data .......................................................................................................................... 85

CHAPTER 5: DISCUSSION .................................................................................................................. 88
Interpretation of Results .................................................................................................................. 88
Limitations ......................................................................................................................................... 90
Implications for Research ................................................................................................................ 92
Implications for Practice .................................................................................................................. 94

APPENDICES ...................................................................................................................................... 97
APPENDIX A: RETELLING PROCEDURES ....................................................................................... 98
APPENDIX B: RETELL PROTOCOL .................................................................................................. 99
APPENDIX C: STUDENT INTERVIEW ............................................................................................... 100
APPENDIX D: TEACHER INTERVIEW ............................................................................................. 105
APPENDIX E: MAZE PROCEDURES ................................................................................................. 106
APPENDIX F: CODED STICKY NOTES ............................................................................................ 107
APPENDIX G: QUESTION-ANSWER RELATIONSHIP CARDS .................................................... 108
APPENDIX H: TEXT CONNECTION CARDS ..................................................................................... 109
APPENDIX I: COMPLETING “I WONDER” STATEMENTS USING QARs AND TEXT CONNECTIONS .................................................................................................................. 110
APPENDIX J: LESSON PLAN ............................................................................................................ 111
APPENDIX K: PROGRESS MONITORING CHARTS ......................................................................... 114
REFERENCES ....................................................................................................................................... 115
LIST OF TABLES

Table 1: Intervention Studies on Instructional Practices in Reading Comprehension...... 30
Table 2: Functional Hearing Rating Scale .......................................................... 43
Table 3: Student Performance in Reading Comprehension .............................. 46
Table 4: Non-strategic Reading Behavior by Participant.................................... 48
Table 5: Assessment Instruments........................................................................ 49
Table 6: Interobserver Agreement Data............................................................... 57
Table 7: CC&R Strategy ...................................................................................... 59
Table 8: Treatment Integrity Checklist ............................................................... 66
Table 9: Reading Comprehension Data ............................................................... 72
Table 10: Strategic Reading Behavior Data ......................................................... 78
Table 11: Non-Strategic Reading Behavior Data .................................................. 79
Table 12: Percentages of Component Integrity for each Student-Teacher Dyad ....... 84
LIST OF FIGURES

Figure 1: Multiple Baseline Results for Reading Comprehension ........................................... 71

Figure 2: Multiple Baseline Results for Reading Behavior ....................................................... 77
ABSTRACT

The purpose of this intervention study was to test the use of a reading comprehension strategy with students who are deaf/hard of hearing (D/HH) in monitoring and resolving problems with comprehension. The strategy, named Comprehension Check and Repair (CC&R), was designed for D/HH students who struggle with comprehension, despite at least average grade level fluency skills. Sufficient research exists in mainstream reading instruction literature to suggest that instruction in metacognitive strategies might positively influence reading comprehension for D/HH students. The CC&R strategy incorporated the use of question-answer relationships and text connections; the instructional method incorporated the use of direct instruction, various levels of supported practice, and think-alouds. The effect of the intervention on the number of details D/HH students retold following oral reading was examined using a multiple baseline design. Frequency data were collected for behaviors that detracted from (i.e., non-strategic) and promoted (i.e., strategic) comprehension during and immediately following oral reading. Results showed (a) increases in strategic reading behavior for Students A, B, and C; (b) decreases in non-strategic reading behavior for Students A and B; and (c) increases in reading comprehension for Student A, and possibly for Student B. The study adds to the limited reading intervention research in education of D/HH students. Instruction in metacognitive strategies to increase strategy use during reading may be an effective means by which to increase reading comprehension for D/HH students. Teachers not only maintained use of the strategy with the students who participated in the study, but also introduced it to other students with whom they worked. Social validity data provided by the teachers and the students indicated high
acceptability of the intervention. Limitations and implications for future research and practice are discussed.
CHAPTER 1
INTRODUCTION

Statement about the Issue

In the United States, student outcomes in reading are a concern in the educational community. Proportionally, there are a higher percentage of students who are deaf or hard of hearing (D/HH) for whom underachievement in reading is reported. This underachievement has led to the call for interventions designed to increase D/HH students’ reading comprehension. Considering that the normative performance of D/HH students, ages eight through 17, since 1973 in reading comprehension has never exceeded the fourth-grade equivalent (Qi & Mitchell, 2012), the need to increase the number of effective interventions is easy to support. Furthermore, few evidence-based instructional practices in reading for D/HH students exist although federal regulations mandate the provision of instruction based on peer-reviewed research.

Researchers have thoroughly documented the underachievement of D/HH students in reading comprehension. Traxler (2000) published a comprehensive report on the academic achievement of D/HH students within the context of national large-scale assessment data. In the area of reading comprehension, Traxler reported that the median performance scores for the entire group of D/HH students in the norming sample indicated less than partial mastery of the knowledge and skills necessary to satisfactorily complete grade-level work and advance to the next grade. The Office of Special Education Programs (2009) published a report on the academic achievement of D/HH students served under the Individuals with Disabilities Education Act (IDEA) during the 2000-2001 school year. According to the report, approximately 85% of the
entire group of D/HH students in the nationally representative sample scored below the 50th percentile in the area of reading comprehension.

Academic achievement data for D/HH students indicates that little has changed since the last large-scale assessment of D/HH children in the United States was conducted in 2003 (Qi & Mitchell, 2012). Although some D/HH students are making adequate progress in reading, normative and criterion-referenced state-level data continue to indicate that the performance of D/HH students in reading lags behind the performance of hearing students (Antia, Jones, Reed, & Kreimeyer, 2009; Easterbrooks & Beal-Alvarez, 2012). Based on analyses of close to four decades’ worth of national-level achievement data, Qi and Mitchell concluded that the median achievement gap between D/HH and hearing students remains large. Furthermore, Qi and Mitchell concluded that the gap is larger in reading than in mathematics, and that the trend of the data does not indicate that the gap is closing.

Investigations of the associations between language and cognition have led researchers (Marschark & Hauser, 2008; Marschark, Lang, & Albertini, 2002; Marschark, Sapere, Convertino, Mayer, Wauters, & Sarchet, 2009; Marschark, Sapere, Convertino, & Pelz, 2008; Marschark & Wauters, 2008) to identify factors that influence academic performance for D/HH learners. Contrary to previously held notions, variables such as degree of hearing loss, mode of communication, and educational placement do not adequately explain the underachievement of some D/HH students. Rather, reliable predictors of academic achievement include the secondary effects of hearing loss, not hearing loss per se (Marschark et al., 2002). The varying effects of hearing loss on vocabulary, language, and metacognitive development more reliably predict academic performance for this specific population of students. For example, the communication
barriers that D/HH children often confront in home and school environments limit opportunities for incidental vocabulary and language acquisition. Hence, much of the knowledge that D/HH students bring to the classroom has been acquired through direct instruction. Acquiring knowledge largely through direct instruction can result in significant gaps in students’ vocabulary and language, which in turn can negatively contribute to academic performance.

The research base on predictors of academic achievement for D/HH students includes research on the factors that contribute to reading achievement specifically. Researchers have suggested that difficulties in processing language may be to blame for difficulties in understanding text for some D/HH students (Marschark et al., 2009). Similarly, Akamatsu, Mayer, and Hardy-Braz (2008) reported that delays in language and communication - signed or oral – could compromise development in phonological analysis and synthesis, working memory, and sound/symbol correspondence. Furthermore, Akamatsu et al. reported that insufficient skills in these areas could in turn negatively contribute to reading comprehension. These variables, identified in the literature relative to D/HH students, are similar to the variables identified in mainstream academic and reading achievement research.

Researchers have shown that proficiency in decoding and linguistic comprehension (i.e., listening comprehension) make positive contributions to achievement in reading for hearing students with and without disabilities (Gough & Tunmer, 1986). The “simple view of reading” asserts that neither decoding nor linguistic comprehension is sufficient for reading; rather competency in both is necessary for understanding text. Gough and Tunmer proposed that the product of decoding and comprehension equals reading, and that variations in decoding written language and understanding spoken language strongly predict variations in understanding text.
Researchers who subscribe to notions of the simple view of reading have suggested that in addition to adequate skills in understanding vocabulary, that activating background knowledge and processing grammatical structures are critical (Hulme & Snowling, 2011; Joshi & Aaron, 2000; Rapp, van den Broek, McMaster, Kendeou, & Espin, 2007).

Findings from research relative to the similarities and differences among skilled hearing readers, skilled D/HH readers, and less skilled D/HH readers are mixed. Some researchers have concluded that reading comprehension varies relative to hearing status (Schirmer, 2003; Schirmer, Bailey, & Lockman, 2004), while others have concluded that reading comprehension varies relative to strategy use during reading (Brown & Brewer, 1996). Across two investigations of D/HH readers’ strategy use, Schirmer and colleagues found that like hearing readers, D/HH readers use strategies to construct meaning, monitor and improve comprehension, and evaluate comprehension. Compared to hearing students whose strategy use is comparable across these three areas, D/HH students’ strategy use falls largely in the category of constructing meaning. For example, D/HH students tend to overview and skim text to construct meaning, but rarely note characteristics of text such as difficulty, structure, and tone to monitor comprehension.

Conversely, other researchers have found that reading comprehension varies relative to the strategies and skills students use during reading, not to hearing loss per se. Brown and Brewer (1996) compared D/HH and hearing students matched for reading level and found differences between skilled and less skilled D/HH readers, not between skilled D/HH and hearing readers. Compared to less skilled D/HH readers, Brown and Brewer found that skilled D/HH and hearing readers performed more accurately on comprehension tasks, and thus concluded that proficiency in cognitive processing contributes largely to reading success for
D/HH students. The findings of Brown and Brewer lend support to the findings of Marschark and Hauser (2008), Marschark et al. (2002), Marschark et al. (2009), Marschark et al. (2008), and Marschark and Wauters (2008) that hearing loss per se does not necessarily impede academic achievement, including achievement in reading.

D/HH and hearing readers, who lack adequate knowledge and skills in reading, tend to lack the understanding that the goal of reading is comprehension (Andrews & Mason, 1991; Ewoldt, 1986; Strassman, 1992). Students who struggle to understand various types of text tend to be skill-oriented, passively participate in reading activities, and depend largely on others to monitor and resolve problems with comprehension. Moreover, like their hearing counterparts who struggle to understand text, struggling D/HH readers’ repertoires of comprehension strategies are often deficient. For example, D/HH readers have been observed to use background knowledge to construct meaning. However, when attempts to do so fail, they do not report realizing that lack of background knowledge contributed to the inability to construct meaning (Schirmer, 2003; Schirmer et al., 2004). In addition, when D/HH readers refer back to text, seemingly for clarification, research has shown that they do so as a visual-matching technique, not necessarily as a metacognitive strategy (LaSasso, 1985).

D/HH learners who lack sufficient strategies for understanding text may benefit from instruction in metacognitive strategies (Andrews & Mason, 1991; LaSasso, 1985; Martin, 1993; Schirmer, 2003; Schirmer et al., 2004; Strassman, 1997). Interventions designed to further develop existing strategies and explicitly teach additional, more efficient strategies have shown to be effective for increasing reading comprehension for hearing students with and without disabilities. Brigham, Berkley, Simpkins, and Brigham (2007) found that instruction in
metacognitive strategies is specifically beneficial for students who lack background knowledge and reading decoding skills. However, research suggests that existing instructional practices in education of D/HH students do not necessarily support development of metacognitive knowledge and control (Marschark, 2007; Strassman, 1997).

Exhaustive reviews of the literature on effective instructional practices in reading for D/HH students followed IDEA 2004 (Easterbrooks, 2005; Easterbrooks & Stephenson, 2006; Luckner & Handley, 2008; Luckner, Sebald, Cooney, Young, & Muir, 2005/2006; Schirmer & McGough, 2005). The consensus among these reports is overwhelming: Despite the mandate that practices used to teach D/HH students must be based on rigorous, scientifically valid research of what works, what does not work, and why, few such practices exist. By law, what D/HH students are taught must align with standards adopted by each state; how D/HH students are taught must align with empirical evidence of what works.

In summary, the difficulty that D/HH students as a group have in deriving meaning from text (specifically from content-area text) clearly warrants attention. Similarities exist between D/HH and hearing students who struggle in reading comprehension. Although there are few evidence-based instructional practices in reading for D/HH students, there are many for hearing students. Therefore, given the evidence from mainstream reading instruction research that instruction in metacognitive strategies increases reading comprehension for some hearing students, the use of these instructional methods should be tested for use with D/HH students.

**Purpose Statement and Research Questions**

Continued research is necessary to identify the instructional methods that facilitate classroom learning and comprehension of content-area text, relative to D/HH students.
Therefore, the purpose of this study was to test the use of a reading intervention with D/HH students in monitoring and resolving problems with comprehension. Research across the fields of reading instruction (Duke & Pearson, 2002), metacognitive strategy instruction (Conley, 2008; Snyder & Pressley, 1995; Harris & Pressley, 1991), and function-based intervention (Umbreit, Ferro, Liaupsin, & Lane, 2007) provided the framework around which the intervention was developed. The strategy, components of the strategy, and the steps that teachers followed to instruct students in the use of the strategy are based on the work of authors Harvey and Goudvis (2005, 2007, 2008), and McLaughlin and Allen (2009), and Gear (2006 & 2008). The strategy, named Comprehension Check and Repair (CC&R), was designed for students who despite at least average skills in word reading fluency struggle with comprehension. The following questions guided the investigation:

- Does the CC&R strategy influence reading comprehension for D/HH students?
- Does the CC&R strategy influence reading behavior for D/HH students?
CHAPTER 2
LITERATURE REVIEW

Chapter 2 summarizes the researcher’s reviews of three areas of the literature: (a) factors that influence reading comprehension, (b) instructional practices in reading for hearing students, and (c) instructional practices in reading for D/HH students. The chapter concludes with a summary of research that lends support to investigating the influence of instruction in metacognitive strategies on reading comprehension for D/HH students.

Factors that Influence Reading Comprehension

The research base relative to the processes of reading and to instructional practices in reading includes varying perspectives on the factors that influence reading comprehension for hearing students with and without disabilities. Gough and Tunmer (1986) suggested that variations in decoding written language and understanding spoken language strongly predict variations in reading comprehension. Hulme and Snowling (2011), Joshi and Aaron (2000), and Rapp et al. (2007) suggested that in addition to the contributions that decoding and linguistic comprehension make, that reading comprehension varies as a result of students’ abilities in activating background knowledge and processing grammatical structures.

Mainstream reading research includes a wealth of theoretical and empirical literature on the contribution of metacognitive awareness and strategy use to reading comprehension. Among the researchers who support the use of strategy instruction in reading are those who support its use in addition to other approaches. Duke and Pearson (2002) and Pressley (2000) are researchers who have supported multidimensional reading programs inclusive of instruction in metacognitive strategies. These researchers have suggested that facility in accurate and automatic
decoding contributes to comprehension, but it is not the only predictor. Comprehension depends on decoding in that readers who are capable decoders have the metacognitive capacity available for drawing meaning from text. However, decoding depends on comprehension in that proficient readers compare the meanings of words as decoded to the meaning of the text in its entirety (Pressley, 2000). Thus, learning to read text and learning to understand text has a mutually beneficial relationship.

Each of these perspectives bears relevance to the reading development and reading instruction of D/HH students. The secondary effects of hearing loss can potentially result in deficits in one or more of these areas. For example, D/HH students’ access to communication and exposure to proficient language models in home and school environments impacts vocabulary and language learning over time. Vocabulary and language deficits can result in gaps in background knowledge and in turn, difficulty with comprehending text, specifically content-area text. Theoretical and empirical literature on the links between metacognitive awareness, strategy use, and reading suggests that D/HH students who rely on others to monitor and resolve problems with comprehension may do so due to deficits in metacognitive knowledge and skills (Andrews & Mason, 1991; LaSasso, 1985; Martin, 1993; Schirmer, 2003; Schirmer et al., 2004; Strassman, 1997).

