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ABSTRACT

This report describes a project for increasing student's ability to comprehend and respond in a reflective manner. The targeted population consisted of 2nd, 3rd, and 5th grade classes in a community unit district located in a suburb of a large midwestern city. The problem of a student's inability to comprehend and respond in a reflective manner was documented through Student Thinking Logs, Student Thinking Interviews, and an Informal Reading Thinking Inventory (IRTI). The probable causes included a curriculum that was so full there was little time for focus on reflection, metacognitive strategies that were not specifically taught, students who did not think about or understand their thought processes, and teachers who taught skills in isolation rather than as strategies. Review of literature revealed that metacognitive strategies are not specifically taught, students are suffering from metacognitive deficit, students do not think about thought processes as they read, and there is little time to teach reflection. A review of solutions that was suggested by knowledgeable others offered the following strategies: accessing prior knowledge, self-questioning, story mapping/graphic organizers, sensory imaging, readers theatre, journaling, and buddy reading. Through an analysis of these strategies, sensory imaging and accessing prior knowledge were the chosen interventions. Post-intervention data indicated an increase in student reading comprehension as shown by the IRTI results. An increase of students' understanding and use of metacognitive strategies was demonstrated through Student Thinking Logs and Student Thinking Interviews. Students showed marked improvement in reflective response during class discussion and in Student Thinking Logs. (Contains 27 references and 4 figures of data. Appendixes contain the teacher survey, student interview questions, consent forms, and student thinking log.) (Author/RS)

METACOGNITION: EFFECTS ON READING COMPREHENSION AND REFLECTIVE RESPONSE

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Metacognition: Its Effects on Reading Comprehension and Reflective Response

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This report describes a project for increasing student's ability to comprehend and respond in a reflective manner. The targeted population consisted of 2nd, 3rd, and 5th grade classes in a community unit district located in a suburb of a large midwestern city. The problem of a student's inability to comprehend and respond in a reflective manner was documented through Student Thinking Logs, Student Thinking Interviews, and an Informal Reading Thinking Inventory IRTI.

The probable causes included a curriculum that was so full there was little time for focus on reflection, metacognitive strategies that were not specifically taught, students who did not think about or understand their thought processes, and teachers who taught skills in isolation rather than as strategies. Review of literature revealed that metacognitive strategies are not specifically taught, students are suffering from metacognitive deficit, students do not think about thought processes as they read, and there is little time to teach reflection.

A review of solutions that was suggested by knowledgeable others offered the following strategies: accessing prior knowledge, self-questioning, story mapping/graphic organizers, sensory imaging, readers theatre, journaling, and buddy reading. Through an analysis of these strategies, sensory imaging and accessing prior knowledge were the chosen interventions.

Post-intervention data indicated an increase in student reading comprehension as shown by the IRTI results. An increase of students' understanding and use of metacognitive strategies was demonstrated through Student Thinking Logs and Student Thinking Interviews. Students' showed marked improvement in reflective response during class discussion and in Student Thinking Logs.

TABLE OF CONTENTS

Abstract iii

CHAPTER 1 - PROBLEM STATEMENT AND CONTEXT 1

General Statement of the Problem 1

Community Context 1

District Profile 2

School Context 3

National Context of the Problem 4

CHAPTER 2 - PROBLEM EVIDENCE AND PROBABLE CAUSE 6

Problem Evidence 6

Probable Causes 10

CHAPTER 3 -THE SOLUTION STRATEGY 13

Literature Review 13

Project Objectives and Processes 19

Project Action Plan 19

Methods of Assessment 22

CHAPTER 4 - PROJECT RESULTS 23

Historical Description of Intervention 23

Presentation and Analysis of Results 29

Conclusions and Recommendations 38

REFERENCES CITED 42

APPENDICES

Appendix A Teacher Reading Comprehension Survey 44

Appendix B Student Thinking Interview 45

Appendix C Parent Consent Form 47

Appendix D Student Thinking Log 49

Chapter I

PROBLEM STATEMENT AND CONTEXT

General Statement of the Problem

The teachers of the targeted second, third, and fifth grade self-contained, heterogeneous classrooms and the gifted third grade reading classroom display concerns about the inability of students to comprehend and respond in a reflective manner to questions or prompts during reading. Lack of metacognition limits student ability to move beyond the literal to higher levels of thinking. Evidence of the concern is found through Teacher Reading Comprehension Surveys and the Student Thinking Interviews.

Community Context

All students in the study attend school in a suburban school district located 35 miles outside a major midwestern city. The population of the city is approximately 18,000. The community is considered affluent and is located in an area that continues to grow and prosper. Predictions forecast the population growth to be in excess of 20,000 over the next decade (City Economic Report, 1999).

The district encompasses an area of 23 square miles and is part of an area that is recognized for its attraction of high technology industry and residential growth. The city is experiencing major growth in housing developments which will significantly add to the population and the growth of the schools. Median household income is $49,755, with 54.1% of the population earning more than $50,000. The average value of a single-family home is $203,567, up 124% from 1985 (City Economic Report, 1999). Amidst the growth, the community holds high expectations for student performance,

which is demonstrated through exceptional involvement in school sponsored activities and events and high expectations for standardized test scores.

District Profile

The community unit school district in the study is comprised of six attendance centers. This includes four elementary buildings (K-5), one middle school (6-8), and one high school (9-12), housing 4,780 students. Elementary enrollment is 2,336, middle school is 1,164, and the high school houses 1,280 students. This school district employs 759 people and of these 319 are teaching faculty. The average teaching experience for the distict is 12.8 years with 41.2% having a bachelors degree and 58.8% having a master's degree or above. (School Report Card A and B, 2000)

New and expanding housing developments are significantly impacting the enrollment of each of the schools. There are plans for the building of a fifth elementary school and the high school is currently being expanded. The student mobility rate of the district remains well below the state average (School Report Card A and B, 2000). Student performance on national standardized achievement tests continues to indicate performance levels above state and national norms (School Report Card A and B, 2000).

The racial/ethnic population distribution of the district is 97.0% White, 0.5% Black, 1.3% Hispanic, and 1.3% Asian/Pacific Islander. Low-income families constitute less than 1% (0.5) of the student population. The truancy rate is 0.1 %. The district expenditure per pupil in 1998 –1999 was $6,756 (School Report Card A and B, 2000).

School Context

School A

Three targeted classrooms will be studied from School A (second, gifted third and fifth). The targeted elementary school has a total enrollment of 594 students with 33 certified teachers, 11 classroom aides, and one administrator. The student population is relatively homogeneous with the majority being from middle to upper middle class homes. The mix of racial/ethnic backgrounds of the students does not vary significantly from the district norms. The school population consists of 96.9 % White, 1.0% Black, 1.4 % Hispanic, and 0.7% Asian/Pacific Islander. The mobility rate of the school is approximately 3.9%, indicating a stable environment (School Report Card A).

This targeted school was built in 1964 on a 14-acre combination school/park district site. The original building housed 13 classrooms. In 1988 a ten-classroom addition, along with a new gymnasium were added to the facility. In November of 1995, another four-classroom wing was added to accommodate the student population growth. The school also has a computer lab with 30 computers and each classroom has at least two computers in it. A new reading series, Signatures by Harcourt Brace (1999), was adopted for use in the 1999-2000 school year for the language arts program along with core novel studies.

School B

One targeted classroom will be studied from School B (third grade). The targeted elementary school has a total enrollment of 665 students with 36 certified faculty members, 15 classroom aides, and one administrator. The school population consists of

95.0% White, 0.6% Black, 2.9% Hispanic, and 1.5% Asian/Pacific Islander. The mobility rate of the school is approximately 6.5% (School Report Card B, 2000).

