



1988

Reciprocal Teaching: A Model of Cooperative Teaching Applied to the Improvement of Reading Comprehension with Remedial High School Students

Rita Tobin Aaron
Loyola University Chicago

Follow this and additional works at: https://ecommons.luc.edu/luc_diss



Part of the [Education Commons](#)

Recommended Citation

Aaron, Rita Tobin, "Reciprocal Teaching: A Model of Cooperative Teaching Applied to the Improvement of Reading Comprehension with Remedial High School Students" (1988). *Dissertations*. 2555.
https://ecommons.luc.edu/luc_diss/2555

This Dissertation is brought to you for free and open access by the Theses and Dissertations at Loyola eCommons. It has been accepted for inclusion in Dissertations by an authorized administrator of Loyola eCommons. For more information, please contact ecommons@luc.edu.



This work is licensed under a [Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 License](#).
Copyright © 1988 Rita Tobin Aaron

RECIPROCAL TEACHING: A MODEL OF
COOPERATIVE TEACHING APPLIED TO THE IMPROVEMENT OF READING
COMPREHENSION WITH REMEDIAL HIGH SCHOOL STUDENTS

by

Rita Tobin Aaron

A Dissertation Submitted to the Faculty of the School of Education
of Loyola University of Chicago in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Education

May

1988

Rita Tobin Aaron

Loyola University of Chicago

RECIPROCAL TEACHING: A MODEL OF COOPERATIVE TEACHING APPLIED TO THE
IMPROVEMENT OF READING COMPREHENSION WITH REMEDIAL HIGH SCHOOL STUDENTS

ABSTRACT

The reciprocal teaching method is reported to be a successful instructional method that has potential for improving achievement under less than ideal circumstances (Brown & Palincsar, 1982; 1986; Palincsar & Brown, 1984). Based on the social interaction principles advocated by Vygotsky, this instructional method is a comprehension-fostering and comprehension-monitoring program that integrates expert scaffolding, guided practice of concrete strategies, and cooperative learning discussions.

In an attempt to demonstrate the utility of using the reciprocal teaching method to foster reading comprehension among remedial students, a study was designed to test for differences in achievement across three methods of instruction (reciprocal teaching, modeling only, and a control condition). In addition, a special attempt was made to control for the individual differences of cognitive style and causal attribution among the participants.

The independent variables were: Group (three methods of instruction); causal attribution (as measured by goal orientation); cognitive style (as measured by tendency to have intrusive or non-intrusive

thoughts); and phase (pretesting, intervention 1, intervention 2, maintenance, delayed posttesting). The dependent variables were 5 measures of achievement (comprehension passages, question generation tasks, summary tasks, Gates vocabulary, Gates comprehension) examined over time (i.e., phases of the investigation).

Forty-six freshmen high school students enrolled in three intact remedial English classes were selected as subjects. Instruction was done on a daily basis for approximately 20 consecutive school days. The daily training sessions lasted thirty minutes. At the completion of instruction, assessment passages were distributed. The students read each passage silently and completed questions from recall. The students in the reciprocal teaching group actively engaged in practicing the strategies (the Vygotskian social component), the modeling only group observed the teacher using the strategies, and the control group received traditional teacher directed instruction.

Repeated measures results indicated that there were significant differences found across methods of instruction over time for the dependent variables of passage comprehension and question generation. Reciprocal teaching was found to be the superior method of instruction. Furthermore, two significant interaction effects were found across methods of instruction and cognitive style over time on the dependent variable of passage comprehension, and across methods of instruction and causal attribution over time on the dependent variable of question generation.