**Instructional Practices in Reading for Hearing Students**

Exhaustive reviews of the literature on effective instructional practices in reading for D/HH students followed IDEA 2004 (Easterbrooks, 2005; Easterbrooks & Stephenson, 2006; Luckner & Handley, 2008; Luckner, Sebald, Cooney, Young, & Muir, 2005/2006; Schirmer & McGough, 2005). Given that D/HH and hearing students may be more similar than they are
different (Marschark et al., 2011), the findings of these literature reviews were reported relative to the findings of the National Reading Panel (NRP).

The NRP convened in 1997 at the request of Congress to examine the scientific evidence relevant to the impact of five areas of reading instruction: alphabets, fluency, comprehension, teacher education, and computer technology (National Institute of Child Health and Human Development [NICHD], 2000a). The Panel aimed to determine the impact of these various approaches to teaching reading. Critics pointed to the conceptual and methodological narrowness of the Panel’s review (Almasi, Garas-York, & Shanahan, 2006). Others pointed to the important body of research on reading instruction that the studies – no more flawed than studies included in similar reviews – constituted (Schirmer & McGough, 2005). Nevertheless, the final report submitted to Congress provided the necessary stimulus for “developing a multidimensional model of reading instruction for students who are deaf or hard of hearing (Luckner et al., 2005/2006, p. 453).”

In the area of comprehension, the NRP conducted extensive analyses of the literature in three subareas: vocabulary instruction, text comprehension instruction, and teacher preparation (NICHD, 2000b). In the subarea of text comprehension instruction, the NRP identified 16 instructional practices, seven of which had sufficient evidence to determine the efficacy of their use with normally achieving readers. The instructional practices that the NRP found were effective for increasing reading comprehension included comprehension monitoring, cooperative learning, graphic and semantic organizers, question answering, question generation, and summarization. The NRP also found that instruction that emphasizes purposefully selecting and
combining multiple strategies, is more effective than instruction that emphasizes using any one strategy alone.

**Instructional Practices in Reading for D/HH Students**

Schirmer and McGough (2005) reviewed reading instruction research in education of D/HH students and compared their findings to the NRP’s in the areas of alphabetics, fluency, comprehension, and computer technology. In comparing the research on text comprehension instruction, Schirmer and McGough found little overlap. Of the seven instructional practices that the NRP found were effective for increasing reading comprehension, Schirmer and McGough found research on four (comprehension monitoring, story structure, question answering, and question generating). The research that Schirmer and McGough found included ability studies and intervention studies. From the ability studies, Schirmer and McGough concluded that D/HH readers have weak abilities in the area of comprehension monitoring. The conclusions that Schirmer and McGough drew from the intervention studies overlapped with the NRP’s conclusions: that the use of story structure and question answering are effective for improving reading comprehension for D/HH students.

**Reviews of literacy research.** Schirmer and McGough stated that although the reading instruction research in education of D/HH students (specifically in text comprehension instruction) discusses the importance of instructional practices identified by the NRP, sufficient empirical evidence of these practices does not exist. Among the research that Schirmer and McGough found for seven of the 16 instructional practices identified by the NRP, they identified 12 intervention studies: (a) one each on mental imagery, a mnemonic procedure, and inference making; (b) two on question answering; (c) three on prior knowledge of topic; and (d) four on
knowledge of text structure. Schirmer and McGough did not identify any intervention studies on prior knowledge of syntax, comprehension monitoring, or question generating.

Easterbrooks (2005) conducted a review of research relative to 15 categories of instructional practices in literacy for D/HH students. The literature that Easterbrooks reviewed included research on instructional practices in reading that the NRP and others (e.g., Laurent Clerc Center of Gallaudet University) identified as critical to literacy learning. The “large individual differences among D/HH students (Marschark et al., 2011, p. 7)” that require teachers of D/HH students to have an array of instructional practices with which to be familiar lends support to literature reviews of such considerable range. In contrast to the findings and conclusions of Schirmer and McGough (2005), Easterbrooks found that the categories of literacy that the NRP identified as effective instructional practices in reading, are among those better researched in education of D/HH students. Easterbrooks added that although research has been conducted relative to the use of these practices with D/HH students, the existing research base is insufficient to establish these practices as effective for D/HH students.

Two of the 15 categories of literacy practices that Easterbrooks reviewed included instruction in text comprehension and instruction in content-area reading (2005). The nine studies that Easterbrooks reviewed across these two categories included the following: Andrews and Mason (1991); Brown and Brewer (1996); Kelly, Albertini, and Shannon (2001); Luetke-Stahlman, Griffiths, and Montgomery (1998); Schirmer (1997); Schirmer, et al. (2004); Strassman (1997); Walker, Munro, and Rickards (1998); and Yore (2000). Based on a review of these nine studies, Easterbrooks concluded that integrated instruction in comprehension, strategy use, and content areas is an important means by which teachers can promote D/HH students’
literacy skills. Furthermore, Easterbrooks concluded that instruction in reading should continue past grades four and five, the grades at which formal instruction in reading typically ends.

In an effort to identify instructional practices in reading currently in use and the efficacy of their use, Easterbrooks and Stephenson (2006) surveyed literature, websites of professional organizations, and websites of state departments of education. Easterbrooks and Stephenson then reviewed the research base for support of the more highly cited practices. The methods that Easterbrooks and Stephenson used to identify effective instructional practices in reading for D/HH students was based on their assertion that limited empirical evidence should not negate real-world evidence of the efficacy of certain instructional practices. Furthermore, they asserted that while the current research base does not provide sufficient evidence for determining the effectiveness of certain instructional practices in reading, neither does it provide sufficient evidence for determining certain instructional practices ineffective.

The instructional practices currently in use that Easterbrooks and Stephenson concluded were effective for increasing D/HH students’ reading comprehension included directed reading in content areas, shared reading activities, and building vocabulary and morphological knowledge through participation in meaningful activities. The instructional practices that Easterbrooks and Stephenson concluded were not effective included independent reading, web-based programs, phonemic awareness, and phonics. As a caveat, Easterbrooks and Stephenson stated,

“Inclusion in the list of practices that resulted from the selection process we have described is not intended to imply that any of the selections are best practices; rather, they are examined practices. Neither does exclusion from the list imply that other practices are not of equal value (2006, p. 386).”
After a comprehensive review of literacy research in education of D/HH students, Luckner et al. (2005/2006) found few well-designed group studies and no systematic replication of studies. Luckner et al. reported that the majority of instructional practices in reading currently used with D/HH students, including the language experience approach, the use of dialogue journals, and the use of predictable books have limited sound data to support their use. Based on their review of literacy research and the findings of the NRP, Luckner et al. suggested that reading programs for D/HH students should include instruction in conversation, alphabetics, vocabulary, fluency, comprehension, and writing.

Luckner and Handley published a second comprehensive review of literacy research, this time limiting their review to research on comprehension (2008). Of the 52 studies Luckner and Handley identified, 27 investigated the use of a specific intervention (i.e., an educational program, product, or practice). The interventions with positive outcomes in multiple studies included (a) explicit comprehension strategy instruction with two quasi-experimental studies and one case study; (b) teaching students story grammar with one quasi-experimental study and two single-subject studies; and (c) modified directed-reading thinking activities (DRTAs) with one one-group pretest-posttest study and two one-shot case studies. The instructional practices for which Luckner and Handley found “tentative” evidence included (a) explicit comprehension strategy instruction; (b) teaching students story grammar; (c) modified DRTA; (d) activating background knowledge; and (e) use of well-written, high-interest text.

Nominal overlap exists between the conclusions of the NRP and the conclusions drawn from reviews of literature on instructional practices in reading for D/HH students. Research in the area of comprehension instruction by Schirmer & McGough (2005), Easterbrooks (2005),
Easterbrooks and Stephenson (2006), Luckner et al. (2005/2006), and Luckner and Handley (2008) suggests that the conclusions of the NRP regarding the following instructional practices in comprehension apply to the reading instruction of D/HH students:

- Instruction of story structure
  - teaching story elements such as setting, characters, plot, problem, and resolution
- Instruction in question answering
  - asking questions, encouraging student responses, providing effective feedback
- Integrated instruction in comprehension, strategy use, and content areas
  - providing opportunities to learn and practice strategies in content areas such as science or social studies
  - teaching strategies through direct explanation, modeling, and guided practice

**Intervention research in reading comprehension.** The researcher reviewed appropriate research-based literature in literacy practices for D/HH students, published between 2000 and 2012. The purpose of the review was to collect data relative to investigations of interventions designed to increase reading comprehension for D/HH students. The researcher used three strategies in searching the literature base and identifying pertinent intervention studies: subject index searchers, footnote chasing, and browsing. Table 1 summarizes the nine intervention studies that the researcher identified. These studies comprise the body of intervention research over the last twelve years on various instructional practices in reading comprehension for D/HH students.

Of the nine intervention studies reviewed, three investigated the use of repeated reading to increase reading comprehension for D/HH students. Schirmer, Therrien, Schaffer, and Schirmer (2009) found that repeated reading did not improve reading comprehension overall for student participants. However, performance on inferential questions improved to levels commensurate with performance on factual questions. Schirmer et al. suggested that pairing
repeated reading with instruction in comprehension strategies might be more effective for increasing students’ overall comprehension than the use of repeated reading alone.

In a subsequent study, Schirmer, Schaffer, Therrien, and Schirmer (2012) tested their hypothesis that pairing repeated reading with a comprehension monitoring strategy would be more likely to increase students’ comprehension overall. Students enrolled in both studies conducted by Schirmer and colleagues demonstrated commensurate performance on inferential and factual questions. However, while Schirmer et al. (2009) did not observe a pattern of improvement in responses to comprehension questions during intervention, Schirmer et al. (2012) did observe a pattern of improvement. In a similar type study, Pakulski and Kaderavek (2001) paired repeated reading with instruction in role-playing. Like Schirmer et al. (2012), Pakulski and Kaderavek found that pairing repeated reading with supplemental instruction - in this case, instruction in role-play - positively influenced reading comprehension for student participants.
Table 1

**Intervention Studies in Reading Comprehension, by Dependent Variable Measure**

<table>
<thead>
<tr>
<th>Study by Dependent Variable Measure</th>
<th>Purpose</th>
<th>Participants</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A Retelling Procedure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pakulski &amp; Kaderavek, 2001</td>
<td>Investigated the effectiveness of repeated reading plus story role-play, using narrative text</td>
<td>14 students, ages 7 to 14</td>
<td>The use of role-play resulted in a more sophisticated oral narrative retelling.</td>
</tr>
<tr>
<td>Gentry, Chinn, &amp; Moulton, 2004</td>
<td>Assessed the effectiveness of multimedia stories, using narrative text</td>
<td>25 students, ages 9 to 18</td>
<td>Students performed better when presented with print and pictures, as compared to print only and print and pictures plus signs.</td>
</tr>
<tr>
<td>Schirmer &amp; Schaffer, 2010</td>
<td>Investigated the effects of the guided reading approach, using leveled, narrative text</td>
<td>19 students in grades 1 through 5</td>
<td>Students whose teachers used the guided reading approach as their regular classroom reading instruction model made progress in reading achievement; for most, progress was modest and inhibited by summer regressions.</td>
</tr>
<tr>
<td><strong>Various Types of Comprehension Questions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Al-Hilawani, 2003</td>
<td>Compared the effects of the key word strategy approach, modified reciprocal teaching, and the basic reading approach, using narrative text</td>
<td>30 students in grade 3</td>
<td>The key word strategy and modified reciprocal teaching significantly enhanced performance in reading comprehension overall.</td>
</tr>
</tbody>
</table>
Table 1 (continued)

**Intervention Studies in Reading Comprehension, by Dependent Variable Measure**

<table>
<thead>
<tr>
<th>Study by Dependent Variable Measure</th>
<th>Purpose</th>
<th>Participants</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trezek &amp; Wang, 2006</td>
<td>Evaluated the effectiveness of a phonics-based reading curriculum plus visual phonics using narrative text</td>
<td>13 students in kindergarten and grade 1</td>
<td>Students demonstrated improvements in beginning reading skills. The acquisition of beginning reading skills did not appear to relate to degree of hearing loss.</td>
</tr>
<tr>
<td>Schirmer, Therrien, Schaffer, &amp; Schirmer, 2009</td>
<td>Investigated the effects of a repeated reading strategy, using narrative text</td>
<td>4 students in grade 2</td>
<td>Comprehension did not improve overall; however, performance on inferential and factual questions was commensurate.</td>
</tr>
<tr>
<td>Brigham &amp; Hartman, 2010</td>
<td>Explored the influence of integrated instruction in metacognitive strategies and social studies, using content-area text</td>
<td>5 students in grades 6 and 7</td>
<td>The number of predictions students made increased and the quality of students’ predictions improved.</td>
</tr>
<tr>
<td>Wang &amp; Paul, 2011</td>
<td>Evaluated the effectiveness of a literature-based, technology-infused literacy project, using narrative text</td>
<td>22 students, ages 7 to 11</td>
<td>Significant effects for story comprehension were found for 2 of 3 experiments.</td>
</tr>
<tr>
<td>Schirmer, Schirmer, Therrien, &amp; Schaffer, 2012</td>
<td>Investigated the effects of a supplemental reading program that included components of repeated reading and question-generation strategies, using narrative text</td>
<td>13 students in grades 3, 5, and 6</td>
<td>Students consistently showed good performance on inferential and factual questions during intervention; no significant improvement in performance on generalized measure of comprehension post-intervention.</td>
</tr>
</tbody>
</table>
Two of the intervention studies reviewed investigated the use of technology to increase reading comprehension. Gentry, Chinn, and Moulton (2004) compared the effects of instruction using print only, using print and pictures, and using print and pictures plus manual signs. Gentry et al. found that performance in comprehension increased in the print and pictures condition, but not in the print only condition or in the print and pictures plus signs condition. Wang and Paul (2011) investigated the use of a literature-based instructional program in word recognition and understanding, supplemented with technology. The technology used during the intervention included, but was not limited to, video-based stories with captions, stories adapted to students’ communication modes (e.g., animated stories in American Sign Language or Signing Exact English) and online hypertext storybooks. Wang and Paul found mixed results for story comprehension, possibly due to effects of the first experiment carrying over to the two subsequent experiments.

Mixed results were also reported for the use of the guided reading approach with D/HH elementary-aged students (Schirmer & Schaffer, 2010). While students’ performance in comprehension improved during the intervention, progress was modest and not maintained over the summer break. Furthermore, most students did not recoup the skills that they had lost until months into the following semester. Although the guided reading approach appeared to be effective initially, outcomes were modest at best. Schirmer and Schaffer attributed their findings in part to the obstacles that conducting classroom intervention research can present. The primary obstacle that Schirmer and Schaffer confronted was the limitation of time and the impact of time constraints on baseline and intervention procedures.
The interventions represented in this review of literature were designed to increase comprehension of narrative text for D/HH students, with the exception of the intervention that Brigham and Hartman (2010) investigated. These researchers investigated the use of instruction in the metacognitive strategy of prediction. The intervention was conducted in a middle school social studies classroom studying the American Revolution. Brigham and Hartman found that through direct instruction, the quantity and quality of students’ predictions related to the content being studied improved. Furthermore, they concluded that by integrating instruction in a metacognitive strategy with instruction in a content area, students learned to use prediction to assist them in understanding cause-and-effect relationships in history. Moreover, Brigham and Hartman reported that student engagement and participation in the task of reading increased during the intervention.

**Integrated Instruction in Reading Comprehension and Metacognitive Strategies**

Bases of research across psychology, literacy learning, second language acquisition, and special education provide sufficient theoretical and empirical evidence for the efficacy of metacognitive strategy instruction to facilitate learning. Specifically, researchers Mastropieri, Scruggs, Bakken, and Whedon (1996); Mastropieri, Scruggs, and Graetz (2003); Swanson & Sasche-Lee (2000); and Talbott, Lloyd, and Tankersley (1994), have shown the effectiveness of instruction in metacognitive strategies for increasing reading comprehension. Three decades’ worth of research has shown that providing instruction in higher-order cognitive thinking skills (e.g., activating prior knowledge, making predictions, drawing inferences, and summarizing) improves students’ reading comprehension (NICHD, 2000b). The findings across various bodies
of research are consistent: instruction in decoding, comprehension, and metacognitive strategies improves student outcomes in reading (Samuels, Ediger, Willcutt, & Palumbo, 2005).