This school was built in 1929. At that time, the building had only 6 classrooms, 5 teachers and 96 students. Today there are 30 classrooms, 11 special rooms and 2 gyms/cafeterias. The school also has a computer lab with 30 computers and a computer in each room. The most recent addition was in the fall of 1999 when four new classrooms, and a second gym/cafeteria were added. A new reading series, Signatures by Harcourt Brace (1999), was adopted for use in the 1999-2000 school year for the language arts program along with core novel studies.

National Context of the Problem

"The mental operations by which individuals control the cognitive skills and strategies they use to make meaning is referred to by experts as metacognition. A number of educators and researchers consider metacognition as the highest, most sophisticated form of thinking" (Beyer, 1988, p. 68). Keene and Zimmerman (1997) believe that metacognition can deepen and enhance reading comprehension. Proficient readers use a variety of metacognitive strategies that help them comprehend and deepen their understanding of text (Paris, Cross, & Lipson, 1984). The metacognitive strategies or processes that proficient readers use while interacting with text include the following: activating relevant prior knowledge, creating visual and other sensory images, making inferences, retelling what they have read, time to evaluate their own progress, and asking questions of themselves, the authors, and the text. These are just a few of the strategies believed to enhance reading comprehension.

It is important for teachers to teach students to be strategic and understand the cognitive processes that are used most frequently by proficient readers. Teacher instruction should include explicit in-depth instruction for long periods of time on the strategies that are used by proficient readers. The teacher, according to Keene and Zimmerman (1997) should model these strategies. Jongsma (2000) believes that teachers are reluctant to try certain strategies and are uncertain on how to model these reading strategies. They are also uncertain about how to help their students become proficient in their use.

According to Payne and Manning (1992), readers with poor reading skills do not use metacognitive skills to help them comprehend their reading. Readers with poorer skills tend to focus on decoding skills instead of metacognitive skills. Research by Doyle, Fisher, and Hiebert (as cited in Marzano, 1991, p. 521) indicates that students are exposed to short-term, teacher-directed tasks that are cognitively quite simple and usually oriented to recall. Collins (1994) states "A learner must be able to self-regulate his or her reading process in order to read for comprehension. The reader needs knowledge about metacognition strategies" (p.2). A goal of all teachers is to move their students to higher levels of thinking. Integration of metacognitive strategies as part of reading instruction can help students to become proficient readers and independently use metacognitive strategies.

Chapter 2

PROBLEM EVIDENCE AND PROBABLE CAUSE

Problem Evidence

Metacognition is thinking about thinking. Metacognitive thought refers to the skills related to the learner's awareness of his or her own thinking according to Presseisen, as cited by Costa (1991). "Metacognition is a turning inward purposely at first and automatically thereafter, to reexamine our processes of comprehending, changing interpretations of the text and our reflections in order to elaborate and deepen our own understanding of a text" (Keene & Zimmermann, 1997, p. 43). Students who are good readers and comprehend well are able to use metacognitive strategies. The researchers have observed students who generally lack the ability to metacognitively reflect in relation to reading. Lack of metacognition limits a student's ability to move beyond the literal to higher levels of thinking. According to Gunning (2000), awareness of metacognitive strategies must be built into all reading instruction. If these metacognitive strategies are specifically taught, hopefully they will become automatic and help readers move to a higher level of thinking.

The teachers of the targeted second, third, fifth grade self-contained classrooms and the gifted grade three reading classroom at sites A and B displayed concerns about the inability of students to comprehend and respond in a reflective manner. The concern was targeted to reading.

The problem evidence was gathered during the first month of the semester through The Teacher Reading Comprehension Survey (Appendix A) and the Student Thinking Interview (Appendix B).

Teacher surveys, developed by the researchers, were administered to all classroom teachers who had one or more years of teaching experience in the targeted elementary buildings. These surveys were distributed and collected by the researchers during the second full week of school. In each of the respective targeted 2nd, 3rd, and 5th grade classes, five randomly selected students completed Student Thinking Interviews. The researchers in their respective classes administered individual interviews during the first quarter of school.

According to the survey results, teachers at the targeted sites responded that they use visualization techniques, written reflection, activate prior knowledge and relate text to life more than once a week to several times per day. These reading comprehension practices are the targeted strategies of this research. The actual survey results are shown in Figure 1.

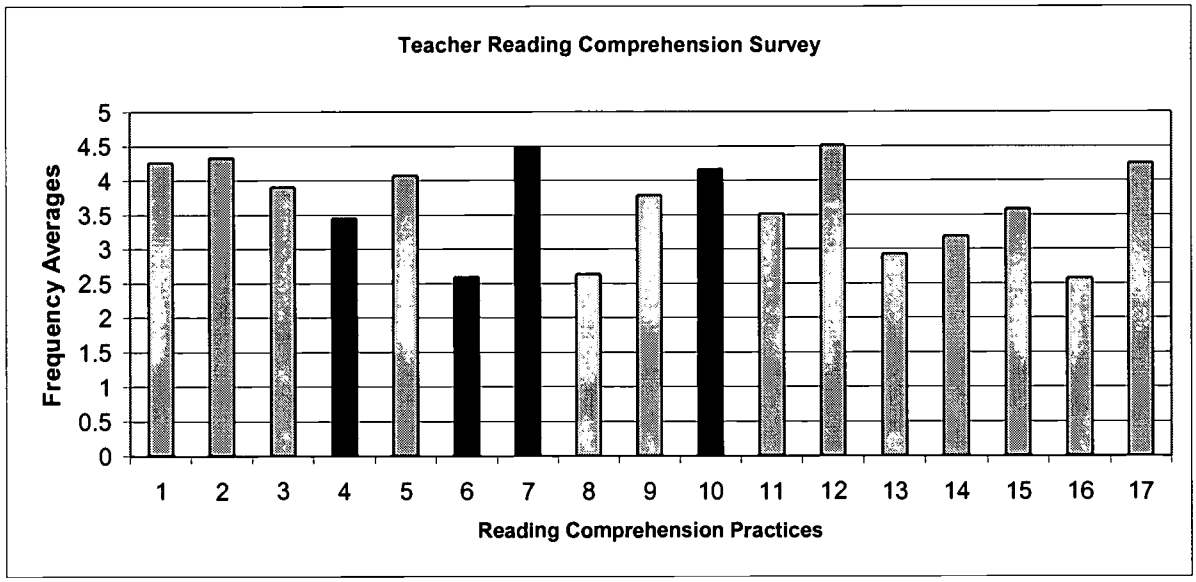


Figure 1. Teacher Reading Comprehension Survey

Value of the frequency averages
1= Not at all
2= Once a week
3= 2-3 times per week
4= Once per day
5= One to several times per day

Reading Comprehension Practices
1- Answer literal comprehension quest
2- Use context clues
3- Retell
4- Use visualization techniques
5- Decode
6- Write reflection
7- Activate prior knowledge
8- Use self evaluation
9- Find the main idea
10- Relate text to life
11- Reread
12- Share their thinking
13- Teach cause and effect
14- Teach sequencing
15- Summarize
16- Use Round Robin reading
17- Share your own thought processes

The results of the survey appear to be inflated according to the researchers. The survey was distributed and completed during the first two weeks of school when teacher expectations are high and sometimes idealistic. The researchers believe that teachers use these targeted strategies, but not as frequently as indicated due to curriculum overload and time constraints.

Student Thinking Interviews showed that overall most students were able to answer the three literal comprehension questions. The remaining six questions required metacognitive reflection. For each of these questions 25% of the responses were metacognitive. That is, student responses were beyond the literal interpretation and reflected metacognition. The remaining 75% of the responses by students were answered literally or with no response.