ACKNOWLEDGEMENTS

The author would like to acknowledge many individuals for their unending support throughout this research study. Among those who deserve special recognition is Dr. Ronald Morgan, Director of the Dissertation Committee, who willingly shared his "cognitive template" with me. In addition, he was always available for suggestions and guidance. Sincere thanks is also expressed to Dr. Jill Reich who provided the author with encouragement and assistance with the development of the project. I am also indebted to Dr. William Watts for suggesting that I do my field research at Argo Community High School and for being a liaison between the school district and the author. Appreciation is expressed to Dr. Martha Wynne who provided the author with direction and clarity in regard to the statistical design and analyses.

A sincere thank you is expressed to the students of Argo Community High School for being enthusiastic participants in this study. I would also like to gratefully acknowledge Gina O'Kelly, who allowed me to conduct the investigation in her classroom. Thanks must also be given to Dr. Steven Holbrook, Superintendent; and the rest of the staff of the district for their interest and participation.

I would also like to express my appreciation to Maureen Connolly and Peg Walsh, who gave many hours of their summer vacations' to help

prepare the reading materials. I also thank Nanci VanBlaricom whose assistance throughout the intervention was invaluable.

Finally, I would like to thank my family. I am indebted to my parents, Harry and Dorothy Tobin, who helped take care of my son and to my mother who spent endless hours typing the manuscript. I am grateful to my five year old son, Tommy, for his smiles, laughter, and drawings in helping his mom finish her project. I appreciate the faith that my husband, John, had in me. Without all his help and encouragement over the years this project would have been impossible.

VITA

The author, Rita T. Aaron, is the daughter of Harry and Dorothy Tobin. Mrs. Aaron is the wife of John Michael Aaron and the mother of Thomas Andrew Aaron. She was born on May 7, 1950 in Chicago, Illinois.

Her elementary education was obtained in Chicago, Illinois. Her secondary education was completed in 1968 at Aquinas Dominican High School in Chicago, Illinois.

In September 1968, Mrs. Aaron entered Marquette University in Milwaukee, Wisconsin. She continued with her studies at Northern Illinois University, receiving a Bachelor of Arts degree in 1972 with a major in English, and minors in Theatre Arts and secondary education. Mrs. Aaron taught in the Chicago Public Schools from 1973-1976.

In June 1975, Mrs. Aaron entered St. Xavier College in Chicago, Illinois receiving a Masters of Arts degree in Learning Disabilities in 1978.

From 1977-1982, Mrs. Aaron was a learning disabilities teacher for the Blue Island School District. In September 1980, she entered Loyola University to pursue a Doctoral Degree in Educational Psychology. During the 1984-1985 school year, Mrs. Aaron completed her school psychology internship at Argo Community High School.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
VITA	iv
LIST OF TABLES	viii
LIST OF FIGURES	x
CONTENTS OF APPENDICES	xi
 Chapter	
I. INTRODUCTION	1
II. REVIEW OF LITERATURE	8
Reciprocal Teaching: A Vygotskian Perspective	9
A Description of the Reciprocal Teaching Method	11
Individual Differences	16
Causal Attribution: Goal Orientation	18
Cognitive Style: Cognitive Interference	21
Models of Reading Comprehension	24
Recapitulation	27
III. METHOD	31
Hypotheses	31
Subjects	32
Procedure	32
Phase 1: Pretesting	32
Phases 2 and 3: Intervention	33
Reciprocal Teaching Treatment Condition	34
Modeling Only Treatment Condition	35
Control Treatment Condition	35
Phase 4: Maintenance	36
Phase 5: Posttesting	36
Preparation of Reading Materials	36