Approaching complex cognitive tasks such as reading with metacognitive knowledge and skill increases the likelihood of accomplishing such tasks efficiently and effectively. Students who actively and constructively engage with text are more likely to understand what they read (Mahapatra, Das, Stack-Cutler, & Parrila, 2010; Strassman, 1997). When proficient readers approach text, they activate their metacognitive knowledge and control, often unknowingly. The integration of higher-order cognitive processes to construct coherent mental representations of text facilitates comprehension (Strassman, 1997). Approaching a task that demands the integration of higher-order cognitive processes, without knowledge of the goal or purpose for completing the task does not facilitate successful completion of the task. A common characteristic of struggling readers, regardless of hearing status, is that they tend to lack the understanding that the purpose of reading is comprehension. Insufficient knowledge of the purpose of reading, and difficulty distinguishing between understanding and misunderstanding, fosters dependent reading behaviors in students.

The process of learning to read for understanding involves knowledge, experience, thinking, and teaching (Fielding & Pearson, 1994). “Development of comprehension abilities is best thought of as a long-term developmental process (Pressley, 2000, p. 551).” The process is not linear; sequential steps for teaching students to read and teaching students to understand what they read do not exist. Pressley added, “text comprehension begins with decoding of words…because comprehension is complicated it requires a complicated educational strategy (Pressley, 2000, p. 551)”. Instruction in reading does not end once proficiency in decoding is
obtained. Reading instruction should be balanced; it should include explicit teaching in decoding, comprehension, strategy use, and thinking (Duke & Pearson, 2002; Gear, 2006; Pressley, 2000). In addition, instruction should “externalize the thinking processes of skilled readers (Fielding & Pearson, 1994, p. 65)” to ensure the authenticity of instruction.

Researchers have found that explicit, integrated instruction in metacognition and comprehension positively influences D/HH students’ literacy skills (Akamatsu, 1988; Jonas & Martin, 1984; Martin, 1993; Martin, Craft, & Sheng, 2001; Strassman, 1997). The purpose for teaching metacognitive awareness to struggling readers is to empower students with the knowledge and control over thinking that proficient readers employ during reading (Strassman, 1997; Beckman, 2002). Teaching strategies for monitoring comprehension and for resolving problems with comprehension are two discrete, yet connected instructional tasks. When teachers use effective instructional practices to instruct students in metacognitive awareness, students learn tools for thinking and for reasoning, not isolated strategies and discrete steps that appear to have no meaning (Conley, 2008; Strassman, 1997). Instruction in metacognitive strategies should occur across the school day and be seamlessly integrated across the curriculum (Pressley, Symons, McGoldrick, & Snyder, 1995). To promote generalization, assessment of students’ knowledge and use of strategies should precede instruction. The strategies selected for instruction should be prioritized or generalization of strategies is less likely to occur.

When content-area text is used during integrated instruction in reading comprehension and metacognition, students learn not only how to read, but also how to read to learn (Eisenberger, Conti-D’Antonio, & Bertrando, 2005). Careful consideration should be given to the selection of appropriate reading material to instruct students in the use of metacognitive
strategies. The use of brief passages of high-interest, instructional-level text can facilitate students’ strategy use. Direct instruction, modeling, and sufficient opportunities for guided practice, should be provided before students attempt to use newly acquired strategies independently. Finally, a sufficient repertoire of compensatory strategies is of limited value if students do not know the appropriate conditions under which to deploy certain strategies (Griffith & Ruan, 2005). Instruction should include not only what metacognitive strategies are, but also why, when, and how to use strategies to monitor and resolve problems with comprehension.

Instruction in metacognitive strategies is feasible and results in both short and long-term gains (Pressley et al., 1995). Earlier research suggested that metacognitive awareness and strategy use were innate skills. However, research has since shown that all types of learners can learn to use metacognitive strategies to construct meaning from text (Beckman, 2002; Garner, 1990; Reid, 2006). Contrary to earlier research that suggested reserving instruction in metacognitive strategies for students in junior or senior high school, research now suggests that elementary-aged students can benefit from instruction in metacognitive strategies (Baker, 2005). Based on current empirical research, students in grades two through six can learn to monitor and resolve problems with comprehension. Therefore, the ideal time to begin instruction in metacognitive strategies might be as early as the primary grades (NICHD, 2000b).

Limitations of Past Research

While the evidence base on the efficacy of integrated instruction in comprehension and strategy use for increasing D/HH students’ reading comprehension is emerging, the evidence base on the efficacy of this instructional practice for increasing the comprehension of normally
achieving and disabled readers is well established. Researchers have shown that provided direct instruction, modeling, and opportunities for practice with varying levels of support, hearing students are able to learn comprehension strategies. As early as the primary grades, students can learn to approach the task of reading confidently by developing metacognitive awareness of their abilities in reading. By the intermediate and more advanced grades, students can develop knowledge of personally effective strategies and are able to apply and regulate their use of strategies with proficiency and automaticity (Griffith & Ruan, 2005).

The base of research in education of D/HH students lacks evidence – in quantity and in quality – of effective instructional practices for increasing students’ reading comprehension. Specifically, no study has been conducted to date that accounts for (a) investigation of an intervention for increasing students’ understanding of content-area text; (b) inclusion of reading behavior and reading comprehension as dependent variables; and (c) measurement of each dependent variable repeatedly over time.

Real-world knowledge of the efficacy of certain instructional practices, coupled with descriptive and quasi-experimental research and the limited empirical research, strongly suggests that D/HH students can learn to use strategies that proficient readers use to facilitate their understanding of text. Furthermore, by developing facility with the appropriate use and application of strategies, it is reasonable to expect that D/HH students can increase their reading comprehension. The influence of instruction that reflects an understanding of the differences in metacognitive awareness, metacognitive strategy use, and content knowledge that exist among and between D/HH and hearing students, and the consequences of these differences on learning
needs of individual students, on D/HH students’ abilities to monitor and resolve problems with comprehension merits investigation.
CHAPTER 3

METHOD

The purpose of this study was to test the use of a reading comprehension strategy with D/HH students. The strategy, *Comprehension Check and Repair* (CC&R), is meant for students who struggle with comprehension, despite at least average skills in fluency. The questions guiding the study were (a) does the CC&R strategy influence reading comprehension for D/HH students; and (b) does the CC&R strategy influence reading behavior for D/HH students?

Chapter 3 details the methodology the researcher selected to test the CC&R strategy. The chapter begins with information regarding the design of the study, the process of recruiting and selecting student-teacher dyads to participate, and the materials used during the study. An operational definition of each dependent variable, the assessment instruments used to measure student performance, and the interobserver agreement reliability procedures follow. The chapter continues with a detailed description of the independent variable that includes the procedures followed during each phase of the study. Information regarding treatment integrity, social validity, and data analysis concludes the chapter.

Research Design

The researcher selected single-case research methodology to ascertain the influence of the CC&R strategy. Researchers in applied and clinical disciplines, such as special education, often use this methodology (Kratochwill, Hitchcock, Horner, Levin, Odom, Rindskopf, & Shadish, 2010). Single-case designs (SCDs) are ideal for investigating interventions intended for use (or already in use) with heterogeneous, low-incidence populations of students.
For the purposes of the present study, the researcher used a multiple baseline across participants design to determine the effect of the CC&R strategy on students’ reading comprehension and reading behavior. The systematic introduction of the intervention to participants at different points in time, and the repeated measurement of the dependent variables, eliminated the need to withdraw the intervention. This defining feature of SCDs, in that participants serve as their own individual unit of control, affords researchers a “methodologically clean and functionally relevant” (Bullis & Anderson, 1986, p. 345) option for empirically investigating the efficacy of instructional practices for D/HH students.

Participants and Setting

The researcher obtained approval to conduct the study from three suburban public school districts. Total student enrollment exceeded 124,000, inclusive of approximately 200 students who received special education support from a teacher of D/HH. Subsequent to approval from the University’s Institutional Review Board, the researcher contacted teachers of D/HH in each district to recruit students with discrepant skills in fluency and comprehension. Initial eligibility criteria included (a) enrollment in grade four, five, six, seven, or eight; (b) documented bilateral hearing loss of any degree; and (c) the provision of one-to-one services in vocabulary, reading, and/or written language from a teacher of D/HH for a minimum of 120 minutes/week.

Seven teachers responded with interest in the study. The researcher met with the teachers, explained the study in more detail, and obtained their consent to participate. To ensure student confidentiality, the teachers assisted the researcher in obtaining parent/guardian consent for (a) referral, (b) the release of educational records to research personnel, and (c) video documentation
of assessment and instructional procedures. The researcher received a total of 14 initial student referrals with parent/guardian consent.

Initial participant assessment. The researcher met with each student-teacher dyad upon receipt of referral to obtain child assent. After explaining the study to the students and obtaining their assent, the researcher collected and reviewed students’ educational records. The purpose of conducting a review of records (described later in the chapter under “measurement”) was to confirm the initial eligibility status of the students referred to the study.

After confirming that the 14 students referred to the study met initial eligibility criteria, the researcher conducted a second review of records. Up to five students within two grade levels of each other could be accommodated to receive the intervention; therefore, the second review assisted the researcher in determining which students were most likely to benefit (i.e., students with documentation of grade-level fluency skills and below grade-level comprehension skills). The second review yielded evidence of discrepant fluency and comprehension skills for 10 of the 14 students referred. Four students, whose records lacked sufficient evidence of discrepant fluency and comprehension skills, did not continue with the study.

Final participant selection. The researcher administered a test of word reading fluency (described later in the chapter under “measurement”) to the ten remaining students. Results of the assessment, coupled with results of the record review, served to assist the researcher in making the final selection of participants. Of the 10 students administered the assessment, six scored within the average range for their respective grade-level, three scored below the average range, and one scored above the average range. Of the six students who scored within the average range, two were enrolled in grade four, three in grade five, and one in grade seven. For
generalization purposes (and due to the availability of materials and resources), the researcher
selected the students enrolled in grades four and five to continue with the study.

Of the five students selected to receive the intervention, three completed the study in its
entirety. One student dropped out of the study during the baseline phase and another during the
intervention phase. Baseline data for the first student revealed that the student’s speech and
language skills were insufficient to receive the intervention. The second student dropped out of
the study during the intervention phase due to the number of activities that the student and
teacher were required to attend the last few weeks of the school year. As a result, the student’s
service time and the integrity with which the intervention was implemented decreased. Not until
the fourth intervention session did time allow the teacher to assess the student for performance in
comprehension. The researcher did not include the few data points obtained for this student
because intervention procedures for did not replicate intervention procedures for the other
student-teacher dyads.

**Teacher participant profiles.** Each teacher who completed the study held a master’s
degree and state certification in education of D/HH students. Collectively, they averaged 25
years of experience in the field. Within their respective districts, each was responsible for
providing itinerant services to students in kindergarten through grade 12, across an average of
eight campuses. Teachers dedicated the majority of their time to providing direct and consult
services to D/HH students, while reserving a portion of their time for reviewing and addressing
program needs, recruiting and hiring additional staff, and representing the district at meetings for
students placed in alternative settings (e.g., a day school or residential school).
**Student participant profiles.** Each student who completed the study attended elementary school and spent the majority of the school day in the general education classroom. The researcher asked the teachers of D/HH to estimate the functional hearing ability of the students using the Functional Hearing Rating Scale (Table 2) that appears on Gallaudet Research Institute’s Annual Survey of Deaf and Hard of Hearing Children and Youth (Karchmer & Allen, 1999). Functional hearing ability refers to the actual use of hearing in the classroom setting with the use of an assistive listening device. Each student was described as (a) having “mildly limited” functional hearing, and (b) preferring auditory/oral communication.

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Estimate of Student’s Functional Hearing Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Negligible difficulty in receiving auditory information</td>
</tr>
<tr>
<td>Mildly Limited</td>
<td>Needs frequent spoken repetitions, occasional visual or tactile communication support or both</td>
</tr>
<tr>
<td>Severely Limited</td>
<td>Realizes some benefit from auditory communications although unable to function adequately in the classroom without visual or tactile communication</td>
</tr>
<tr>
<td>No Functional Hearing</td>
<td>Receives no benefit from spoken communication</td>
</tr>
</tbody>
</table>

Student A was 10.9 years old and enrolled in grade five at the beginning of the study. He had a profound, sensorineural hearing loss in both ears and used a cochlear implant consistently. Student A met with his teacher of D/HH for 60 minutes a day, four days a week. Student A differed from Students B and C in that he received educational interpreting services in the
general education classroom to augment oral instruction. Neither the researcher nor the research assistant observed Student A signing expressively at any time during the study.

Student B was 9.2 years old, enrolled in grade four, and had a sensorineural hearing loss in both ears. Student B experienced a significant decrease in hearing sensitivity during the baseline phase and subsequently, was diagnosed with “enlarged vestibular aqueduct syndrome.” Prior to baseline, Student B demonstrated a moderate hearing loss in the low frequencies, dropping to a severe loss in the middle frequencies, rising to a moderate loss in the high frequencies for the right ear; and a moderate rising to mild hearing loss for the left ear. During baseline, audiometric evaluation revealed a profound hearing loss across all frequencies for the right ear and a moderate loss across all frequencies for the left ear. Student B used behind-the-ear hearing aids consistently. In one-to-one and large group situations, he used an FM system coupled to his hearing aids. Student B’s teacher described him as a “very good hearing aid and FM user” who “lets adults know right away if either are not working properly”. Student B received services from the teacher of D/HH 30 minutes a day, four days a week.

Student C was 10.8 years old and enrolled in grade five at the beginning of the study. She had a mild, sloping to moderate-severe sensorineural hearing loss in both ears. Student C used behind-the-ear hearing aids consistently, but rarely used the FM system that the school provided. According to the most recent comprehensive evaluation report Student C primarily uses English, although are both English and Spanish are used in the home. Student C understands Spanish as her mother communicates with adults in the home in Spanish. Results of the Arizona English Language Learner Assessment (AZELLA) indicated Student C was “proficient in all areas [of English, including listening and speaking] except for written language and reading
comprehension.” Student C received services from the teacher of D/HH 45 minutes a day, three days a week.

Table 3 presents the results each student obtained in reading for two consecutive years on Arizona’s Instrument to Measure Standards (AIMS). State and federal law requires the administration of AIMS, a standards-based assessment that measures student proficiency in writing, reading, mathematics, and science (Arizona Department of Education, 2012). The 2012 administration of AIMS fell two weeks after initiating intervention procedures for Student A, and one week after initiating intervention procedures for Student B. (Intervention procedures for Student C initiated almost two weeks after administration of AIMS.) Table 3 lists each student’s grade-level performance in word reading fluency, reading comprehension, and the discrepancy (in years) between the two pre-intervention. The grade-level listed is an aggregation of data from (a) the review of records, (b) the test of word reading fluency, and (c) the teacher interview (each of which is described later in the chapter under “measurement”).
Table 3

**Student Performance in Reading Comprehension**

<table>
<thead>
<tr>
<th></th>
<th>Spring 2011</th>
<th>Spring 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student A</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIMS Reading</td>
<td>Approach Standards</td>
<td>Fell Far Below</td>
</tr>
<tr>
<td>Reading Vocabulary</td>
<td>25.0 % correct</td>
<td>17.0 % correct</td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>25.0 % correct</td>
<td>33.0 % correct</td>
</tr>
<tr>
<td>Comprehension</td>
<td>36.0 % correct</td>
<td>20.0 % correct</td>
</tr>
<tr>
<td>Informational Text</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word Reading Fluency</td>
<td>end of grade 4/beginning of grade 5</td>
<td></td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>end of grade 1/beginning of grade 2</td>
<td></td>
</tr>
<tr>
<td>Discrepancy</td>
<td>3-4 years</td>
<td></td>
</tr>
<tr>
<td><strong>Student B</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIMS Reading</td>
<td>Met Standards</td>
<td>Met Standards</td>
</tr>
<tr>
<td>Reading Vocabulary</td>
<td>83.3 % correct</td>
<td>75.0 % correct</td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>77.8 % correct</td>
<td>100.0 % correct</td>
</tr>
<tr>
<td>Comprehension</td>
<td>52.9 % correct</td>
<td>68.0 % correct</td>
</tr>
<tr>
<td>Informational Text</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word Reading Fluency</td>
<td>grade 4</td>
<td></td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>grade 3</td>
<td></td>
</tr>
<tr>
<td>Discrepancy</td>
<td>1 year</td>
<td></td>
</tr>
<tr>
<td><strong>Student C</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AIMS Reading</td>
<td>Approach Standards</td>
<td>Approach Standards</td>
</tr>
<tr>
<td>Reading Vocabulary</td>
<td>25.0 % correct</td>
<td>50.0 % correct</td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>63.0 % correct</td>
<td>50.0 % correct</td>
</tr>
<tr>
<td>Comprehension</td>
<td>44.0 % correct</td>
<td>28.0 % correct</td>
</tr>
<tr>
<td>Informational Text</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word Reading Fluency</td>
<td>grade 5</td>
<td></td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>end of grade 3/beginning of grade 4</td>
<td></td>
</tr>
<tr>
<td>Discrepancy</td>
<td>1-2 years</td>
<td></td>
</tr>
</tbody>
</table>

**Materials**

**Recording equipment.** The researcher provided the teachers with a pocket video camera, memory card, tripod, battery charger, rechargeable batteries, cables, and adapters to record assessment and instructional procedures during baseline, intervention, and follow-up phases. The video recording equipment ensured the timely collection of data during the study. Teachers were
designated their own folder on a shared, secure website (dropbox.com) to which only the researcher had access. As the teachers uploaded recorded assessment and instructional procedures daily, the researcher downloaded the recordings and made back-up copies on a personal external hard drive.