The results of the Student Thinking Interview support the researchers belief that students can answer literal comprehension questions, but have difficulty answering questions that require metacognitive thought. When asked literal questions that require students to state the main idea, setting, and characters, students easily answered them. Students' responses to the metacognitive questions were vague, brief, and lacked depth and elaboration. For example, when asked, "What things do you do to help you read and understand a story?" one student responded "I forgot." Another student responded "Kind of.....well...ummm. There is nothing that helps me read a story." These responses are representative of students at all grade levels. Students often looked to the teacher and wanted reassurance that they were on the right track or had given the correct response, assuming that there was one correct response. If students had been instructed in reflective metacognitive response they would have understood that making

connections is personal and there is no one right answer. If students had been specifically taught and understood the use of metacognitive strategies they would have responded with a higher level of thinking.

The teacher survey results indicate that teachers believe they provide opportunities for students to use strategies. However, for students to internalize strategies and understand the cognitive processes, the researchers believe they must be specifically taught as strategies for future use. After conducting the Student Thinking Interviews it was apparent that students were not internalizing and utilizing these strategies in their responses. Teachers expose students to metacognitive strategies, but do not explicitly instruct students on how, when, why, and where to use these strategies.

Probable Causes

Site-based

The researchers have observed students who generally lack the ability to metacognitively reflect in relation to reading. Lack of metacognition limits a student's ability to move beyond the literal to higher levels of thinking.

After conducting teacher surveys throughout the targeted elementary schools, the responses indicated that teachers expose students to metacognitive reading comprehension strategies. According to Student Thinking Interview responses, students are able to answer literal comprehension questions but are unable to answer metacognitive questions. Based on these findings it would appear that metacognitive strategies are not specifically taught as tools for reading comprehension. Students do not think about their thinking or understand their thought processes.

Literature-Based

According to Keene and Zimmermann (1997), students who can read fluently, decode, and use context to identify unknown words do not think about their own thought processes as they read. They aren't reading in a critical, analytical, imaginative, or probing manner because of this. Costa's article (1984), suggests that some children have no idea of what they are doing when performing a task and are unable to explain their strategies. "Those who can consciously apply their intellectual skills are those who possess well-developed metacognitive abilities" (p. 57). Good readers read strategically and integrate information using metacognitive strategies.

Many students appear to be reading yet they are unable to talk about their thought processes or show evidence that they are thinking about what they have done. "Students who are unable to describe these mental processes may be suffering from a metacognitive deficit" (Bonds & Bonds, 1992, p.56). Invisible mental processes are at the core of reading, yet not all people seem to be capable of metacognition. According to Costa (1984) some psychological research shows that not all adults are capable of metacognition. If this is true, it appears that metacognition is not an automatic learning strategy that is picked up along the way to adulthood. Students must be specifically taught these strategies so that they may become proficient in their use.

If metacognitive strategies are at the core of reading and should specifically be taught, it will be difficult for teachers to find time to add this to an already full day. There is little time to teach comprehension and reflective response. "Teachers have never been under more pressure. Pressure to perform. Pressure to cover the curriculum. Pressure to insure high scores on standardized tests. Pressure to meet standards. The

political climate surrounding education is more demanding than ever before. Teachers are overwhelmed with state mandates, running records, and rubrics for every task" (Harvey & Goudvis, 2000, p.6). Teachers are already teaching decoding, spelling, vocabulary, and response writing. Reflection is viewed as one more thing. With all of the responsibilities and time constraints teachers have, it is difficult for them to fit yet another thing into their teaching repertoire.

According to Gunning (2000) if a teacher tries to cover all subject areas students are unlikely to gain an in depth and meaningful understanding of reading. Teachers tend to present information without students becoming actively engaged in the process. Conceptual thinking takes longer to teach and often teachers avoid this.

Swanson and De La Paz (1998) suggest that "Good readers sometimes engage in strategic behaviors while reading but seldom recall being explicitly taught how, when, and where to use metacognitive strategies." (p.209) According to Graves, Watts-Taffe, and Graves (1999) too much of a teacher's time is spent giving assignments, grading papers, etc., and very little or no time is spent teaching specific strategies for improving comprehension. According to Durkin (as cited in De La Paz, 1998, p. 210) teachers monitor student comprehension by asking follow-up questions after reading, rather than teaching specific strategies to help students comprehend their reading.

Chapter 3

THE SOLUTION STRATEGY

Literature Review

After reviewing professional literature concerning students' inability to comprehend and respond in a reflective manner to questions or prompts during reading, the researchers found the following strategies could be used to improve comprehension and reflective response: accessing prior knowledge/making connections, self-questioning, story mapping/graphic organizers, sensory imaging, and journaling. To better understand the strategies involved in moving a student beyond the literal to higher levels of thinking, a literature review was conducted.

Keene and Zimmermann (1997) believe that metacognition can deepen and enhance reading comprehension. Proficient readers use a variety of metacognitive strategies that help them solve comprehension problems and deepen their understanding of text (Paris, Cross, & Lipson, 1984). It is important for teachers to teach students to use strategies and understand the cognitive processes that are most frequently used by proficient readers. Teachers can explain to students why the use of these strategies is so important. Payne and Manning (1992) found that 20 fourth grade students who received deliberate training in metacognitive skills strategies demonstrated significant gains in reading comprehension, showed evaluation, planning and regulation of their own reading, and displayed potential for transfer of these metacognitive abilities to other areas. This study was conducted over an eight-month period for 45 to 60 minutes daily. These results were obtained through analysis of pre and post testing in reading comprehension, awareness, and attitude.

Teacher instruction should include explicit in-depth instruction for long periods of time on strategies that are used by proficient readers. Routman and Butler (1996) feel that strategies should be taught in the context of enjoying wonderful literature. "Teaching children which thinking strategies are used by proficient readers and helping them use those strategies independently creates the core of teaching reading" (Keene & Zimmermann, 1997, p. 53).

Accessing prior knowledge/making connections

Accessing prior knowledge is believed to be a strategy that can have great impact on comprehension instruction. According to Shanahan (1997) a study was done by Pichert and Anderson that asked students to read a story from one of two perspectives. One group of students read from the perspective of a thief, and the other students read from the victim's point of view. The students then answered questions about the story. Their answers reflected their respective points of view. The prior knowledge used in the different perspectives greatly impacted comprehension. "Because of Pichert and Anderson's efforts teachers could no longer assume information presented in the text to be the only essential factor in reading comprehension" (Shanahan, 1997, p. 53). According to Harvey and Goudvis (2000) making connections between the text and the reader's own life enhances the reader's understanding. They believe these connections occur naturally by the reader.

Readers can purposely bring to consciousness information that will help them understand what they are reading now or are about to read. Readers are putting together schemata that is setting a framework for the new information they will be reading (Graves, Watt-Taffe & Graves, 1999). Knowledge about "objects, situations,

events, sequences of events, actions and sequences of actions" define schemata (Rumelhart, 1980, as cited by Graves, Juel & Graves, 1998, p. 168). Experiences are interpreted through encounters with the world or through reading by comparing these experiences to existing schemata.

Activation of available schemata by the teacher is essential for effective reading instruction. Continual monitoring by the teacher helps the student maintain reader-text interaction (Vacca & Vacca, 1996). "Schema theory provides direction and focus for helping children to enhance their comprehension. It has been known for some time that one of the most effective ways to improve comprehension is to activate 'mental files' before reading" (Keene & Zimmermann, 1997, p. 51).