Instrumentation.	38
Gates-MacGinitie Reading Tests.	38
Leggett/Dweck Intelligence Scale.	39
Question Generation Task.	39
Summary Task.	40
Thought Occurrence Questionnaire.	41
Description of Pilot Study	41
Design and Statistical Analysis.	43
 IV. RESULTS.	 46
Results Related to Testing Null Hypothesis 1	51
Results Related to Testing Null Hypothesis 2	55
Results Related to Testing Null Hypothesis 3	55
Results Related to Testing Null Hypothesis 4	56
Results Related to Testing Null Hypothesis 5	61
Post Hoc Tests	63
 V. DISCUSSION	 67
Discussion Related to Null Hypothesis 1.	67
Discussion Related to Null Hypothesis 2.	75
Discussion Related to Null Hypothesis 3.	76
Discussion Related to Null Hypothesis 4.	76
Discussion Related to Null Hypothesis 5.	78
Discussion Related to Post Hoc Tests	85
General Discussion of Results.	87
Significance of the Study.	89
Suggestions for Future Research.	89
 REFERENCES.	 92
 APPENDIX A.	 96
 APPENDIX B.	 109
 APPENDIX C.	 117
 APPENDIX D.	 121
 APPENDIX E.	 124
 APPENDIX F.	 127

APPENDIX G.	130
APPENDIX H.	133
APPROVAL SHEET.	136

LIST OF TABLES

Table	Page
1. A Vygotskian Based Instructional Model.	30
2. Means, Standard Deviations, and Sample Sizes of Passage Comprehension Scores.	47
3. Means, Standard Deviations, and Sample Sizes of Question Generation and Summary Tasks Scores	48
4. Means, Standard Deviations, and Sample Sizes of Gates-MacGinitie Tests Scores	49
5. Frequency Distribution of the Relationship Between Causal Attribution and Group	50
6. Frequency Distribution of the Relationship Between Cognitive Style and Group	51
7. Summary Table of Repeated Measures Analysis of Passage Comprehension by Group Model.	52
8. Summary Table of Repeated Measures Analysis of Question Generation by Group Model	54
9. Summary Table of Repeated Measures Analysis of Passage Comprehension for Group by Time (phases 1,2,3) Model. . . .	57
10. Summary Table of Repeated Measures Analysis of Passage Comprehension for Group by Time (phases 1,2) Model.	57
11. Summary Table of Repeated Measures Analysis of Passage Comprehension for Group by Time (phases 2,3) Model.	58
12. Summary Table of Repeated Measures Analysis of Passage Comprehension for Group by Time (phases 3,4,5) Model. . . .	59

13.	Post Hoc Contrast Analysis Procedure of Passage Comprehension for Group by Time (phases 1,2,3,4,5) Model	64
14.	Post Hoc Contrast Analysis Procedure of Passage Comprehension for Group by Time (phases 1,2,3) Model. . . .	65
15.	Post Hoc Contrast Analysis Procedure of Question Generation for Group by Time (phases 1,4) Model	66
16.	Examples of Student Answers to Daily Passage Questions at Pretest.	69
17.	Examples of Student Answers to Daily Passage Questions after Twentieth Day of Intervention	70
18.	Examples of Student Generated Questions at Pretest.	73
19.	Examples of Student Generated Questions at Maintenance. . .	74

LIST OF FIGURES

Figure	Page
1. A graphic presentation of phase 1 to phase 5 changes in mean score performance on the comprehension passages. . . .	53
2. A graphic presentation of phase 1 to phase 4 changes in mean score performance on question generation tasks	60
3. A graphic presentation of phase 1 to phase 5 changes in mean score performance of cognitive style (non-intrusive) by group on passage comprehension	80
4. A graphic presentation of phase 1 to phase 5 changes in mean score performance of cognitive style (intrusive) by group on passage comprehension	81
5. A graphic presentation of phase 1 to phase 4 changes in mean score performance of causal attribution (performance goal) by group on question generation	83
6. A graphic presentation of phase 1 to phase 4 changes in mean score performance of causal attribution (learning goal) by group on question generation	84

CONTENTS OF APPENDICES

	Page
Appendix A Student Worksheets	96
Appendix B Training Passage	109
Appendix C Daily Assessment Comprehension Passage	117
Appendix D Leggett & Dweck Intelligence Scale	121
Appendix E Question Generation Task	124
Appendix F Summary Task	127
Appendix G Thought Occurrence Questionnaire	130
Appendix H Summary Listing of Dependent and Independent Variables	133