**Assessment and instructional passages.** The researcher provided the teachers with brief passages of content-area text at students’ respective instructional reading levels for assessment and instructional purposes. To confirm the readability levels of the passages, the researcher conducted random readability checks using the Flesch-Kincaid formula. Factors such as content, structure, and length of text, reader interest, and background knowledge influence the readability of text beyond the scope of any readability formula. More than 100 readability formulas exist, most of which predict the grade level necessary for 75% – 85% comprehension (Micro Power & Light Co., 2008). The Flesch-Kincaid formula, the use of which is ideal for assessing upper-elementary reading materials, is widely used among educational publishing companies. The Flesch-Kincaid Formula uses the number of words, syllables, and sentences to calculate the readability of text.

The teachers repeatedly measured student performance in comprehension across baseline, intervention, and follow-up phases using the assessment passages. The researcher provided each teacher with a minimum of 30 assessment passages, averaging 200 words in length. Teachers instructed students in the use of CC&R strategy during the intervention phase using the instructional passages. The researcher provided each teacher with a minimum of 15 instructional passages, averaging 500 words in length. Student-teacher dyads completed one instructional
passage per session when students were familiar the content, or in two sessions if students were not familiar with the content.

**Manipulatives.** The researcher created coded sticky notes, question-answer relationship cards, and text connection cards to facilitate students’ use of the CC&R strategy. Each manipulative is described in detail later in the chapter under “procedures.”

**Dependent Variables**

The dependent variables in the study were reading comprehension and reading behavior. The operational definition for reading comprehension was the number of details students retold in one-minute, following oral reading of instructional-level, content-area text. The term “reading behavior” described observable strategic and non-strategic behaviors in which students engaged during reading that facilitated or detracted from the process of comprehension, respectively. The operational definition of strategic reading behavior was following the steps of the CC&R strategy. The operational definition of non-strategic reading behavior varied, specifically to each individual student (Table 4).

<table>
<thead>
<tr>
<th>Student</th>
<th>Non-strategic Reading Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>When asked to retell details from text, linguistically or non-linguistically responds, “I don’t know.”</td>
</tr>
<tr>
<td>B and C</td>
<td>During oral reading, stopped reading, looked up from the text or alternatively, kept eyes on the text, and did not resume reading until the teacher provided assistance.</td>
</tr>
</tbody>
</table>
Measurement

The researcher used the formal and informal assessment instruments listed in Table 5 to (a) confirm that students referred to the study met initial eligibility criteria, (b) select students to receive the intervention, and (c) measure student performance in reading comprehension and reading behavior during intervention and follow-up. A description of each assessment instrument follows the table.

Table 5

<table>
<thead>
<tr>
<th>Assessment Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Selection Measures</td>
</tr>
<tr>
<td>Record Review</td>
</tr>
<tr>
<td>Word Reading Fluency</td>
</tr>
<tr>
<td>Maze Reading Procedure</td>
</tr>
</tbody>
</table>

Participant selection measures. The researcher used the following measures to confirm students’ initial eligibility status and select students who could benefit from the intervention.

Review of records. The researcher reviewed each student’s most recent comprehensive evaluation report, Individualized Education Plan (IEP), and standardized test scores to confirm initial eligibility status. The teachers assisted the researcher in locating and obtaining students’ records from school sites, district special education offices and district D/HH offices. Students’ evaluation reports provided documentation of hearing loss and eligibility for special education services. Students’ IEPs provided documentation of (a) performance in vocabulary, reading, and written language, and (b) the type and frequency of services received. Norm-referenced and
criterion-referenced test scores enabled the researcher to compare the academic performance of students referred to the study to hearing students and to state standards.

**Word reading fluency.** The researcher administered the *Test of Silent Word Reading Fluency* (TOSWRF; Mather, Hammill, Allen, & Roberts, 2004) to determine who among the 10 students for whom initial eligibility and discrepant fluency and comprehension skills were confirmed, were most likely to benefit from the intervention. The TOSWRF measures a student’s ability to recognize printed words accurately and efficiently by counting the number of printed words the student identifies from rows of words, ordered by reading difficulty (e.g., dim/how/fig/blue). The student has three minutes to draw a line between the boundaries of as many words as possible (e.g., dim/how/fig/blue). Results yield raw scores that convert to standard scores, percentiles, and age and grade equivalents. The primary score is the Silent Word Reading Fluency score; a standard score based on a mean of 100 and a standard deviation of 15.

The TOSWRF was normed using a representative sample (which included students with disabilities) of more than 3,592 students across 34 states ranging in age from 6.6 to 17.11 years. Administered for its stated purposes, the TOSWRF is a valid and reliable assessment instrument. Content, criterion-related, and construct validity data show the TOSWRF to be a valid measure of reading fluency and general reading ability. The magnitude of the reliability coefficients obtained from alternate form (immediate and delayed) and test-retest measures rounded to or exceeded .90, strongly suggesting little test error and the reliability of the TOSWRF.

**Primary reading comprehension measure.** A retelling procedure provided the most frequent, and thus primary, measure of student performance in reading comprehension. The
researcher used the retelling data to ensure the systematic implementation of the intervention across student participants.

**Retelling procedure.** Each baseline, intervention, and follow-up session concluded with a retelling procedure (Appendix A). Retelling procedures were video recorded for the researcher to later review, transcribe, and score (Appendix B). The researcher analyzed the transcriptions for the number of details retold. For every complete detail included, whether explicit or inferred, students received one point. The definition of one complete detail was a meaningful unit of thought relating to the main idea, or to important details that support the main idea.

Teachers provided students with an assessment passage to read aloud, and instructed the students to think about the main idea, the important details, and the order in which events in the text occurred. Although difficulty with word reading was not anticipated, teachers were permitted to provide students minimal assistance with word reading (not meaning). When students came to the end of a passage, the passage was removed from view. Teachers told the students that they had one minute to retell everything they remembered reading, and that for every detail retold, they would receive one point. The teachers used a timer to signal to students when it was time to start (and stop) retelling details, and provided one prompt to continue reading should students stop with time remaining.

**Supplemental reading comprehension measures.** Students were administered two additional measures during the study to assess for performance in reading comprehension. The results of these measures complemented retelling data to provide a more complete picture of students’ reading skills, before, during, and after intervention.
**Informal reading inventory.** The researcher administered the expository passages that accompany the *Qualitative Reading Inventory-4* (QRI-4; Leslie & Caldwell, 2006) as a measure of student performance in comprehension pre- and post-intervention. Results of QRI-4 administered pre-intervention (coupled with results obtained from reviews of records and administration of the TOSWRF), ensured the selection of text at students’ respective instructional reading levels for (a) assessment purposes during baseline, intervention, and follow-up; and (b) instructional purposes during intervention. The expository passages that accompany the QRI-4 are comparable in topic and format to those found in content-area textbooks. For the purposes of this study, students read the passages and answered the comprehension questions orally. The number of questions students answered correctly provided an estimate of their independent, instructional, and frustration reading levels.

When administered for one of its stated purposes, including for estimating students’ reading levels, the QRI-4 is a valid and reliable assessment instrument. Content, criterion-related, and construct validity data show the QRI-4 is a valid measure of reading comprehension. Results obtained from inter-scorer, internal-consistency, and alternate-form reliability measures suggest the QRI-4 is a highly reliable tool. The magnitude of the reliability coefficients obtained across examiners’ scores for total explicit and total implicit comprehension was very high (.98 for both). Administration of any single passage resulted in a relatively large standard error of measurement; hence, authors of the QRI-4 recommended administering more than one passage to estimate students’ true scores. At the first, second, third, and fourth grade level respectively, students’ scores indicated the same instructional level on two passages of similar design, 86, 78, 80, and 89 percent of the time.
Maze reading procedure. Students completed a maze reading procedure (Appendix E) during each phase of the study as a direct, frequent, and continuous measure of performance in comprehension. Maze reading is a multiple-choice cloze task that requires students to read brief passages of text, typically 150 - 400 words in length. The first sentence of a maze reading passage is intact; thereafter, three words inside a set of parentheses replace every seventh word. One of the words inside each set of parentheses is the correct word choice; the other two words are distractors (one of the same class as the correct word choice; the other not of the same class, but selected randomly from the story). Students read the maze passages silently for three minutes, while attempting to restore meaning to the passages by selecting the correct word choice from inside each set of parentheses. The number of correct responses achieved provided a weekly record of students’ progress in comprehension.

Maze reading is a valid and reliable means by which to monitor students’ progress in silent reading fluency and comprehension (Brown-Chidsey, Davis, & Maya, 2003; Hale, Hawkins, Sheeley, Reynolds, Jenkins, Schmitt, & Martin, 2011a; Hale, Henning, Hawkins, Sheeley, Shoemaker, Reynolds, & Moch, 2011b). The procedure is one of many progress monitoring tools used by schools to identify students making inadequate progress, to evaluate the effectiveness of instruction, and to inform future instruction. The procedure is one of few progress monitoring tools determined valid and reliable for use with D/HH students. Research has shown that maze reading is sensitive to the improvement D/HH students can make in comprehension within brief periods of time (Rose, 2006).

Maze reading passages were obtained from AIMSweb, a web-based assessment, data management, and reporting system that provides brief, valid, and reliable progress monitoring.
tools (e.g., maze reading) to measure students’ academic performance. The National Center on Response to Intervention (2010), under the U.S. Department of Education, developed and published four charts of commercially available progress monitoring tools in the last five years. The charts provide information about the technical rigor of the tools, based on reviews conducted by the Center’s Technical Review Committee (TRC). The U.S. Department of Education does not officially endorse any of the progress monitoring tools that the TRC reviews. However, the tools available on AIMSweb have an established record of receiving the Committee’s highest ratings for “reliability of performance level score,” “validity of performance level score,” and “sensitive to student improvement” (according to the TRC’s established set of criteria for evaluating the technical adequacy of progress monitoring tools).

The researcher set a goal (defined by AIMSweb as the score level on the progress monitoring measure the student is expected to reach by a particular date) for each student to achieve on the maze reading procedure. AIMSweb uses the formula \( \text{Survey Level Assessment Score} + (\text{Rate of Improvement} \times \text{Number of Weeks}) \) to establish the maze reading goal criterion, whereas the survey level assessment (SLA) score represents current performance; and the rate of improvement (ROI) represents the rate at which students must progress to achieve the designated assessment goal. Although students should be progress-monitored at their current grade placement, the researcher selected passages one grade lower than each student’s current grade placement to increase the sensitivity of the maze reading procedure.

**Reading behavior measures.** Reading behavior measures included informal interviews and observations prior to initiating baseline procedures across participants. Additionally,
measurement of reading behavior included interviews during the follow-up phase and direct observation during baseline, intervention, and follow-up phases.

**Informal interviews and observations.** The researcher interviewed students and teachers prior to the baseline phase for the purposes of (a) planning informal observations, and (b) measuring social validity of reading comprehension, reading behavior, and the intervention. To assess further the social validity of the intervention, the researcher interviewed students and teachers again during the follow-up phase of the study. The researcher conducted the student interviews (Appendix C) with the teacher of D/HH present, and the teacher interviews (Appendix D) in a one-to-one setting, using the appropriate interview protocol. The researcher noted students and teachers’ responses to interview questions on the appropriate protocol, and later reviewed each protocol for accuracy using video recordings of the interview sessions.

Subsequent to interviewing each student and teacher, the researcher conducted an informal observation of each dyad during a session described as “typical.” During the observations, teachers provided students with the reading instruction to which they were accustomed. The researcher documented the strategies the teachers used most frequently (e.g., questioning) and the behaviors in which students engaged while reading aloud and answering comprehension questions. Each time students engaged in behavior that detracted from the process of comprehension (e.g., stopping at an unfamiliar word and looking at the teacher) the researcher recorded the antecedents and consequences (e.g., teacher pronounced/defined words for the students) surrounding the behavior.

Informal interview and observation data enabled the researcher to (a) identify students’ non-strategic reading behaviors; (b) operationally define the behaviors; (c) determine antecedent
conditions under which the behaviors occurred; and (d) identify consequences that affected future occurrences of the behaviors (Umbreit et al., 2007). Analysis of interview and observation data collected prior to initiating baseline procedures further enabled the researcher to determine the function of each student’s non-strategic behavior (i.e., assisted student in “escaping reading instruction” or in “gaining attention during reading instruction”). The researcher used these data to plan the intervention, inclusive of the appropriate antecedent conditions, reinforcements and consequences, and monitor its implementation specifically to each student.

*Direct observation.* The researcher measured strategic and non-strategic reading behavior by direct observation using frequency recording during the retelling procedure that concluded every baseline, intervention, and follow-up session. The researcher reviewed 100% of the video-recorded retelling procedures for the number of strategic and non-strategic reading behaviors in which students engaged. Each time students engaged in strategic behavior (following the steps of the strategy) the researcher placed a tally mark in the designated space on the retell protocol (Appendix B). Each time students engaged in non-strategic behavior (varied specifically to each individual student) the researcher placed a tally mark in the designated space on the retell protocol. Reading behavior data were recorded during the baseline phase until stability in the reading comprehension data (i.e., the retelling data) was recorded. Collection of reading behavior data continued during the intervention phase and the follow-up phase of the study.

**Interobserver Agreement Reliability**

To assess the accuracy of the reading comprehension and reading behavior data the researcher recorded, inter-observer agreement (IOA) data were collected throughout the course of the study. For reading comprehension, the researcher and the research assistant analyzed
100% of the total number of retelling transcriptions (72) across phases. IOA data for strategic and non-strategic reading behavior were recorded for 20% of the total number of video-recorded retelling procedures (five of 22 baseline sessions, nine of 43 intervention sessions, and three of seven follow-up sessions).

IOA data for reading comprehension was calculated by dividing the number of agreements by the sum of agreements and disagreements, and multiplying the result by 100. IOA for strategic and non-strategic reading behavior was computed by dividing the number of agreements by the sum of agreements and disagreements, and multiplying the result by 100. The minimum acceptable value for reading comprehension and reading behavior was 85%. Table 6 lists the percentages of IOA for each student-teacher dyad during each phase of the study, as well as overall IOA percentages for all three dyads.