Connections are made to help build a reader's understanding. Harvey and Goudvis (2000) suggest a variety of strategies that will help the reader make meaningful connections. They include "That Reminds Me", text-to-self, text-to-text, text-to-world, and text-to-author. The strategy "That Reminds Me" encourages students to make a connection between what they are reading and prior knowledge. The strategies of text-to-self, text-to-text, text-to-world, and text to author encourage students to make connections between the themselves and text, other literature, the world, and authors. They believe these strategies help build a store of knowledge about the content, connect big ideas and themes, and build historical understanding. Keene and Zimmermann (1997) also believe that text-to-self, text-to-text, and text-to-world connections help the reader relate unfamiliar text to their prior world knowledge.

Harvey and Goudvis (1999) believe that students have trouble making meaningful connections when first learning the strategy. Teacher and peer modeling

combined with time help students strengthen their ability to make connections that deepen their understanding of what has been read.

Self-questioning

Students can use self-questioning in a variety of ways to help with comprehension. Before reading students can ask themselves questions about the text to activate prior knowledge (Bransford, Stein, Arbitman-Smith, & Vye, 1985, as cited by Abromitis, 1994), use these questions to predict, and help set a purpose for reading. During the reading process, students summarize, evaluate and predict, and build relationships with what is already known (Abromitis, 1994). Using self-questioning during reading forces the student to pause frequently during reading to consider their own understanding or lack of, and plan corrective action if it is needed (Sanacore, 1984, as cited by Abromitis, 1994).

Keene and Zimmermann (1997) focus their discussion of self-questioning on the strategies used by proficient readers. These readers generate questions before, during, and after reading. These questions that readers ask themselves clarify meaning, help locate a specific answer, help predict, and identify information about the author's intent. Self-questioning by proficient readers leads to the development of the reader's interpretation of the text, sometimes explicitly but also inferentially. Finally, proficient readers understand that asking questions of the text deepens their comprehension. Reflective and critical readers develop through self-questioning (Abromitis, 1994).

Story mapping/graphic organizers

Story maps are one of many graphic organizers that teachers use to help students improve their reading comprehension. They include story elements used as

headings on either teacher-made worksheets or photocopies from text/workbook material. Researchers support teaching students to use story mapping as a comprehension strategy. Story maps have proven especially helpful to students with reading difficulty or learning disabilities. They aid students in organizing and understanding characters, major events and ideas in a story. In recent years, teachers have increasingly used story maps for visual/spatial learners (Baumann & Bergerron, (1993), and Idol, (1987), as cited by Swanson & De La Paz, 1998).

Davis and McPherson (1989) believe that story maps are particularly effective because they require students to actively read and self-monitor. Story maps can become increasingly complex as a child progresses to more complex stories. They can include reoccurring themes, plot/climax, character critique and conflict resolution. Story maps serve as a prompt for students by helping them retell a story or give the main idea. They also assist teachers in checking student comprehension for a particular story. Story map questions trigger student's existing schema for a story and help them generate their own questions.

Sensory imaging

According to Fogarty (1994), visualization is the act of imaging, or picturing in the mind, an idea or situation. In reading, visualization skills are used to help construct meaning. Imaging improves comprehension by helping students visualize what is occurring in the text (Abromitis, 1994). "Visualization is a specialized form of perception that can be 'trained' with practice" (Fogarty, 1994, p. 22).

Gunning (2000) states that mental imaging has many benefits. It promotes the use of prior knowledge and improves the reader's ability to make predictions and

inferences. In addition to enhancing overall comprehension, it also aids retention. Visualizing personalizes reading and keeps readers engaged. It helps them build meaning as they go, and enhances their understanding of the text (Harvey & Goudvis, 2000). Fogarty (1994) believes that one's ability to create a mental image fosters long-term learning because it imprints on the mind and improves the visualization process of learning. Visualizing while reading not only develops meaning from a text, but also brings the text to life for the reader based on his or her own past experiences. It can also facilitate our conversations about books and make the strategy concrete.

Keene and Zimmermann (1997) state that proficient readers purposely create images from all 5 senses as well as emotions. These images stem from the reader's prior knowledge.

Journaling

Journaling, as described by Costa and Kallick (2000), enables the students to reflect on their own thinking. It provides a means for development of the inner voice of "self talk". Through response journals students share feelings, impressions and other observations about literature. The response can be written before, during and/or after the reading of a selection. Sentence stems can be provided to stimulate thoughtful reflections. Some examples of these are: I noticed..., I wonder..., This reminds me of....

Writing and illustrating a log or journal causes students to synthesize thoughts and translate them into symbolic form. The journal also provides an opportunity for students to revisit their initial thoughts and predictions and compare changes in their perceptions that occurred as a result of the information gained from the text. Students'

comprehension grows through reflection, and this growth can be observed and assessed through their journal writing (Fogarty, 1994).

After reviewing the literature on improving comprehension and reflective response the researchers focused their intervention on two specific strategies: accessing prior knowledge/making connections, and sensory imaging. Literature review has revealed these two strategies as the basic foundation of reading comprehension and metacognitive response. The researchers own experiences in the classroom also influenced their intervention choices.

Project Objectives and Processes

As a result of teaching metacognitive strategies during the period of September 2000 to February 2001, the students in the targeted 2nd, 3rd, and 5th grade classes will increase their ability to comprehend and respond in a reflective manner as measured by Student Thinking Logs, Student Thinking Interviews, and an Informal Reading Thinking Inventory.

In order to accomplish the objective, the following processes are necessary:

1. Lessons that foster sensory imaging will be developed and taught.
2. A series of lessons connecting text to self, text to other text, and text to the world will be developed and taught.

Project Action Plan

The action plan of this project is presented in outline form by weeks rather than specific dates because a school week in an elementary school is filled with many interruptions. In the targeted schools the interruptions include announcements, assemblies, classroom visits, fire drills, tornado drills, photography sittings, field trips, standardized testing and conference days. The schedule covers the time frame of 16 weeks beginning in the fall of 2000 through February 2001 due to the many interruptions previously mentioned. The action plan follows:

Week 1 Teacher survey will be distributed and collected.
One Student Thinking Log entry completed by students.

Week 2 Send out reminder notes for collection of surveys that have not been returned.
Administer Informal Reading-Thinking Inventory Form A

Week 3 Discuss project and consent form (Appendix D) at Back-to-School Night with parents.
Conduct five Student Thinking Interviews.

For weeks 4-16 lessons will be presented each week for a 30-45 minute period per lesson. A minimum of 6 Student Thinking Log entries will be completed.

Week 4 Topic-Accessing prior knowledge-making connections

- Model "remind" strategy with picture book.
- Guided Practice of "remind" strategy
- Independent use of "remind" strategy

Week 5 Topic-Accessing prior knowledge-making connections

- Model "text-to-self" strategy
- Guided practice "text-to-self" strategy
- Independent use of "text-to-self" strategy

Week 6 Topic-Accessing prior knowledge-making connections

- Model "text-to-text" strategy
- Guided practice "text-to-text" strategy
- Independent use of "text-to-text" strategy

Week 7 Topic-Accessing prior knowledge-making connections

- Model "text-to-world" strategy
- Guided practice "text-to-world" strategy
- Independent use of "text-to-world" strategy

Week 8 Topic-Accessing prior knowledge-making connections

- Model "text-to-author" strategy
- Guided practice "text-to-author" strategy
- Independent use of "text-to-author" strategy

Week 9 Topic-Accessing prior knowledge-making connections

- Model identifying unfamiliar text structures/genres
- Guided practice identifying unfamiliar text structures/genres
- Independent use of identifying unfamiliar text structures/genres