Table 6

<table>
<thead>
<tr>
<th>Phase</th>
<th>Student A</th>
<th>Student B</th>
<th>Student C</th>
<th>Across Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RC</td>
<td>RB</td>
<td>RC</td>
<td>RB</td>
</tr>
<tr>
<td>Baseline</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Intervention</td>
<td>99</td>
<td>91</td>
<td>95</td>
<td>99</td>
</tr>
<tr>
<td>Follow-up</td>
<td>100</td>
<td>94</td>
<td>100</td>
<td>97</td>
</tr>
</tbody>
</table>

*Note. RC = Reading Comprehension; RB = Reading Behavior.*

**Independent Variable**

The independent variable in the study was the CC&R strategy. Research across the fields of reading instruction (Duke & Pearson, 2002), cognitive strategy instruction (Conley, 2008; Snyder & Pressley, 1995; Harris & Pressley, 1991), and function-based intervention (Umbreit et
The strategy. The CC&R strategy (Table 7) provided students a concrete approach to managing the abstract concept of reading comprehension. Student participants learned to pause at the end of pre-determined segments of text during oral reading to question their understanding aloud. If students understood what they read, they made a comment about information in the text. If students did not understand what they read, they asked a question about a vocabulary word or a sentence in the text. Students recorded their comments and questions on coded sticky notes (Appendix F) and used question-answer relationship cards (Appendix G) and text connection cards (Appendix H) to assist them in finding answers to their questions. When students found an answer to a question, they recorded it on the corresponding sticky note and placed the note next to the appropriate segment of text. Students resumed reading aloud and practicing the strategy until they came to the end of the instructional passage. If any questions remained, teachers provided assistance by reminding students to use their knowledge of QARs and text connections to find answers to their questions.
Table 7

**CC&R Strategy**

1. At the end of each segment of text, the reader asks aloud, “Do I understand what I just read?”

2. If the answer is yes, the reader
   - “thinks-aloud” a comment about the text
   - selects an “I knew that” or an “I didn’t know that” sticky note
   - records the comment on the sticky note
   - places the sticky note next to the appropriate segment of text
   - resumes reading aloud

3. If the answer is no, the reader
   - “thinks-aloud” a question about the text
   - selects an “I wonder” sticky note
   - records the question on the sticky note
   - places the sticky note next to the appropriate segment of text

4. Before resuming reading, the reader
   - determines where the answer to the question might be found
   - selects a QAR card, and if necessary a text connection card
   - resumes reading

5. When an answer to a question is found during reading, the reader
   - verbalizes the answer
   - records the answer on the corresponding sticky note
   - moves the sticky note from the place in the text where the question was asked, to the place in the text where the answer was found
   - resumes reading aloud

**Components.** Teachers instructed students in how to use the CC&R strategy during oral reading using think-alouds, described by Davey (1983) as concrete, visual models of thinking. The use of think-alouds enabled teachers to model their own cognitive behavior (i.e., commenting, questioning, and answering). As students learned to use the CC&R strategy, they too used think-alouds to model their own thinking. Thus, the use of think-alouds enabled the
teachers to not only model their own cognitive behavior, but also monitor the cognitive behavior of the students. For example, after reading text they understood, students verbalized a comment and selected an “I knew that” sticky note to record the comment. After reading text they did not understand, students verbalized a question and selected an “I wonder” sticky note.

Appendix I depicts the process teachers and students followed to resolve comprehension problems using question-answer relationships (QARs; Raphael, 1986) and text connections. After completing “I wonder” sticky notes, students referred to the QAR cards to determine where they might find answers to their questions – “in-the-book” or “in-my-head”. As students continued reading, if they found an answer to a question they asked earlier in the text, they recorded the answer on the corresponding sticky note and moved the note to the place in the text where they found the answer. Students used the text connection cards to answer “in-my-head” questions. In-my-head questions required students to think beyond what was explicitly stated in the text. Students answered these question types by connecting what they knew from reading other texts, what they knew from their own life experience, and what they knew from the world around them.

**Teacher training.** The researcher provided the teachers with one-to-one training using discussion, role play, video, and PowerPoint presentations. Each teacher received training after the baseline phase, but prior to implementing the intervention. The training teachers received covered the following:

- the CC&R strategy and its components;
- the lesson plan to follow while teaching the CC&R strategy (Appendix J);
- materials for previewing the vocabulary and concepts associated with the CC&R strategy; and
- procedures for monitoring student progress.
The lesson plans provided to the teachers were identical except for the reinforcements and consequences included in each plan. Following tenets of function-based assessment and intervention (Umbreit et al., 2007), the researcher used interview and observation data to ensure students would be appropriately reinforced for using the CC&R strategy. The researcher also used the data collected from students and teachers’ interviews and observations to ensure teachers would withhold the consequences that previously reinforced students’ non-strategic reading behaviors.

During the teacher training, the researcher provided the teachers with guidelines and materials for previewing vocabulary and concepts with the students, an activity with which teachers reported being familiar. During the interview process, teachers reported that they often previewed material with the students to better prepare them for instruction in the general education classroom. Similar to the previewing activities in which students typically participated, the purpose of the previewing activities that the researcher planned was to expose students – some of them for the first time - to vocabulary (e.g., the word, “strategy”) and concepts (e.g., “comprehension” and “think-alouds”) associated with the CC&R strategy.

**Procedures.** The same general procedures were followed each baseline, intervention, and follow-up session. Student-teacher dyads met in the same area, at the same time, and for the same length of time, they routinely met. The first five to ten minutes of each session, teachers and students reviewed material from the previous session and previewed material for the day’s session. For the next 20-30 minutes, teachers provided instruction. During the baseline phase and the follow-up phase, teachers provided instruction using the methods and materials they routinely used. During the intervention phase, teachers provided instruction using the methods
and materials provided by the researcher. For the last five to ten minutes of each session across each phase of the study, students completed the retelling procedure. For each student participant, each dependent variable was measured a minimum of five times during the baseline phase (“instruction-as-usual”); a minimum of nine times during the intervention phase (instruction of the CC&R strategy); and a minimum of two times during the follow-up phase.

**Baseline phase.** Student-teacher dyads initiated baseline procedures simultaneously. Each session, students received the instruction they were accustomed to receiving (i.e., “instruction-as-usual”) and teachers assessed the students for comprehension. With five to ten minutes remaining each session, instruction ended and the retelling procedure began. After each student’s baseline data reflected stability - a minimum of three data points were necessary to establish stability - the researcher initiated intervention procedures across each student-teacher dyad in a staggered fashion. Student A was the first student to receive the intervention. Students B and C continued to receive instruction-as-usual until the number of details Student A retold increased and remained stable. Student C continued to receive instruction-as-usual until the number of details Student B retold increased and remained stable.

**Intervention phase.** Teacher training marked the initiation of the intervention phase, at which time the retelling procedure was suspended. After meeting with the researcher a minimum of two times for at least one hour each time, the teachers met with their students and completed the previewing activities. Previewing activities included discussion of what reading strategies the students already knew (e.g., previewing vocabulary, predicting what a book may be about based on its title and cover) and when they used them (before, during, or after reading). Discussion also included the importance of reading and its purpose. The teachers reminded the students of their
purpose for participating in the study (i.e., to assist the researcher in determining if strategies that help some students improve comprehension, help them improve their own comprehension).

Previewing activities concluded with the teachers letting the students know that the next time they met they would begin learning the CC&R strategy.

The retelling procedure resumed when teachers initiated formal instruction of the CC&R strategy. At the beginning of each intervention session, teachers (a) named the strategy, (b) listed the steps of the strategy, and (c) modeled the strategy. As students became familiar with the strategy and its components, their responsibility for naming and explaining the strategy at the beginning of each session increased. As the intervention phase progressed, the number of times each session that students read aloud and used the strategy increased. By the end of the intervention phase, when a review of the strategy itself was no longer necessary, sessions consisted of teachers and students previewing the content of the instructional passage, and students taking primary responsibility for reading aloud and using the strategy. As students read the instructional passages and used the strategy, teachers continued to provide the appropriate consequences and reinforcements.

Students completed the retelling procedure at the end of each intervention session as they did at the end of each baseline session, with one exception. Teachers provided the students not only an assessment passage, but also the coded sticky notes, QAR cards, and text connection cards to use during the retelling procedure, should they elect to use them. When the desired change in the number of details Student A retold was observed over a minimum of three sessions and remained stable, student-teacher dyad B transitioned to the intervention phase. Student-teacher dyad C remained in baseline, Student A remained in intervention, and data collection
continued for all three participants. When the desired change in the number of details Student B retold was observed over a minimum of three sessions and remained stable, student-teacher dyad C transitioned to the intervention phase. Student-teacher dyads A and B remained in intervention, and data collection continued for all three participants.

**Follow-up phase.** A follow-up phase was included to measure whether students maintained intervention performance in reading comprehension and behavior after a break from formal instruction and practice in the CC&R strategy. Due to time constraints at the end of the school year, follow-up procedures were initiated ten days, three days, and two days following the conclusion of the intervention phase for Students A, B, and C respectively. During this phase, teachers returned to instructing students using the methods and materials they routinely used. Toward the end of each session, instruction ended and students completed the retelling procedure. The researcher returned during the follow-up phase to administer the QRI-4 and interview both students and teachers.

**Treatment Integrity**

The researcher, research assistant, and the teachers collected treatment integrity data across components and sessions using the treatment integrity checklist (Table 8). The researcher and research assistant independently measured the degree to which each teacher implemented the intervention by direct observation of recorded intervention sessions. The researcher observed a minimum of 20% of the total number of sessions for each student-teacher dyad across all phases. The research assistant observed 20% of the sessions that the researcher observed in order to obtain interobserver agreement data. The teachers were asked to provide information on the
degree to which they implemented the intervention by self-report at the end of every intervention session.

The researcher and research assistant marked components of the intervention procedure that they observed teachers implement; and left blank those components of the procedure teachers did not implement during the session. The researcher calculated the percent of session integrity for each teacher by dividing the number of components the teacher completed by the total number of components, and multiplying the result by 100. To calculate the percent of integrity for each component of the intervention procedure by teacher, the researcher divided the number of sessions the teacher implemented the component by the total number of sessions, and multiplied the result by 100. The minimum acceptable level of session and component integrity was 80%.
Table 8

*Treatment Integrity Checklist*

<table>
<thead>
<tr>
<th>Delivery of Instruction</th>
<th>Date</th>
<th>Component Integrity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicited student’s interest and activated prior knowledge.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Named, explained, and modeled steps of the strategy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provided interactive, guided, and independent practice as appropriate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provided appropriate reinforcement for the replacement behavior.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withheld the consequence that reinforced the target behavior.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy Instruction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paused to verbalize thoughts at the end of pre-determined segments of text.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recorded comments and questions on coded sticky notes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used QARs and text connections to answer questions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recorded answers on corresponding sticky notes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Placed notes next to segments of text where answers were found.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Session Integrity                                                                      |      |                     |
|                                                                                       |      |                     |

**Social Validity**

The researcher interviewed teachers and students prior to the baseline phase and again during the follow-up phase to measure the social validity of the intervention. The teachers, and the students, completed the same interview protocol pre- and post-intervention. Interview data
provided the researcher a means for measuring participants’ overall perceptions of the intervention, as well as their level of acceptance of the intervention and its outcomes. Furthermore, interview data served as a supplemental measure of student performance in reading comprehension and reading behavior prior to and after learning the CC&R strategy.

**Data Analysis Procedures**

To determine whether changes in reading comprehension, strategic reading behavior, and non-strategic reading behavior were a function of instruction in the CC&R strategy, the researcher conducted visual analyses of the data as recommended by Horner, Carr, Halle, McGee, Odom, and Wolery, (2005) and Kratochwill et al. (2010). The researcher assessed the level, trend, and variability of the data for each dependent variable within and between phases, and calculated medians, means, and standard deviations for each phase. After examining the immediacy of effect and overlap, the researcher combined the information from each of the phase comparisons to determine whether all the data across all phases demonstrated the efficacy of the intervention (Kratochwill et al., 2010).
CHAPTER 4

RESULTS

The purpose of this study was to investigate the influence of the CC&R strategy on reading comprehension and reading behavior for D/HH students. As recommended by Horner et al. (2005) and Kratochwill et al. (2010), the researcher examined within- and between-phase data patterns using visual analysis of: level, trend, variability, overlap, and immediacy of effect. The researcher used descriptive measures (medians, means, standard deviations, and ranges) and effect-size calculations (standard mean difference [SMD], percentage of non-overlapping data [PND], and percentage of data exceeding the median of the baseline [PEM]) to complement visual evidence of intervention effects.

Although visual analysis is the most frequently employed procedure for analyzing single-case data (Gast & Spriggs, 2010), whether to complement its use with quantitative procedures has received considerable attention in recent literature (Campbell & Herzinger, 2010). Various alternative methods for calculating effect size with SCDs have been suggested (Ma, 2006; Manolov, Solanas, Sierra, & Evans, 2011; Parker & Brossart, 2003; Parker, Vannest, & Davis, 2011; Shadish, Rindskopf, & Hedges, 2008); however, most do not yield results comparable to those used in between-group designs (Campbell & Herzinger, 2010; Kratochwill, et al., 2010). Due to the lack of consensus regarding an appropriate effect-size estimator for SCDs, Campbell and Herzinger (2010) recommended supporting visual evidence with multiple effect-size calculations. Olive and Smith (2005) observed consistency across alternative methods for analyzing single-case data such as the SMD and PND. While they acknowledged the usefulness of effect-size calculations, they recognized that reporting results of alternative analyses alone
could mask important characteristics of data. Olive and Smith (2005) therefore recommended reporting results of alternative analyses in tandem with individual participant graphs to minimize the risk of influencing interpretation of intervention effects.

Figures 1 and 2 graphically display baseline, intervention, and follow-up data for each student in reading comprehension and reading behavior, respectively. As anticipated, reading comprehension data were variable across participants (with the exception of baseline data for Students A and B). The split-middle method has been recommended over the freehand method for estimating the trend of variable data patterns (Gast & Spriggs, 2010), and as such was used to estimate the trend of each data series. To determine immediacy of effect, the researcher compared the extent to which the level, trend, and variability of the last three data points in the baseline phase were discernibly different from the first three data points in the intervention phase as suggested by Kratochwill et al. (2010).

Table 9 presents the median, mean, SD, SMD, PND, and the PEM for each student in reading comprehension. Tables 10 and 11 present the median, mean, SD, range, and the PND for each student in strategic and non-strategic reading behavior. The SMD was calculated by dividing the difference of the baseline mean and the intervention mean by the SD of the baseline. The PND was calculated by dividing the number of intervention data points that fell outside the range of baseline data-point values by the total number of intervention data points, and multiplying the result by 100. The PEM was calculated by dividing the number of intervention data points exceeding the baseline median by the total number of intervention data points, and multiplying the result by 100.
**Reading Comprehension**

Data points in Figure 1 represent the number of details each student retold following oral reading of an assessment passage, each baseline, intervention, and follow-up session. A chart of each student’s progress on the maze reading procedure appears in Appendix K. The solid black goal line denotes predicted progress, while the segmented red line denotes students’ actual progress. AIMSweb, as well as other progress monitoring systems that the researcher considered using for the purposes of this study, contained only narrative passages. Reviewers should interpret each student’s overall progress and rate of improvement illustrated in Appendix K cautiously, as content-area text, not narrative, was used to instruct students in the use of the CC&R strategy.

As Figure 1 illustrates, baseline procedures initiated across student-teacher dyads simultaneously. Systematic implementation of the intervention began approximately 3-weeks following initiation of the baseline phase, when the number of details each student retold had reached stability. Student-teacher dyad A initiated intervention procedures first, followed by student-teacher dyads B and C approximately 4½- and 6-weeks following initiation of the baseline phase respectively. Students A, B, and C participated in five, seven and 10 baseline sessions respectively; and 19, 15, and nine intervention sessions respectively. Follow-up data were recorded for each student. Student A completed three retelling procedures during the follow-up phase, while Students B and C each completed two retelling procedures during the follow-up phase.
Figure 1. Reading comprehension during baseline, intervention, and follow-up.
Table 9

Median, Mean, SD, SMD, PND, and PEM of Reading Comprehension across Participants

<table>
<thead>
<tr>
<th>Student</th>
<th>Baseline</th>
<th>Intervention</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>1.0</td>
<td>4.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>1.4 (0.6)</td>
<td>3.8 (2.1)</td>
<td>5.0 (1.4)</td>
</tr>
<tr>
<td>SMD</td>
<td>4.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PND</td>
<td>63.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEM</td>
<td>89.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>7.0</td>
<td>10.0</td>
<td>9.5</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>7.6 (1.4)</td>
<td>10.2 (2.6)</td>
<td>9.5</td>
</tr>
<tr>
<td>SMD</td>
<td>1.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PND</td>
<td>60.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEM</td>
<td>86.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>3.0</td>
<td>9.0</td>
<td>7.5</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>4.1 (2.7)</td>
<td>8.3 (3.2)</td>
<td>7.5</td>
</tr>
<tr>
<td>SMD</td>
<td>1.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PND</td>
<td>11.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEM</td>
<td>88.9%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Student A.**

*Primary reading comprehension measure.* The median and mean levels of Student A’s performance in reading comprehension during the baseline phase were 1.0 and 1.4 details respectively. Baseline data were stable and showed a fairly flat trend. The intervention had an immediate effect on Student A’s comprehension. The median number of details retold between baseline and intervention tripled. Intervention data, although variable, showed an accelerating trend that continued through the follow-up phase. The PND and PEM for Student A in comprehension were 63.2% and 89.5% respectively. Figure 1 graphically depicts the increase in
the mean level and the accelerating trend, suggesting the CC&R strategy had an extremely positively influence on Student A’s comprehension of content-area text.

**Supplemental reading comprehension measures.** Based on the results of the assessment instruments administered post-intervention, the influence of the intervention on Student A’s comprehension is less clear. Results of the QRI-4 administered pre- and post-intervention indicated an instructional reading level of grade one and a frustration reading level of grade two. Student A completed eight, grade four maze reading passages during intervention and follow-up phases. Based on the initial performance score (21 responses correct with one error), an ROI of 0.85 responses correct per week, and a time frame of seven weeks, Student A’s goal was to achieve 27 responses correct with two errors. On the final maze reading passage administered, Student A achieved a score of 26 responses correct with two errors and an average ROI of 0.25 responses correct per week. Thus, Student A’s average ROI at the end of the study was less than the ROI necessary to achieve the designated assessment goal.

**Student B.**

**Primary reading comprehension measure.** Median and mean levels of performance in reading comprehension for Student B during the baseline phase were 7.0 and 7.6 details respectively. Baseline data were fairly stable with an accelerating trend. The effect of the intervention on Student B’s comprehension was not immediate; however, the intervention median increased by almost half. Intervention data were variable, with the number of details retold ranging from six to 17. Intervention data showed an accelerating trend. The PND for reading comprehension was 60.0% and the PEM was 86.7%, reflecting the variability of the intervention data. Examination of Figure 1 shows that while the mean level of Student B’s
performance did not increase between intervention and follow-up as it did for Student A, it did not return to baseline levels. Figure 1 graphically depicts the increase in the mean level, the similarity between baseline and intervention trends, and the somewhat positive influence of the CC&R strategy on Student B’s comprehension of content-area text.

**Supplemental reading comprehension measures.** For Student B, administration of the QRI-4 and the final maze reading passage during follow-up yielded findings similar to findings obtained from visual analyses. Pre- and post-intervention results of the QRI-4 indicated an instructional reading level of grade three and a frustration reading level of grade four. Student B completed eight, grade three maze reading passages across baseline, intervention, and follow-up phases. Based on the initial performance score (24 responses correct with two errors), an ROI of 1.0 responses correct per week, and a time frame of seven weeks, Student B’s goal was to achieve 31 responses correct with two errors. On the final maze reading passage administered, Student B achieved a score of 24 responses correct with six errors and an average ROI of 0.23 responses correct per week. Despite having achieved scores of 31 or higher responses correct with four or more errors on two earlier administrations of the maze reading procedure (3- and 12-days prior), at the end of the study Student B’s average ROI was less than the ROI necessary to achieve the designated assessment goal.

**Student C.**

**Primary reading comprehension measure.** Median and mean levels of Student C’s performance in reading comprehension between baseline and intervention increased from 3.0 to 9.0 and from 4.1 to 8.3 respectively. The intervention appeared to have an immediate effect on Student C’s comprehension. The number of details Student C retold during the first intervention
session compared to the last baseline session increased by nine. Comprehension data for Student C were highly variable throughout the study. Split-middle analysis revealed an accelerating baseline trend, and a decelerating intervention trend that returned to accelerating during follow-up. As was observed for Student B, although the mean level of Student C’s performance did not increase between intervention and follow-up, it did not return to baseline levels. The PND and PEM for Student C in comprehension were 11.1% and 88.9% respectively. One outlying intervention data point (Session 8) accounted for almost 90% of the overlap between intervention and baseline data. Careful examination of Figure 1 and the improving to deteriorating to improving trend across phases, suggests the CC&R strategy may have negatively influenced Student C’s comprehension of content-area text.

Supplemental reading comprehension measures. Findings from administration of the QRI-4 and the final maze reading passage during follow-up contrast findings from visual analyses. Results of the QRI-4 indicated that Student C’s instructional reading level rose slightly, from end of grade three pre-intervention, to beginning of grade four post-intervention. Student C completed seven, grade four maze reading passages across baseline, intervention, and follow-up phases. Based on the initial performance score (10 responses correct with six errors), an ROI of 0.85 responses correct per week, and a time frame of seven weeks, Student C’s goal was to achieve 16 responses correct with one error. On the final maze reading passage administered, Student C achieved a score of 23 responses correct with one error and an average ROI of 2.09 responses correct per week. Student C’s average ROI at the end of the study was greater than the ROI necessary to achieve the designated assessment goal.
Reading Behavior

Data points in Figure 2 represent the reading behaviors (i.e., behaviors that facilitated or detracted from the process of comprehension) in which students engaged during oral reading and retelling procedures each baseline, intervention, and follow-up session. Tables 10 and 11 present the median, mean, SD, range, and the PND for each student in strategic and non-strategic reading behavior. Strategic reading behavior was defined as following the steps of the CC&R strategy. Non-strategic reading behavior was defined individually for each student.
Figure 2. Reading behavior during baseline, intervention, and follow-up and treatment integrity during intervention.
Table 10

Median, Mean, SD, Range, and PND, of Strategic Reading Behavior across Participants

<table>
<thead>
<tr>
<th>Student</th>
<th>Baseline</th>
<th>Intervention</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
<td>1.0</td>
<td>16.0</td>
</tr>
<tr>
<td>Student A</td>
<td>Mean (SD)</td>
<td>1.0 (1.0)</td>
<td>15.3 (9.4)</td>
</tr>
<tr>
<td>Range</td>
<td>2</td>
<td>30</td>
<td>21</td>
</tr>
<tr>
<td>PND</td>
<td></td>
<td></td>
<td>79.0%</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>0.0</td>
<td>16.0</td>
</tr>
<tr>
<td>Student B</td>
<td>Mean (SD)</td>
<td>0.9 (1.6)</td>
<td>13.7 (9.1)</td>
</tr>
<tr>
<td>Range</td>
<td>4</td>
<td>27</td>
<td>1</td>
</tr>
<tr>
<td>PND</td>
<td></td>
<td></td>
<td>73.3%</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>0.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Student C</td>
<td>Mean (SD)</td>
<td>0.6 (1.0)</td>
<td>3.9 (3.3)</td>
</tr>
<tr>
<td>Range</td>
<td>2</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>PND</td>
<td></td>
<td></td>
<td>66.7%</td>
</tr>
</tbody>
</table>
### Table 11

**Median, Mean, SD, Range, and PND, of Non-Strategic Reading Behavior across Participants**

<table>
<thead>
<tr>
<th>Student</th>
<th>Baseline</th>
<th>Intervention</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>3.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>3.8 (1.3)</td>
<td>0.7 (1.2)</td>
<td>0.0</td>
</tr>
<tr>
<td>Range</td>
<td>3</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>PND</td>
<td>0.0% / 89.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>1.0 (1.5)</td>
<td>0.1 (0.5)</td>
<td>0.0</td>
</tr>
<tr>
<td>Range</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>PND</td>
<td>0.0% / 93.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>1.5</td>
<td>1.0</td>
<td>5.5</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>1.9 (1.5)</td>
<td>1.0 (1.1)</td>
<td>5.5 (3.5)</td>
</tr>
<tr>
<td>Range</td>
<td>4</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>PND</td>
<td>0.0% / 44.4%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Student A.** The mean level of Student A’s performance in strategic reading behavior during baseline was 1.0 with a SD of 1.0. Baseline data revealed a slightly decelerating trend. The effect of the intervention was fairly immediate. The median level increased dramatically between baseline and intervention, from 1.0 to 16.0. Intervention data although variable, revealed a steep, accelerating trend. Data for the first follow-up session showed a sudden decrease in strategic behavior. By the second follow-up session, strategic behavior returned to intervention levels and a sharp, accelerating trend. The PND for strategic behavior was 79.0%, suggesting a fair outcome. Collectively, analyses of level, trend, immediacy of effect and PND suggest that the CC&R strategy was highly effective and positively influenced Student A’s strategic reading behavior during oral reading of content-area text.
The non-strategic reading behavior in which Student A engaged was responding, “I don’t know” (linguistically or non-linguistically) when asked to retell details from content-area text. The mean level of Student A’s performance during baseline was 3.8 with a SD of 1.3. Baseline data showed a slightly accelerating trend and stability (with the exception of the third data point). The effect of the intervention was immediate; after three intervention sessions the mean level of Student A’s non-strategic behavior decreased by half. The median level of non-strategic behavior between baseline and intervention decreased from three to zero. Intervention data showed low variability initially, quickly stabilized, and revealed a flat trend that continued throughout the remainder of the intervention and follow-up phase. The PND was 89.5%, suggesting the CC&R strategy was a highly effective means by which to reduce, and almost eliminate, Student A’s non-strategic reading behavior.

Student B. The mean level of Student B’s performance in strategic reading behavior during baseline was essentially zero. Baseline data were stable with a slightly decelerating trend that flattened as the baseline phase progressed. Although the effect of the intervention was not immediate, the median level of Student B’s strategic behavior increased dramatically between baseline and intervention, from 1.0 to 16.0. The frequency of Student B’s strategic behavior remained high during the second half of the intervention phase. Data during the intervention phase were variable with an accelerating trend. Follow-up data continued to show a high frequency of strategic behavior. The PND for Student B’s strategic reading behavior was 73.3%, suggesting a fair outcome. Collectively, data analyses reveal that the CC&R strategy was a moderately to highly effective means by which to increase Student B’s strategic reading behavior during oral reading of content-area text.
The non-strategic reading behavior in which Student B engaged was stopping during oral reading, looking up from the text (or alternatively, keeping eyes on the text), and not resuming reading until the teacher provided assistance. Student B’s frequency of non-strategic behavior was minimal during baseline, with a mean level 1.0. Baseline data were variable with a slightly accelerating trend. The effect of the intervention was fairly immediate, as the mean level of non-strategic behavior for the first three intervention sessions (compared to the mean level for the last three baseline sessions) decreased from 2.0 to 0.7. While the median level of non-strategic behavior was zero for both baseline and intervention, the range of the data-point values decreased from four during baseline to two during intervention. Intervention data were stable and revealed a flat trend that continued into the follow-up phase. The PND for non-strategic behavior was zero (despite visual evidence of an intervention effect) as four of the seven baseline data-point values reached the floor level. Without the zero baseline data-point values, the PND was 93.3%. Collectively, analyses of data reveal that the CC&R strategy was a moderately effective means by which to decrease Student B’s non-strategic reading behavior.

**Student C.** The mean level of Student C’s performance in strategic reading behavior during baseline was essentially zero (0.6). Baseline data were stable and revealed a flat trend. The effect of the intervention was fairly immediate. The median level increased between baseline and intervention, from 0.0 to 3.0. Intervention data although variable, revealed an accelerating trend. Two data points were recorded for Student C during the following-up phase; the first showed a high frequency of strategic behavior while the second showed a low frequency of strategic behavior. Although visual inspection and calculation of median and mean levels suggest a fairly positive influence of the CC&R strategy on Student C’s strategic behavior during oral
reading of content-area text, the PND of 66.7% calls the efficacy of the intervention into question. At best, Student C received marginal benefit.

The non-strategic reading behavior in which Student C engaged was stopping during oral reading, looking up from the text (or alternatively, keeping eyes on the text), and not resuming reading until the teacher provided assistance. Student C’s frequency of non-strategic behavior was fairly minimal during baseline, with a mean level 1.9. Baseline data were somewhat variable with a decelerating to flat trend. The effect of the intervention, although immediate, was minimal overall. The median level of non-strategic behavior decreased from 1.5 during baseline, to 1.0 during intervention. Data recorded for the intervention phase were slightly less variable than baseline, and revealed a flat trend. The data-point value for the first follow-up session indicated a low frequency of non-strategic behavior, while the data-point value for the second follow-up session indicated a high frequency of non-strategic behavior. The PND for Student C was zero (despite visual evidence of an intervention effect) as two of the ten baseline data-point values reached the floor level. Without the zero baseline data-point values, the PND was 44.4%. Analysis of non-strategic reading behavior suggests that Student C received minimal, if any, benefit from the intervention.

**Treatment Integrity Data**

While reviewing a recorded intervention session, the researcher documented whether the teacher implemented the intervention as it was intended to be implemented. For each session reviewed, treatment integrity was obtained by adding the number of components implemented by the teacher, and dividing this number by the total number of components. The mean of session
scores constituted the average treatment integrity percentage. The average treatment integrity for Teachers A, B, and C was 93%, 90%, and 70%, respectively.

Additionally, the integrity with which each component of the intervention procedure was implemented across sessions was obtained by adding the number of sessions the teacher implemented the component, and dividing this number by the total number of sessions. The mean of each component score constituted the average component integrity percentage. The average integrity that each component of the intervention procedure was implemented across teachers is listed in Table 12. The degree to which teachers provided a balance of interactive, guided, and independent practice was 100%. The degree to which the consequence that previously reinforced the target behavior was extremely low (chapter five explores plausible reasons for this finding).
### Table 12

**Percentages of Component Integrity for each Student-Teacher Dyad**

<table>
<thead>
<tr>
<th>Delivery of Instruction</th>
<th>A</th>
<th>Student B</th>
<th>C</th>
<th>Across Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elicited student’s interest and activated prior knowledge.</td>
<td>100%</td>
<td>100%</td>
<td>50%</td>
<td>83%</td>
</tr>
<tr>
<td>Named, explained, and modeled steps of the strategy.</td>
<td>100%</td>
<td>75%</td>
<td>50%</td>
<td>75%</td>
</tr>
<tr>
<td>Provided interactive, guided, and independent practice as appropriate.</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Provided appropriate reinforcement for the replacement behavior.</td>
<td>100%</td>
<td>100%</td>
<td>50%</td>
<td>83%</td>
</tr>
<tr>
<td>Withheld the consequence that reinforced the target behavior.</td>
<td>100%</td>
<td>75%</td>
<td>0%</td>
<td>58%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategy Instruction</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Paused to verbalize thoughts at the end of predetermined segments of text.</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Recorded comments and questions on coded sticky notes.</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Used QARs and text connections to answer questions.</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Recorded answers on corresponding sticky notes.</td>
<td>75%</td>
<td>100%</td>
<td>50%</td>
<td>75%</td>
</tr>
<tr>
<td>Placed notes next to segments of text where answers were found.</td>
<td>50%</td>
<td>100%</td>
<td>100%</td>
<td>83%</td>
</tr>
</tbody>
</table>
Social Validity Data

The researcher analyzed interview data to assess for social validity. In addition, the researcher analyzed anecdotal recordings of comments teachers offered (through personal communication and email) throughout the study. Analysis of interview data, coupled with analysis of anecdotal recordings, revealed a) participants’ level of acceptance of the intervention and its outcomes; b) teachers’ reflections of the instruction they provided students before and during intervention, c) teachers’ perceptions of student progress, and d) students’ self-perceptions.