Week 10 Topic-Sensory imaging

- Model drawing visualization strategy
- Guided practice using drawing visualization strategy
- Independent use of drawing visualization strategy

Week 11 Topic-Sensory imaging

- Model verbal visualization strategy
- Guided practice using verbal visualization strategy
- Independent use of verbal visualization strategy

Week 12 Topic-Sensory imaging

- Model multi-sensory visualization strategy
- Guided practice using multi-sensory visualization strategy
- Independent use of multi-sensory visualization strategy

Week 13 Topic-Sensory imaging

- Continue Independent use of multi-sensory strategy

Week 14 Topic-Sensory imaging and accessing prior knowledge

- Independent practice of imaging and accessing prior knowledge

Week 15 Topic-Post assessments

- Administer Informal Reading-Thinking Inventory Form B
- Administer Student Thinking Interview

Week 16 Topic-Post assessments

- Complete administration of Informal Reading-Thinking Inventory Form B
- Administer Student Thinking Interview

Methods of Assessment

In order to assess the effects of the intervention, pre- and post- intervention assessment will be used to analyze data. The assessments include the Student Thinking Interview (Appendix B) and the Informal Reading Thinking Inventory. In addition, Student Thinking Logs (Appendix D) will be used to document the student's progress in accessing prior knowledge/making connections and sensory imaging.

Chapter 4

PROJECT RESULTS

Historical Description of Intervention

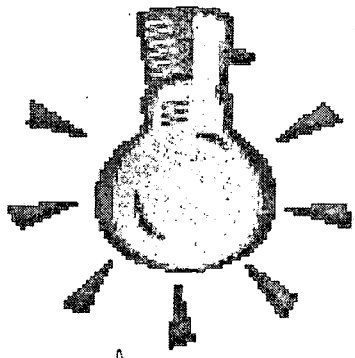
The objective of the intervention addressed student's inability to comprehend and respond in a reflective manner in the targeted second, third, and fifth grade classes. As a result of the intervention during the period of September, 2000 to February, 2001, the targeted groups would improve their ability to comprehend and respond in a reflective manner as measured by Student Thinking Logs (Appendix D), Student Thinking Interviews (Appendix B), and an Informal Reading Thinking Inventory (Manzo & Manzo, 1995). It was revealed through the pre-assessment results that students were unable to respond reflectively because they do not think as they read, and they are not specifically taught strategies.

Pre-intervention data gathered by the researchers included the Teacher Reading Comprehension Survey (Appendix A) and the Student Thinking Interviews (Appendix B). The data from the Teacher Survey (Appendix A) indicated that most teachers believe they are using and teaching metacognitive strategies to teach reading comprehension. The results of the Student Thinking Interview (Appendix B) support the researchers' belief that students can answer literal comprehension questions, but have difficulty answering questions that require metacognitive thought. The researchers developed an action plan designed to teach students metacognitive strategies that would foster sensory imaging and empower students to make connections with the text, thus giving students the strategies to reflectively respond.

Researchers conducted Student Thinking Interviews (Appendix B) prior to administering the Informal Reading-Thinking Inventory. The Student Thinking Interviews were conducted one-on-one with each student. The interview was given orally and the teacher recorded the responses.

The Informal Reading-Thinking Inventory Form A (IRTI) (Manzo & Manzo, 1995) was administered over a three week period, rather than a one week period as stated in the plan. The Informal Reading-Thinking Inventory Form B (IRTI) (Manzo & Manzo, 1995) was administered after the intervention period. The IRTI took longer than expected to administer to individual students. Each IRTI took approximately 30-40 minutes to administer. It was difficult to allocate time for this individual assessment due to the responsibilities of monitoring the rest of the class and covering required curriculum.

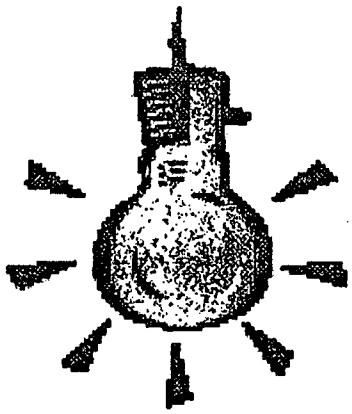
The Student Thinking Logs (Appendix D) were an ongoing assessment tool. The instrument was designed by one of the researchers. Students illustrated the cover in response to the prompt, "Draw a picture of where you are and what you look like when you do your best thinking." The log was used prior to the intervention, and throughout the intervention. The first Student Thinking Log entry was done during the first week of the intervention in all the targeted classrooms. Teachers read a picture book to the entire class. All students completed an entry in their Student Thinking Log (Appendix D). The teachers prompted the students with the sentence starter " This reminds me of..." Students were encouraged to write and/or illustrate their thinking. A sample of an initial entry is shown in Figure 2.



Today's Date: 10-11-00
Title of Book: Barn Dance
Author: Bill Martin
This reminds me of my Dad's farm.

Today's Date: 10-9-00
Title of Book: Barn Dance!
Author: Bill Martin
This story reminds me of animals like horses cows chickens and rousters that give you milk eggs that are good for you.

Figure 2. Initial Log Entries



Today's Date: 10-11-00

Title of Book: Three knock rise

Author: Natalie Babbit

This reminds me of the fair of Swedish days.

Today's Date: 10-2-00

Title of Book: Where the Red Fern Grows.

Author: Wilson Rawls

The part we read today remins me of when he chews tabaco and my dad chews tabaco.

Figure 2. Initial Log Entries

After the initial log entry, students completed entries after varied reading experiences such as read aloud, buddy reading, independent reading, and during novel studies. Over the course of the intervention each student in the classroom completed at least 8 to10 entries when prompted to do so by the teacher. In several of the classrooms, students requested to write their thoughts in their log without prompting from the teacher.

According to the action plan, lessons would be presented formally for a 30-40 minute period. The researchers found this procedure to be stilted, unnecessary, and unrealistic in length. For the targeted second grade group a 30-40 minute lesson was too long to hold their attention. In the other targeted groups the students easily grasped the concepts and lessons did not require that amount of time.

The researchers in the targeted classrooms chose to teach the metacognitive strategies using reading materials that coincided with the curriculum at their grade level. Each strategy "remind", "text-to-self", "text-to-text", "text-to-author", "text-to-world", and visualization, as outlined in the plan, was to be modeled, guided, and independently used on a weekly basis. However, the researchers found that students grasped the strategies of making connections and were able to integrate them quickly once introduced. Therefore modeling, guidance, and independent practice of these strategies was sometimes done during the same lesson. There was much overlap between the strategies. After teachers taught the name of the strategy and gave students the vocabulary to express their thoughts and make their connections, students were eager to do so. Students discovered and created their own connections and named them "text-to-movie," text-to-dream," and "text-to-painting."

One of the techniques used to help students make connections involved using post-it-notes. Students were instructed to place a post-it-note in the text where a connection was made. Students indicated on the post-it-note the name of the connection made. Connections were made during discussion time. The researcher of the targeted third grade class at School B used another technique with the post-it notes. The researcher read a story aloud to the class. During the read aloud the students wrote the connections they were making on post-its. Following the read aloud, students placed their post-its on posters with the specific connection names written on them. Students made the decision as to which category the connection fit.

Finally, the reading specialist of the district for all the targeted schools modeled metacognitive strategies of the intervention using a different technique. To elicit discussion and foster connections from the students, she played a game in which students responded with the name of the connection they were making. The students were also given the opportunity (time) to share the particulars of their connection.