All three teachers indicated that the intervention improved the effectiveness of their reading instruction, not only with the students who participated in the study, but also with other students with whom they worked. One teacher shared, “I’m using think-alouds with my other students; a 3rd grader and a 4th grader…even a 1st grader.” At the conclusion of the study, each teacher requested templates of the coded sticky notes, question-answer relationship cards, and text connection cards. When school resumed after summer vacation, one of the teachers contacted the researcher to inquire about obtaining additional materials. Social validity data further indicated that the teachers benefitted from learning instructional strategies such as think-alouds and “I wonder…” statements. One teacher reported, “Having the student stop and think aloud about what he read has been fabulous.” Another teacher commented that the vocabulary and language used to perform think-alouds provided “the perfect transition to getting the student to look more closely at questions he asks and to analyze the text even further.”

Teachers used think-alouds and “I wonder…” statements not only to model cognitive behavior, but also to decrease the number of questions they asked students during oral reading.
Early in the intervention phase, one teacher reflected, “I forgot to preview the hard-to-pronounce words. When the student struggled and looked at me, I just pronounced the word for her.” The teacher added, “After I thought about it, I should have prompted the student to generate an “I wonder…” statement. I just fed into the ‘look’ and gave her the pronunciation.” During the post-intervention interview, one teacher commented, “All of my questioning wasn’t that great of a thing. I didn’t realize I was doing it so much.”

Social validity data further revealed teachers’ perceptions of the progress students made in learning how to use the CC&R strategy and in understanding content-area text. Whether or not the number of details students retold increased and remained stable, all of the teachers commented that the quality of students’ retells improved. Toward the end of the intervention phase, one teacher commented, “Once the student realized that I wasn't telling him he was doing something ‘wrong’ by asking him to revisit the passage, he seemed to ask more relevant questions.” During the post-intervention interview, one teacher shared, “For him to know it’s ok to stop and make those comments, even when we’re reading other things like fiction, I’ve noticed it.” The teacher proceeded to share,

“His fidgeting is less...he’s more relaxed now. I think he’s very comfortable with the whole process. When we are sitting together and we’re using the strategy I think he’s a really careful reader and he’s really reading to understand. I think he’s reading to understand instead of just reading, and without me having to ask a million questions. He’s reading because he knows he’s going to have to make a comment. So, I think he’s got it.”

Finally, social validity data pointed to possible increases in students’ metacognitive knowledge and use before, during, and after reading. During the middle of the intervention phase, one student commented, “My head is on fire!” Comments like this speak not only to the efficacy of the intervention for increasing students' metacognitive awareness of the processes
involved in comprehending text, but also for potentially improving students’ self-perceptions of
themselves as readers. Following, is what one teacher referred to as her student’s “a-ha
moment”:

“I asked the student to write the name of the strategy we’ve been working on...the
student paused, said ‘Comprehension Check Repair’, then looked completely
shocked at his own recollection of this information. His facial expression was
priceless as he looked at me and asked, ‘How did I know that?’ He ran around
the room telling everyone that he had a ‘big brain’ and that he had a lot of
information inside his brain.”
CHAPTER 5

DISCUSSION

Chapter 5 begins with an explanation of the study’s findings and the contribution of the study to the evidence base of effective reading instruction for D/HH students. Chapter 5 continues with a discussion of the relationship between the intervention and the dependent variables, and factors that may have contributed to the study’s findings. The chapter concludes with summaries of the study’s limitations, implications for research, and implications for practice.

Interpretation of Results

The present study investigated the effect of instruction in a metacognitive strategy on reading behavior and reading comprehension for D/HH students in grades four and five. Visual analysis of intervention data showed (a) increases in strategic reading behavior for Students A, B and C; (b) decreases in non-strategic reading behavior for Students A and B; and (c) increases in reading comprehension for Student A, and possibly for Student B. These findings contribute to the evidence base in that intervention studies relative to effective reading instruction for D/HH students are sparse.

Based on a review of current literature, investigations of various instructional practices relative to reading and classroom learning concern college-aged D/HH students (Andrews & Mason, 1991; Brown & Brewer, 1996; Courtin et al., 2008; Hauser, Lukomski, & Hillman, 2008; Kelly et al., 2001; Marschark & Wauters, 2008). Few evidence-based instructional practices exist relative to school-aged D/HH students’ classroom learning. This study is the only intervention study to date that has (a) examined the efficacy of instruction in a metacognitive strategy for
increasing school-aged D/HH students’ understanding of content-area text; (b) included reading behavior and reading comprehension as dependent variables; (c) and measured both reading behavior and comprehension continuously and repeatedly over time.

Research has shown that proficient readers approach text with a repertoire of compensatory strategies from which to monitor and resolve problems with comprehension (Griffith & Ruan, 2005). Research has shown that D/HH students’ repertoire of comprehension strategies can be deficient and as such, they use few strategies to assist with comprehension (Schirmer et al., 2004). In the present study, D/HH students as young as nine and ten were able to learn a metacognitive strategy that enabled them to monitor their understanding of content-area text and resolve problems with comprehension when they arose. This finding supports research that suggests that elementary-aged students can learn strategies to monitor their understanding of text and further, that instruction in comprehension monitoring is appropriate for some students as early as the primary grades (Baker, 2005; NICHD, 2000b).

The finding of three intervention effects for strategic reading behavior lends support to the findings of Brigham and Hartman (2010) who studied the influence of instruction in the metacognitive skill of prediction on D/HH students in a middle school social studies classroom. Brigham and Hartman found that the number of predictions that students made increased and further, that the quality of students’ predictions improved. As opposed to measuring only metacognitive strategy use as in the study conducted by Brigham and Hartman, the present study accounted for measurement of strategic reading behavior and comprehension. Replication of the study could include the use of measures similar to those used by Brigham and Hartman to provide qualitative data on students’ strategic reading behavior and comprehension.
Limitations

In consideration of the study’s limitations, and the factors to which the study’s limitations might be attributed, the researcher referred to Campbell and Herzinger (2010), Gast and Spriggs (2010), Kratochwill et al. (2010), and Olive and Smith (2005). Three demonstrations of an intervention effect coinciding with no non-effects were necessary to establish a causal relationship between the intervention and the dependent variables (Kratochwill et al., 2010). Individual and collective visual analyses clearly validated a functional relationship between the CC&R strategy and strategic reading behavior. However, visual analyses did not validate a functional relationship between the CC&R strategy and non-strategic reading behavior and reading comprehension. Students A & B both showed decreases in non-strategic reading behavior, and increases in strategic reading behavior and reading comprehension. Treatment integrity data showed that the intervention was implemented with the highest degree of integrity for Students A and B. Student C showed increases in strategic reading behavior, but not in reading comprehension. Furthermore, Student C did not show decreases in non-strategic reading behavior. Interestingly, treatment integrity data showed that the intervention was implemented with the lowest degree of integrity for Student C.

For reading comprehension, an effect was documented for Student A, a possible effect was documented for Student B, and a non-effect was documented for Student C. Reasons for concluding a possible effect for Student B include baseline data that reflected gains in performance, intervention data that reflected a latent effect, and overlapping baseline and intervention data points. For student C, reasons for concluding a non-effect include baseline data that insufficiently demonstrated a clearly defined pattern from which to extrapolate projected
performance, and intervention data-point values that showed considerable range. (Intervention data were highly variable across participants, which the researcher predicted a priori. Until additional reading intervention studies are conducted using single-case methodology, the degree of variability to expect from measures of reading comprehension is unknown.) Additional reasons for concluding a non-effect for Student C include failure to accurately identify and operationally define non-strategic reading behavior, low treatment integrity, and below average vocabulary skills.

Student C’s non-strategic reading behavior was operationally defined as “stopping during oral reading, looking up from the text or alternatively, keeping eyes on the text, and not resuming reading until provided assistance.” Alternatively, non-strategic reading behavior for Student C might have been more appropriately defined as, “leaning back, looking around the room, stretching, and yawning.” The researcher documented these behaviors prior to baseline during informal observations, but did not identify them as “non-strategic” until after implementation of the intervention. The consequence that likely maintained the behavior was the teacher’s response, “Why are you so tired? Did you stay up late?” Treatment integrity might have been higher for Student C, had Student C’s non-strategic reading behavior and the consequences contributing to reoccurrence of the behavior been more appropriately defined prior to intervention.

The considerable range in the number of details each student retold might be the result of gaps in vocabulary knowledge. Hearing loss (plus limited English proficiency for Student C) can create communication barriers that restrict access to incidental and formal learning opportunities. Restricted access to learning opportunities can influence vocabulary and language acquisition
during various stages of learning. Gaps in vocabulary knowledge can negatively contribute to reading comprehension, specifically in content-areas. Thus, the possibility that barriers to communication contributed to gaps in vocabulary knowledge that in turn, contributed to varying levels of comprehension for these students, cannot be ruled out.

**Implications for Research**

Decidedly few rigorous intervention studies on reading comprehension instruction for D/HH students existed as recently as seven years ago (Schirmer and McGough, 2005). Two possible reasons as to why include (a) the heterogeneity of this population of students, also characterized as low-incidence, and (b) the difficulty of assessing students for comprehension. Researchers considering investigating the use of metacognitive strategies, such as the CC&R strategy, should not rule-out single-case methodology. A multiple-baseline design, across three to five self-contained classrooms, with extended intervention phases might be appropriate. The process of gaining facility in comprehension is a long-term process (Pressley, 2000); therefore, researchers should not anticipate intervention data to reflect changes in comprehension immediately following implementation of the intervention.

For the purposes of the present study, the retelling procedure served as the primary reading comprehension measure. “Methodological problems” can create difficulty in “designing single-participant experiments on academic constructs such as reading comprehension (Scruggs & Mastropieri, 2001, p. 239).” Operationalizing the definition of reading comprehension as “the
number of details retold in one-minute following oral reading of instructional-level, content-area text” provided a means by which to address the difficulty of monitoring student performance and progress in comprehension. While the retelling procedure appeared sufficiently sensitive to changes in students’ comprehension, researchers may want to consider the use of explicit and inferential comprehension questions in multiple-choice format as the primary reading comprehension measure in future studies. Five of the nine intervention studies reviewed in Chapter 2 used questions to measure performance in comprehension (Al-Hilawani, 2003; Schirmer et al., 2012; Schirmer et al, 2009; Trezek & Wang, 2006; Wang & Paul, 2011). Three of the studies used a retelling procedure (Gentry et al., 2004; Pakulski & Kaderavek, 2001; Schirmer & Schaffer, 2010).

The maze reading procedure served as a supplemental measure of performance in reading comprehension during each phase of the study. Compared to the retelling procedure, the maze procedure did not appear to be as sensitive to changes in comprehension. One reason that the maze procedure was not as sensitive to changes in comprehension might be that maze passages were derived from narrative text, while assessment and instructional passages were derived from content-area text. This hypothesis calls into question the use of maze passages derived from narrative text as a general measure of progress in reading comprehension. Research on progress monitoring procedures for use with D/HH students has shown that (a) oral reading fluency is the best predictor of comprehension; (b) performance on maze reading passages is the next best predictor; and (c) the use of maze reading passages as a general measure of progress in reading comprehension is valid and reliable (Rose, 2006). The finding that the maze reading procedure was not sensitive to changes in comprehension, and the hypothesis that this finding may be due
to the use of maze passages derived from narrative text, point to the need for teachers to have a clear understanding of students’ instructional reading levels in both narrative and content-area text.

**Implications for Practice**

The teachers who participated in the present study stated that they found value in instructing students in the use of the CC&R strategy and its components. However, given the few effective instructional practices in reading from which teachers have to choose, it is possible that almost any intervention offered would have been met approval. Prior to receiving training on the intervention, the teachers were not familiar with think-alouds, QARs, and text connections. The researcher suspects that this finding is not exclusive to these particular teachers.

The high percentage of D/HH students who lack sufficient comprehension strategies suggests that a high percentage of D/HH students could benefit from instruction in a metacognitive strategy like the CC&R strategy. To assist teachers in planning instruction specific to students’ unique learning needs, identifying the individual contributions of the various components and procedures of the intervention would be helpful. The present study did not account for measurement of the intervention’s components (i.e., think-alouds, QARs, and text connections), procedures (i.e., direct instruction, modeling, interactive practice, and guided practice), consequences, and reinforcements. Additional research is necessary to disentangle the various components and procedures that contributed to changes in students’ reading behavior and comprehension.

Additional research is also needed to explore the differential effects of instruction in metacognitive strategies (like the CC&R strategy), with and without self-monitoring. At the
conclusion of the study, the researcher asked Student B’s teacher what concerns remained regarding Student B and his reading comprehension. The teacher responded, “I want him to realize that he can do it. I don’t think he really believes he’s a good reader.” When asked what could change that, Student B’s teacher stated, “For him to see how successful he is.” Sawyer, Graham, and Harris (1992) compared the differential effects of direct teaching, strategy instruction, and strategy instruction with self-monitoring on students’ writing performance. Experimental procedures like those used by Sawyer et al., that account for measurement of various confounding factors, can be used as a model for investigating the differential effects of instruction in metacognitive strategies with and without self-monitoring.

Researchers have built a solid foundation from which to build an extensive base of research on effective instructional practices for increasing D/HH students’ reading comprehension. Further research of an empirical nature will provide teachers a sufficient evidence base from which to select instructional practices specific to D/HH students’ individual learning needs. Students identified with an educationally significant disability (including students identified with educationally significant hearing loss), are entitled to a free, appropriate, and public education. The term “appropriate” can be subject to considerable interpretation. Küpper (2007) defined this “highly influential term in IDEA” (p. 1-51) as, “whatever’s suitable, fitting, or right for a specific child, given that child’s specific needs, specific strengths, and established goals (p.1-51).” Küpper further stated,

“FAPE is the fundamental core of the IDEA…Conceptually, FAPE is both the goal and the path to reaching the goal…In terms of developing or building an IEP, the foundation is FAPE, and the apex is FAPE (p. 1-48).”
In terms of D/HH students’ academic achievement, the foundation is reading comprehension, and the apex is reading comprehension. Instruction in metacognitive strategies, such as the CC&R strategy and its components, may be the path for some D/HH students to reach the goal of increased reading comprehension.
APPENDICES
APPENDIX A: RETELLING PROCEDURES

Materials:
- short passage of nonfiction text
- retell protocol
- timer
- video camera

Frequency of administration:
- every session during baseline, intervention, and follow-up
- the last five – 10 minutes of each session

Note:
Although difficulty with word reading is not anticipated as passages selected are at the student’s instructional reading level, minimal assistance with word reading (not meaning) may be provided.

Steps:
1. Before providing the student the day’s passage, say to the student,
   “I want you to read a short passage of nonfiction text. You will read the passage aloud. Start with the title of the passage and as you read, think about the main idea of the text, important details included in the text, and how the details support the main idea. You may find events referenced in the text. Think about these events and the order in which they occur.”

2. As you set the passage down in front of the student say, “Now, read carefully. You have as much time as you need. You may begin.”

3. After the student finishes reading the passage aloud, remove the passage and say,
   “Great job. You now have one minute to tell me everything you remember reading, as if I have never read or heard the passage. You get a point for every detail from the passage that you can tell me. I won’t interrupt you, so tell me as much as you can before stopping. Remember, every detail you tell me - within one minute - is worth one point. The timer will signal to us when one minute is up. Ready, begin.”

4. Start the timer.

5. If the student stops and time remains, ask one time, “What else can you think of?”

6. After the timer signals that one minute is up instruct the student to stop.
APPENDIX B: RETELL PROTOCOL

<table>
<thead>
<tr>
<th>NAME:</th>
<th>DATE:</th>
<th>SESSION:</th>
<th>CONTENT AREA:</th>
<th>PRIOR KNOWLEDGE:</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
</table>

**TOPIC:**

**TITLE:**

Prior Knowledge: 1 = none; 2 = little; 3 = much

**TRANSCRIPTION OF STUDENT’S RETELL**

---

**EXPLICIT AND INFERRED DETAILS**

| Details |  
|---------|---|
|         |   |
|         |   |
|         |   |
|         |   |

Total Number of Explicit Details and Inferences (Primary Observer)

Total Number of Explicit Details and Inferences (Secondary Observer)

% Agreement

---

**STRATEGIC BEHAVIORS**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Frequency</th>
<th>Read-Aloud</th>
<th>Retell</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pauses briefly at regular intervals.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questions understanding aloud.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verbalizes comments &amp; questions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Records comments &amp; questions on sticky notes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uses QARs and text connections.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finds and verbalizes answers to questions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Records answers on coded sticky notes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moves notes to appropriate place in text.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Number of Strategic Reading Comprehension Behaviors (Primary Observer)

Total Number of Strategic Reading Comprehension Behaviors (Secondary Observer)

% Agreement

---

**NON-STRATEGIC BEHAVIORS**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Frequency</th>
<th>Read-Aloud</th>
<th>Retell</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stops reading and keeps eyes on page or looks up at teacher until pronunciation/understanding of text is confirmed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Number of Non-Strategic Reading Comprehension Behaviors (Primary Observer)

Total Number of Non-Strategic Reading Comprehension Behaviors (Secondary Observer)

% Agreement
APPENDIX C: STUDENT INTERVIEW

STUDENT NAME:  

AGE:  

GRADE:  

INTERVIEWER:  

SCHOOL:  

DATE:  

Part I

Questions 1 – 10 provide an opportunity to get to know the student and the student’s thoughts about reading. For each question, record the student’s response in the space provided.

1. In my free time, what I enjoy doing most is _____________________________.
2. How about reading? In my free time, I -- always / often / sometimes / never -- choose to read.
3. Describe yourself as a student. How would your teachers describe you as a student?
4. Describe yourself as a reader. Do you like to read? Are you a strong reader?
5. What do you think is the easiest part / hardest part about reading?
6. What would you like to do when you are older? Do you think reading will be important to you?
7. What do you feel helps you / doesn’t help you become a better reader?
8. What parts of the body do you use to read?
9. What things did you need to learn in order for you to be able to read? (e.g., “I need to know the alphabet.”)
10. When you read, do you ever reach the end of a page and realize you don’t know what you just read? What do you do if this happens?

Part II

Questions 11 – 24 prompt the student to think about what it is that he or she does to facilitate comprehension during reading. For questions 11 – 14, circle the word that the student thinks best describes him or her. For questions 15 – 24, mark the one statement that the student thinks would help him or her the most. Be sure to tell the student that there are no right answers.

11. When I read, I make connections between what I am reading and my own experiences, other books, and the world around me.
   always  often  sometimes  never

12. While I’m reading, I ask myself questions about the story.
   always  often  sometimes  never

13. While I’m reading, I make pictures in my head about what is happening in the story.
   always  often  sometimes  never

14. While I’m reading, I fill in words or pictures in my head that the author didn’t include.
   always  often  sometimes  never
15. While I'm reading, it's a good idea to
   a. Read the story very slowly so that I will not miss any important parts.
   b. Read the title to see what the story is about.
   c. Check to see if the pictures have anything missing.
   d. Check to see if the story is making sense by seeing if I can tell what's happened so far.

16. While I'm reading, it's a good idea to
   a. Stop to retell the main points to see if I am understanding what has happened so far.
   b. Read the story quickly so that I can find out what happened.
   c. Read only the beginning and the end of the story to find out what it is about.
   d. Skip the parts that are too difficult for me.

17. While I'm reading, it's a good idea to
   a. Look all of the big words up in the dictionary.
   b. Put the book away and find another one if things aren't making sense.
   c. Keep thinking about the title and the pictures to help me decide what is going to happen next.
   d. Keep track of how many pages I have left to read.

18. While I'm reading, it's a good idea to
   a. Keep track of how long it is taking me to read the story.
   b. Check to see if I can answer any of the questions I might have had before I started reading.
   c. Read the title to see what the story is going to be about.
   d. Add the missing details to the pictures.

19. While I'm reading, it's a good idea to
   a. Have someone read the story aloud to me.
   b. Keep track of how many pages I have read.
   c. List the story's main character.
   d. Check to see if my guesses are right or wrong.

20. While I'm reading, it's a good idea to
   a. Check to see that the characters are real.
   b. Make a lot of guesses about what is going to happen next.
   c. Not look at the pictures because they might confuse me.
   d. Read the story aloud to someone.

21. While I'm reading, it's a good idea to
   a. Try to answer the questions I asked myself.
   b. Try not to confuse what I already know with what I'm reading about.
   c. Read the story silently.
   d. Check to see if I am saying the new vocabulary words correctly.
22. While I'm reading, it's a good idea to
   a. Try to see if my guesses are going to be right or wrong.
   b. Reread to be sure I haven't missed any of the words.
   c. Decide on why I am reading the story.
   d. List what happened first, second, third, and so on.

23. While I'm reading, it's a good idea to
   a. See if I can recognize the new vocabulary words.
   b. Be careful not to skip any parts of the story.
   c. Check to see how many of the words I already know.
   d. Use what I already know in relation to what is happening in the story to make predictions.

24. While I'm reading, it's a good idea to
   a. Reread or read ahead to see if I can figure out what is happening if things aren't making sense.
   b. Take my time reading so that I can be sure I understand what is happening.
   c. Change the ending so that it makes sense.
   d. Check to see if there are enough pictures to help make the story ideas clear.

For younger students who do not have experience with traditional, content-area textbooks, this completes the interview. For older students who do have experience with this type of text, proceed to questions 25 – 30.

Part III
Questions 25 – 30 address how students interact with content-area text. For each question, mark the comprehension strategy (or strategies) that the student states he or she would use to understand this type of text.

25. If you are reading science or social studies material, what would you do to remember the important information you've read?
   a. Skip parts you don't understand.
   b. Ask yourself questions about the important ideas.
   c. Realize you need to remember one point rather than another.
   d. Relate it to something you already know.

26. Why would you go back and read an entire passage over again?
   a. You didn't understand it.
   b. To clarify a specific or supporting idea.
   c. It seemed important to remember.
   d. To underline or summarize for study.
27. As you read a textbook, which of these do you do?
   a. Adjust your pace depending on the difficulty of the material.
   b. Generally, read at a constant, steady pace.
   c. Skip the parts you don't understand.
   d. Continually make predictions about what you are reading.

28. While you read, which of these are important?
   a. Know when you know and when you don't know key ideas.
   b. Know what it is that you know in relation to what is being read.
   c. Know that confusing text is common and usually can be ignored.
   d. Know that different strategies can be used to aid understanding.

29. When you come across a part of the text that is confusing, what do you do?
   a. Keep on reading until the text is clarified.
   b. Read ahead and then look back if the text is still unclear.
   c. Skip those sections completely; they are usually not important.
   d. Check to see if the ideas expressed are consistent with one another.

30. Which sentences are the most important in the chapter?
   a. Almost all of the sentences are important; otherwise, they wouldn't be there.
   b. The sentences that contain the important details or facts.
   c. The sentences that are directly related to the main idea.
   d. The ones that contain the most details.
Scoring & Interpretation

Insights gained from questions 1 – 14 about the student’s thoughts about reading and attitude toward reading:

Responses that indicate metacognitive reading awareness:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td>D</td>
<td>21.</td>
</tr>
<tr>
<td>16.</td>
<td>A</td>
<td>22.</td>
</tr>
<tr>
<td>17.</td>
<td>C</td>
<td>23.</td>
</tr>
<tr>
<td>19.</td>
<td>D</td>
<td>25.</td>
</tr>
<tr>
<td>20.</td>
<td>B</td>
<td>26.</td>
</tr>
<tr>
<td>27.</td>
<td>a, d</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>a, b, d</td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>a, b, d</td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>b, c</td>
<td></td>
</tr>
</tbody>
</table>

Sources:


APPENDIX D: TEACHER INTERVIEW

STUDENT NAME:  

AGE:  

GRADE:  

SCHOOL:  

TEACHER:  

INTERVIEWER:  

DATE:  

1. Could describe for me a typical reading/language arts period in the student’s general education / resource classroom? Please include time spent, materials used, methods, grouping techniques.

2. What would you say is the greatest emphasis in your comprehension instruction and assessment? (For example, do you tend to emphasize recall of information, student response to text, or both equally?

3. Compare the support in reading/language arts that you provide the student to what the student receives in the classroom.

4. What type of instruction or strategies seems to work best? What doesn’t seem to work?

5. How does your student generally react to reading instruction in the classroom? To your supplemental instruction?

6. Can you identify specific behaviors in which your student engages/does not engage during reading?

7. How would you characterize your student’s
   a. Ability  
   b. Attitude  
   c. Interests  
   d. Needs  
   e. Behavior

8. Why do you think that your student struggles with reading?

9. What is your primary concern in regard to your student’s reading?

10. If there was one thing that you could recommend that you think would help your student, what would it be?

Sources:

APPENDIX E: MAZE PROCEDURES

Materials:
- maze passage
- timer
- video camera

Frequency of administration:
- once every week during baseline, intervention, and follow-up
- following the retelling procedure

Steps:
1. Before providing the student the maze passage, say to the student,
   "I am going to give you a short passage of nonfiction text to read silently. Some words in the text have been replaced with groups of three words written in dark print and enclosed in parentheses. Your job is to circle the one word that makes the most sense. Only one word from each group of three can make sense."

2. As you hand the student the passage say,
   "Remember, only one word from each group of three will make sense. You have one minute; the timer will signal to us when one minute is up. Work quickly, but carefully. Ready, begin."

3. Start the timer. If while reading, the student asks you to identify a word simply remind him/her to do the best that he/she can.

4. If the student stops working and time remains, a simple prompt such as, "Keep up the good work. You are almost finished” may be provided.

5. After the timer signals that one minute is up instruct the student to stop reading. Ask the student to write an “X” after the last word he/she read and then hand you the passage.

Example:
1. Write the following sentence on the board or on a piece of paper:
   The dog (apple, broke, ran) after the cat. The cat ran (fast, green, for) up the hill. The dog barked (in, at, is) the cat.

2. Say to the student, "The dog (apple, broke, ran) after the cat. Which one of three words in parentheses belongs in the sentence?"

3. Student responds. "Yes, the word ‘ran’ belongs in the sentence.” Have the student circle “ran” and say, "The dog ran after the cat.”

4. Say to the student, "Now look at the next sentence. The cat ran (fast, green, for) up the hill. Which one of three words in parentheses belongs in the sentence?"

5. Student responds. "Yes, the word ‘fast’ belongs in the sentence.” Have the student circle “fast” and say, "The cat ran fast up the hill.”

6. Say to the student, "Let's do one more. The dog barked (in, at, is) the cat. Which one of three words in parentheses belongs in the sentence?"

7. Student responds. "Yes, you are right. The word ‘at’ belongs in the sentence. Have the student circle “at” and say, “The dog barked at the cat.”"
## APPENDIX G: QUESTION-ANSWER RELATIONSHIP CARDS

<table>
<thead>
<tr>
<th>IN THE BOOK QUESTIONS</th>
<th>Where to find the answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right There</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the text</td>
</tr>
<tr>
<td></td>
<td>In one place</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>How to find the answer</td>
</tr>
<tr>
<td></td>
<td>Reread</td>
</tr>
<tr>
<td></td>
<td>Scan for key words</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IN THE BOOK QUESTIONS</th>
<th>Where to find the answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Think &amp; Search</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In the text</td>
</tr>
<tr>
<td></td>
<td>In several places</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>How to find the answer</td>
</tr>
<tr>
<td></td>
<td>Reread</td>
</tr>
<tr>
<td></td>
<td>Scan for key words</td>
</tr>
<tr>
<td></td>
<td>Put important pieces of information together</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IN MY HEAD QUESTIONS</th>
<th>Where to find the answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author &amp; Me</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not in the text</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>How to find the answer</td>
</tr>
<tr>
<td></td>
<td>Reread or skim</td>
</tr>
<tr>
<td></td>
<td>Predict</td>
</tr>
<tr>
<td></td>
<td>Connect with personal knowledge &amp; experience</td>
</tr>
</tbody>
</table>
APPENDIX H: TEXT CONNECTION CARDS

Text to Text (T-T) Connections
Connect the characters, setting, and events from the text to another text.

- The character in this story is like the character in...
- The setting in this story is the same as the setting in...
- This event is like the event in...
- These two stories are alike...

Text to Self (T-S) Connections
Connect the text to your personal life experiences.

- This reminds me of...
- I understand how the character feels because...
- The setting makes me think about another place...
- I experienced something like this myself...

Text to World (T-W) Connections
Connect the text to events that happened or are happening in your community and world.

- The character in this story is like the character in...
- The setting in this story is the same as the setting in...
- This event is like the event in...
- These two stories are alike...

Adapted from:
©2008 Teaching eVentures AND ©2003 IRA/NCTE, ReadWriteThink Image ©2003 Microsoft Corporation
APPENDIX I: COMPLETING “I WONDER” STATEMENTS USING QARs AND TEXT CONNECTIONS

QARs

In-the-Book

Right There
The answer was in the text, usually within a single sentence.

Think & Search
The answer was in the text, but I have to search in more than one place to find it.

In-my-Head

Author & Me
The answer was in the text & in my head.

On my Own

TEXT CONNECTIONS

- text + personal life experience
- text + another text read previously
- text + something that occurred/was occurring in the world
APPENDIX J: LESSON PLAN

Direct Instruction

Teacher Responsibilities
- Adjust the antecedent conditions so new behaviors are learned and aversive conditions avoided.
  - Introduce student to the CC&R strategy. Name the strategy. List the steps of the strategy. Explain how each step contributes to comprehension.
  - Use instructional level, content-area text to teach students the CC&R strategy. Introduce student to the topic of the text and activate prior knowledge.
  - Decrease the number of teacher-generated questions by using think-alouds and “I wonder…” statements so that the student does not have the occasion to use non-strategic reading behavior.
  - Allow the student to demonstrate understanding of text in a variety of ways (i.e., drawing, writing).

Student Responsibilities
- Will vary depending on the student’s familiarity with the CC&R strategy and with the topic of the text.

Modeling

Teacher Responsibilities
- “I do; you watch.”
- Take full responsibility for reading aloud and thinking aloud the steps of the CC&R strategy.

Student Responsibilities
- “I watch and ask for clarification when I need it.”
Teacher Responsibilities

- “We practice together and take turns reading and using the strategy.”
- Practice the CC&R strategy with the student. Take turns reading aloud and thinking aloud the steps of the strategy.
- Withhold the consequences that previously reinforced the target behavior (non-strategic reading behavior; i.e., defined individually for each student)
  - Do not read or explain the text.
  - Do not allow the student to read aloud without pausing to think-aloud and use the CC&R strategy.
  - Provide consequences specific to student performance. Provide verbal prompts such as, "If you’re having a hard time thinking of a question, why don’t you make a comment instead?" or "Remember, comments can be very brief."
- Monitor the student’s use of the CC&R strategy and understanding of the text.

Student Responsibilities

- “We take turns reading and using the strategy. I ask for clarification when I need it.”

Guided Practice

Teacher Responsibilities

- “We practice together and I support you by giving tips.”
- Shift responsibility for using the CC&R strategy to the student. Support the student with appropriate consequences and reinforcements.
- Provide appropriate reinforcement for the replacement behavior (strategic reading behavior; i.e., using the CC&R strategy)
  - Provide verbal phrase such as, "You asked that question well. It was very clear what information you wanted” or "That was interesting information. I would call that kind of information detail that supports the main idea.”
  - Provide the student a break by taking a turn reading aloud.

Student Responsibilities

- “I take more turns reading and using the strategy, listening to the feedback my teacher gives me.”
### Independent Practice

#### Teacher Responsibilities
- “You do; I watch.”
- Administer the retelling procedure.

#### Student Responsibilities
- “I practice reading and using the strategy independently.”
APPENDIX K: PROGRESS MONITORING CHARTS

Student A (Grade 5)
Grade 4: MAZE - Comprehension

Student B (Grade 4)
Grade 3: MAZE - Comprehension

Student C (Grade 5)
Grade 4: MAZE - Comprehension
REFERENCES


Brigham, Berkley, Simpkins, & Brigham (2007).