There was a natural relationship and flow for students to move from learning and using the strategy of making connections to learning and using visualization. Since it was natural for students to use visualization strategies when making their connections, researchers did not interfere with the natural learning taking place and did not teach the identification of unfamiliar text structures/genres as outlined in the action plan. To cover this strategy researchers would have had to change the curriculum to be covered to fit the strategy and break the learning flow that was occurring. For this reason, the strategy was not covered in the intervention.

Presentation and Analysis of Results

The effects of the planned intervention were assessed by reviewing the results of the IRTI pre- and post-tests, pre- and post Student Thinking Interviews (Appendix B), and the Student Thinking Log (Appendix D) entries. At Sites A and B, all students indicated an improvement in reading comprehension according to pre- and post-IRTI results. Some students increased reading comprehension beyond their pre-IRTI grade level assessment while the remainder improved comprehension within their pre-IRTI grade level assessment. The first graph in Figure 3 shows that prior to the intervention seven of the 20 students scored below grade level. Out of those seven students, six students increased their score by one or more grade levels on the post assessment. The second graph on Figure 3 shows that of the thirteen students who initially scored at or above grade level, nine scored at least one grade level higher on the post-assessment. Sixty-five percent of the students increased their score by at least one grade level.

Following the intervention, Student Thinking Interviews (Appendix B) showed that students continued to answer the three literal comprehension questions with ease as they did in the pre-Interviews. The six remaining questions required metacognitive reflection. On the pre-Interview 14 of 20 students were unable to give a metacognitive response to one or more of the six questions. On the post-Interview of the 20 students all but 2 answered every metacognitive question. Researchers observed that overall responses to metacognitive questions had increased in depth, elaboration, and length. The question that students had the most difficulty with on the pre-interview was question nine. This question required students to think about their thinking and identify the

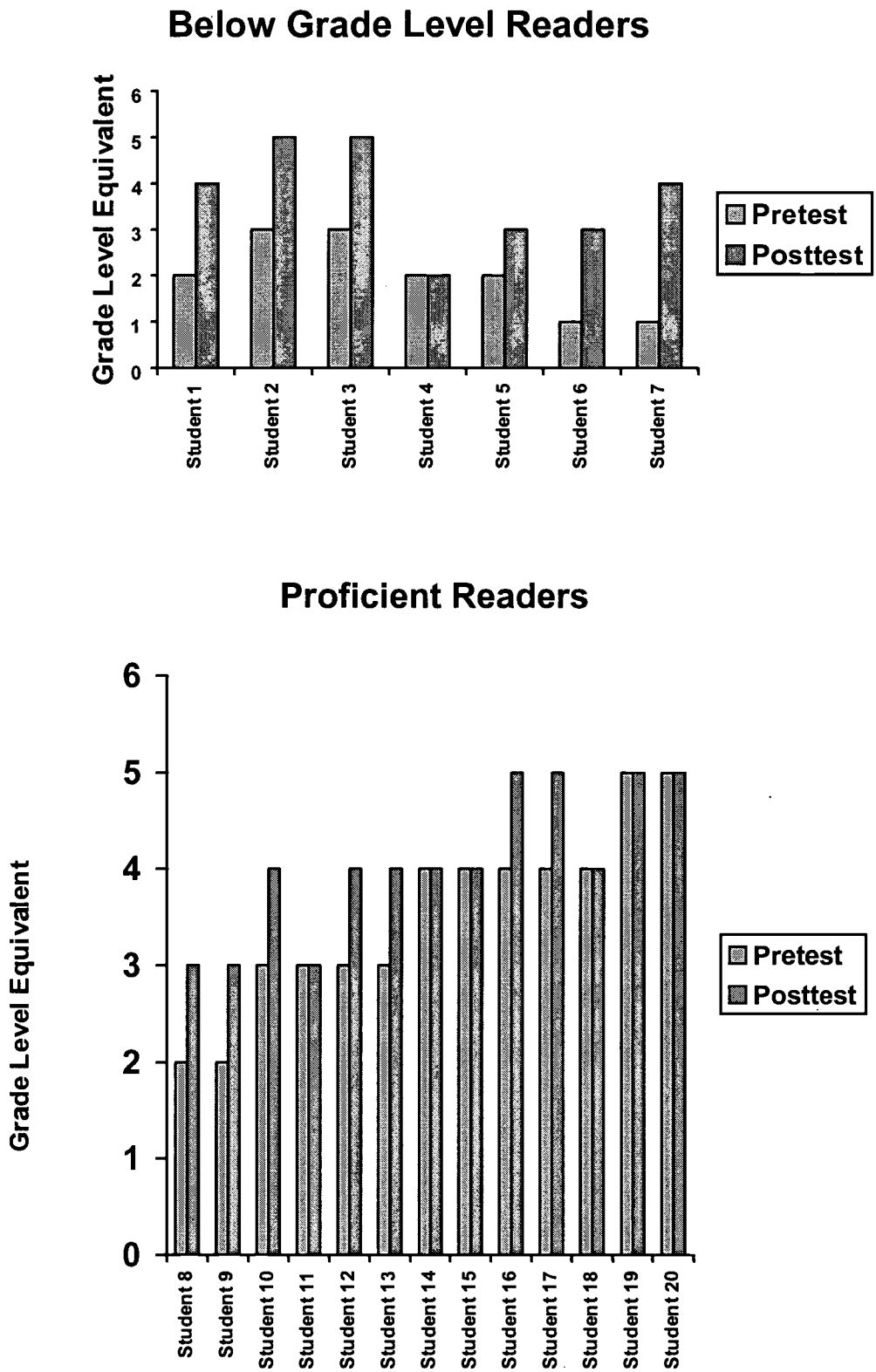


Figure 3. IRTI Pretest and Posttest Scores

strategies they use in order to comprehend. Students needed to demonstrate their use of the strategy and articulate the strategy.

Question nine asked, "What things do you do to help you read and understand a story?" Examples of the responses given prior to the intervention include:

"I reread it."

"I sound out words."

"I read fast and then I read slow to get details."

"If you don't know a word, skip it and go back to it."

"I read it."

"I reread the entire sentence."

"I look for words that might help me."

"I forgot."

"I ask my family."

"There's nothing that helps me read a story."

These responses show that students were not aware of or using metacognitive strategies.

The post-interview responses to question nine include:

"I try to picture it in my mind or I listen real hard."

"I understand the story more by making connections."

"I try to picture things that go on."

"If I don't understand a sentence I read it over slowly. Read the story 2 times. Talk about it. Use text to text, text to world, or text to life."

"I visualize, I'm making connections with...1. Text to Text

2. Text to World

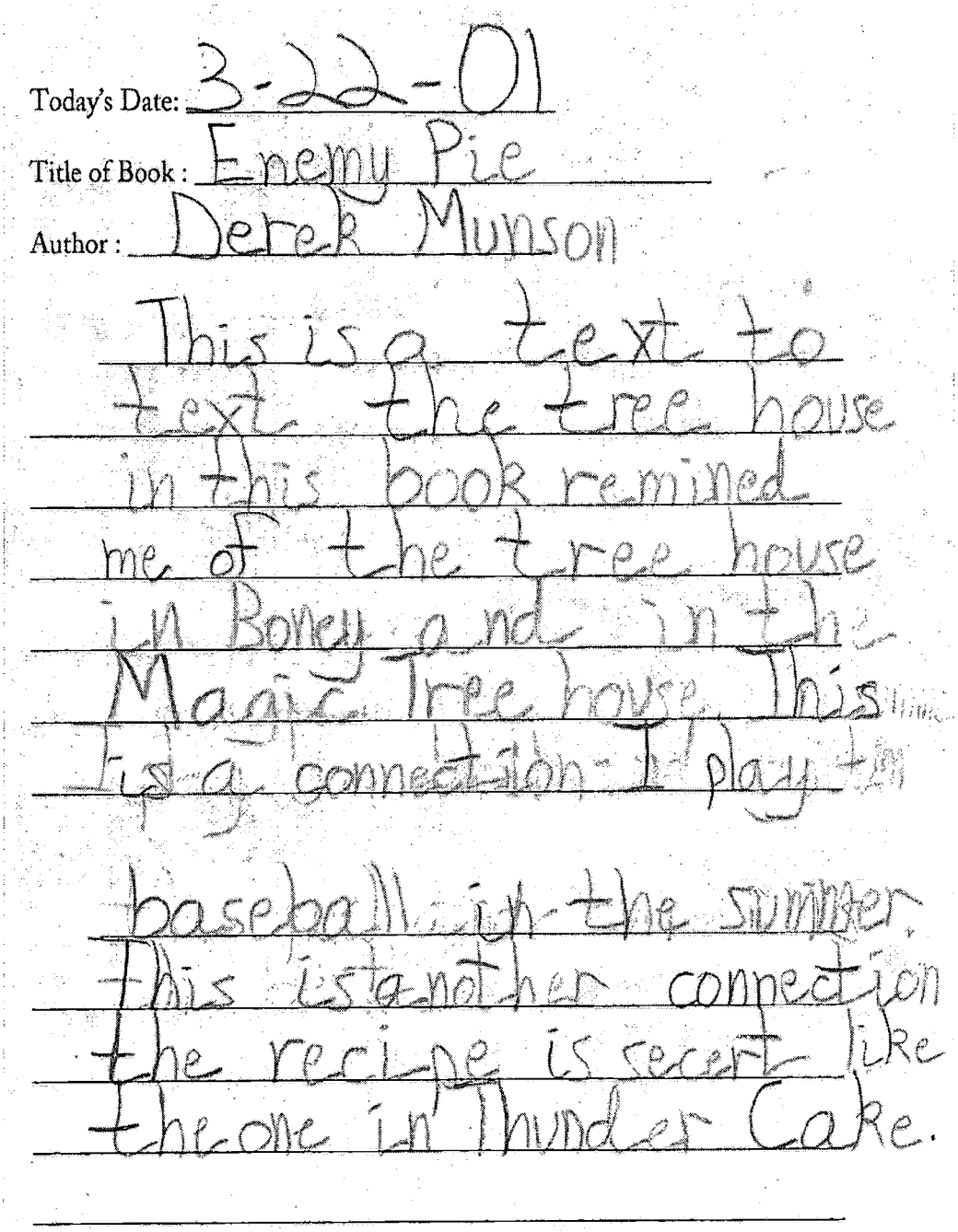
3. Text to Life."

"I picture lots of things that are going on in the story and I try to remember life experiences of my own."

These responses show the students' ability to think about their thinking and demonstrate their understanding of these metacognitive strategies that required them to make connections.

The first response entry in the Student Thinking Log (Appendix D) given prior to the intervention was varied. All students were able to respond to the prompt, "This reminds me of." Second and third grade students tended to respond briefly. Some second and third grade students were unable to make a connection and responded, "This doesn't remind me of anything." The connections made by other second and third grade students lacked depth and elaboration. An example would be "This reminds me of my dad's farm." Fifth grade students were able to respond in greater detail to the prompt. It seemed to the researchers that the older students responded automatically. Responses were connected to life experiences.

As strategies were introduced and modeled by the teacher, then practiced and independently used by students, the written responses in the Student Thinking Logs (Appendix D) gradually became more detailed, elaborate, and reflective. Some students used the name of the specific connection/strategy in their response. Students used the vocabulary text-to-text, text-to-life, and text-to-world in their entries. Some students created new connection names that included "text-to-movie," "text-to-dream," and "text-to-painting." Figure 4 exemplifies written responses.



Today's Date: 3-22-01

Title of Book : Enemy Pie

Author : Derek Munson

This is a text to text the tree house in this book remined me of the tree house in Boney and in the Magic Tree house. This is a connection- I play baseball in the summer. This is another connection the recipe is secert like the one in Thunder Cake.

Figure 4. Written Responses During and After Intervention

Today's Date: March 9, 2001

Title of Book: Flyaway Girl

Author: Ann Grifalconi

The images that ran through my mind were very neat. I saw colorful clothing. I saw elephants, giraffes, birds and other animals. I also saw colorful fish in the water, all different shapes, sizes, and textures.

When the little girl went through my mind, I thought of her racing like the wind. I could see her bewildered face when she heard the voice. I saw her picking the light sticks. I saw her finally finding the dark ones. Finally, I see her happily running home with the two colors.

Figure 4. Written Responses During and After Intervention

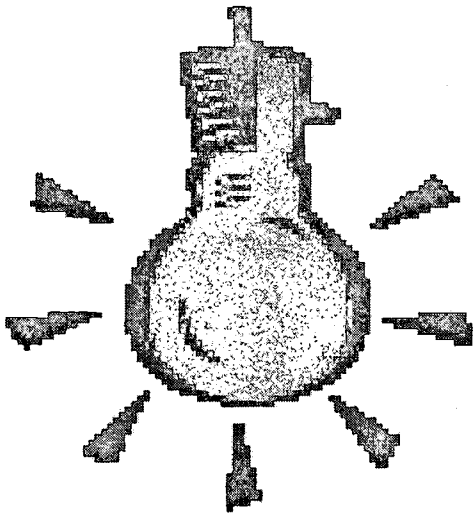
Today's Date: 2-7-01

Title of Book: Shells

Author: _____

This book reminds me of when I moved to Geneva, Ill. from Boston, Massachusetts. It was nice. But then after a year or so someone else move hear. I thought the girl that was about my age was not going to be that nice. But then I met her and she was great! What I am trying to say is that I was like Aunt Esther. She was like me. She did not like Michael. But then she got to know him and he was nice.

Figure 4. Written Responses During and After Intervention



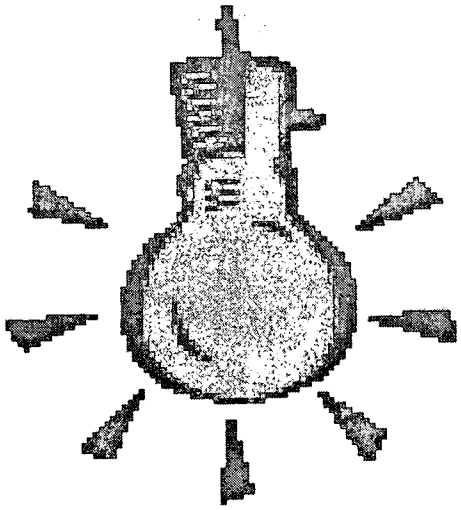
Today's Date: 1/10/01

Title of Book : Abel's Island

Author : William Steig

I made a connection with the book Hatchet because Abel was stranded just like Brian. I made a connection to my life's when I'm at my grandma's house. I see the sun glistening on my grandma's lake. I made a connection to my life when Abel made three boats and sailed on them. It reminded me of my sailing lessons I take in the summer.

Figure 4: Written Responses During and After Intervention



Today's Date: 1/12/01

Title of Book : Abel's Island

Author : William Steig

When I'm reading about the island that Abel is on it reminds me of the time I went to Hawaii. Abel had a lot of free time, and in Hawaii I had a lot of free time. I picture me going the the pool. I picture me going snorkeling. Abel was the same way. He spent his free time doing something he enjoyed.

Figure 4. Written Responses During and After Intervention

Students demonstrated their use of the visualization strategy by writing descriptive responses with many details or through illustration. After the students were taught the strategy, they could easily create illustrations of what they had visualized. Students commented in discussions that they were "getting a picture in their mind."

Evidence that the intervention was having a positive impact was witnessed in a way not anticipated by the researchers. It was most apparent during reading discussions that the students were independently using these strategies. The students were frequently discussing their connections and identifying the strategy used. Students readily shared their thinking about their thinking. Even students who have difficulty expressing their thoughts in writing were able to make and verbalize connections in class discussion. This trend continues. Students readily raise their hand and say, "I have a connection to make." They then share their connection and it often becomes a springboard for others to share their connections with the group.

However, the biggest surprise the researchers experienced was the unplanned use of metacognitive strategies throughout the day during curricular areas other than reading. The students seemed to make these strategies their own once they had the vocabulary to articulate their thoughts. This showed the researchers that language and articulation of their thoughts was a powerful tool.

Conclusions and Recommendations

Based on the presentation and analysis of the data on metacognitive strategies, students showed marked improvement in reading comprehension and reflective response. Following the teaching, modeling, guided practice, and independent use of the targeted strategies, student's awareness of their thinking increased. Students were

able to verbalize their thinking as well as share their thoughts in writing. The depth of their written responses improved as a result of learning these strategies. The group of students who were most affected by the intervention were those reading below grade level. After learning and using the strategies, this group showed the most improvement in reading comprehension. This intervention supports the earlier research cited that proficient readers use these strategies naturally and poor reading students would benefit from the strategies being specifically taught.

Student Thinking Logs (Appendix D) were found to be effective. At the beginning the reflections were very brief, vague, and lacked substance. As the intervention continued, the students became more deliberate in their explanations of their thinking. As students used the strategies independently, thoughtful reflection increased.

The researchers had mapped out their plans to implement the intervention. They realized day-to-day planning and events in the classroom caused them to be more flexible therefore it was necessary to allow for spontaneity. All the researchers agree that the strategies be taught simultaneously instead of in isolation. Students at the targeted grade levels easily assimilated the information. It was also agreed that a better assessment tool could be found to use as an indicator of pre- and post- reading comprehension levels, perhaps a standardized test. The language in the Teacher Survey (Appendix A) and Student Thinking Interviews (Appendix B) could also be modified to make the questions clearer.

This study had an impact on the researchers' methods and plans for future teaching practices. All the researchers plan to continue teaching these metacognitive strategies. The researchers would teach the strategies simultaneously rather than in

isolation. The Student Thinking Log (Appendix D) would be used more often as a part of the planned lesson, and students would be encouraged to independently reflect in their logs as connections occur.

The researcher from School B is a member of a professional book group within her building. She recommended that Mosaic of Thought be the first book to be read and discussed. Bi-monthly discussion continues. Researchers at Building A plan to share the results of their research with colleagues at their grade level.

The reading specialist within our district requested samples of Student Thinking Logs (Appendix D) to share with new teachers in the district at their monthly new teacher training. She presented these samples as an example of one tool for monitoring students' independent use of metacognitive strategies.

We believe that if all teachers taught metacognitive strategies beginning in first grade, subsequent teachers would be able to build on set strategies and introduce new ones. In order for student use of metacognitive strategies to be most effective they must be taught throughout the grade levels. If this trend continued, by fifth grade students would be well versed in the independent use of metacognitive strategies. Their responses would be automatic and less teacher directed, empowering them to think about their thinking.

For learning to take place it needs to be connected to the learner. Connecting their prior experiences enables the learner to make sense of new material. All learning requires prior knowledge. Teaching students to use metacognitive strategies gives them the tool to attach their learning to what they already know. Giving the students the language to articulate their thoughts and have a name for the metacognitive

strategies greatly empowered the students. The researchers see the value of teaching these strategies and will make them an integral part of their teaching repertoire to improve reading comprehension and reflection.

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Appendices

Appendix A

Teacher Reading Comprehension Survey

Please indicate how frequently you use the following activities or practices for teaching reading comprehension in a typical week by circling the appropriate number.

	Not at all	Once a week	2-3 times	Once a day	One to several Times per day
1) Answer literal comprehension questions	1	2	3	4	5
2) Use context clues	1	2	3	4	5
3) Retell	1	2	3	4	5
4) Use visualization techniques	1	2	3	4	5
5) Decoding	1	2	3	4	5
6) Write reflection	1	2	3	4	5
7) Activate prior knowledge	1	2	3	4	5
8) Use self evaluation	1	2	3	4	5
9) Find the main idea	1	2	3	4	5
10) Relate text to life	1	2	3	4	5
11) Reread	1	2	3	4	5
12) Share their thinking	1	2	3	4	5
13) Teach cause and effect	1	2	3	4	5
14) Teach sequencing	1	2	3	4	5
15) Summarizing	1	2	3	4	5
16) Use Round Robin Reading	1	2	3	4	5
17) Share your own thought processes with students	1	2	3	4	5

Appendix B

Student Thinking Interview **Name** _____

1. What is the story mainly about?

2. Where and when does it take place?

3. Who are the main characters?

4. How is this story like something else that you have read or heard?

5. Has anything like this ever happened to you or someone you know?

6. What happened in the story that made you stop and think?

Appendix B Continued

7. What did you wonder about as you read the story?

8. Were their places in the story where you made a picture in your mind?

9. What do you do to help you read and understand the story?

Appendix C
Parent Consent Form

September, 2000

Dear Parent or Guardian:

Our class is participating in a research project designed to enhance reading comprehension. The project will provide opportunities for students to better understand what they read, share their thinking, and move beyond the literal to higher levels of thinking.

This project is result of a Masters Program at Saint Xavier University. I am working on this project with three other teachers in the district. We have researched literature regarding metacognition and its role in reading comprehension and are planning to implement some of the strategies learned. We would like to use the data from this project to assess its effectiveness in increasing reading comprehension. In order to assess the effectiveness of this project we will use a variety of assessment tools. I am writing to ask your permission to use data collected from your child's assessments in reporting my project results.

All student work will be kept strictly confidential. The results of the findings will only be reported for groups of students, such as "80% of the students who were taught these strategies improved in comprehension levels." No identifying information will be used in reporting the data collected. Please return the attached form.

If you have any questions please contact me at _____.
Thank you for your cooperation!

Sincerely,

Appendix C Continued

Metacognition Project
Consent Form

Please return this form by September _____.

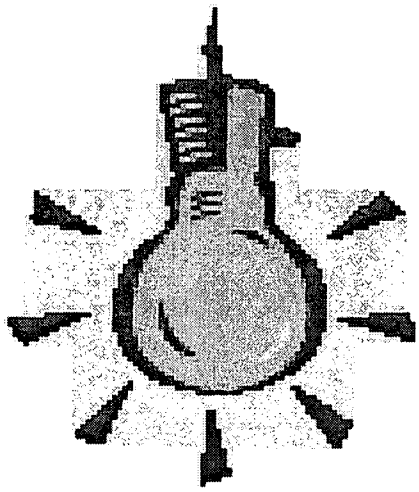
I, the parent/legal guardian of the minor named below, acknowledge that the investigator has explained to me the need for this research, identified the risks involved, and offered to answer any questions I may have about the nature of my child's participation. I freely and voluntarily consent to my child's participation in the assessments associated with this study. I understand all information gathered during the study will be completely confidential (or anonymous). I also understand that I may keep a copy of this consent form for my own information.

_____
Name of Minor Participant

_____ _____
Signature of Parent or Guardian Date

Appendix D

Student Thinking Log



Today's Date: _____

Title of Book _____

Author _____

_____

_____

_____

_____

_____

_____

_____

_____

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