CHAPTER I

INTRODUCTION

At the beginning of the century, John Dewey suggested that there was a need for a "linking science" between the disciplines of education and psychology. With the continuing development of instructional psychology, the possibility of bridging the gap between these two fields is becoming a reality. Until recently, priority has been given to educational research that was designed to investigate the students' ability to understand, reason, problem solve, and learn. The results of these investigations produced models for educational environments, that facilitated the acquisition of knowledge while at the same time encouraged learners to acquire cognitive abilities to think, reason, and continue learning on their own (Glaser, 1985).

However, the understanding of cognitive ability alone, is no longer sufficient to explain achievement. According to Snow & Farr (1987), improvement of instruction requires:

A whole person view that integrates cognitive, conative, and affective aspects of learning, and individual differences therein ... (they) are three facets of individual performances, not isolated provinces (p. 1).

Today affect and motivation are being rediscovered and are resurfacing in the mainstream of psychological theorizing (Sternberg, 1987).

The present study was designed to test variations in achievement when different methods of instruction were used as well as test the influence of individual differences on achievement. In particular, the study reported here focused on the potential of using the reciprocal teaching method on reading comprehension with remedial high school students. This model is a comprehension-fostering and comprehension-monitoring procedure based on the theoretical principles of Vygotsky, in particular; social interaction (Brown & Palincsar 1982; 1986; Palincsar & Brown, 1984).

In addition, individual differences of cognitive style (as measured by the tendency to have intrusive or non-intrusive thoughts) and causal attribution (as measured by goal orientation) were examined to explain their potential influence and interaction on the learning task.

The theoretical implications of this study rest on its potential to add to a growing knowledge base, that integrates three areas of psychology: social psychology, cognitive instructional psychology, and differential psychology. The results of this study could generate an instructional model, that could lead to optimal achievement in a regular school setting, while simultaneously linking important individual differences directly to the curriculum design.

Research that examines the influence of the interaction of cognitive and affective processes on cognitive processing models relevant to learning, makes a contribution to the field of education in that seldom has anyone investigated this area based solely on the combination of variables included in this study. The results of this study also contribute to the growing number of replication studies utilizing the reciprocal teaching method.

Moreover, this study makes a contribution to the field of school psychology in that the generated instructional model could be used as a consultative and diagnostic tool. As a consultative tool, reciprocal teaching is a viable procedure that can be used under less than ideal circumstances and can be adapted to existing curricula. As a diagnostic tool, the model may help explain some behaviors that interfere with optimal achievement. Being made aware of the affective as well as the cognitive interplay in the classroom process is a valuable piece of knowledge that could be given to teachers (McKeachie, 1987).

Finally, research comparing the effects of affect and motivation on cognition and learning has been a recent addition to educational research literature. The need for more research in this area has been suggested by many authors (Snow & Farr, 1987; Messick, 1987; Sternberg, 1987).

A review of the literature indicates that there is a substantial foundation of research on the subjects of reading comprehension, reciprocal teaching, cognitive style, and causal attribution. Although

there is no unified theory of reading at the present time, there is reported to be considerable agreement that reading is an active process, that encompasses searching for understanding rather than a mechanical process of decoding (Orasanu & Penney, 1986). The emerging model of comprehension implies a changed student-teacher relationship along with different instructional approaches (Farr, Carey, & Tone, 1986).

Wilson and Anderson (1986) suggest that reading comprehension can be improved if students are given direct instruction in techniques that actively involve students in reasoning. Direct instruction may help the individual to focus on knowledge that is relevant to the task at hand and/or set up the process for the student to discover new expert forms of knowledge.

Brown and Palincsar (1982) designed a direct instruction program that improved comprehension-fostering and comprehension-monitoring skills. This procedure was termed reciprocal teaching. Reciprocal teaching includes:

1. Expert scaffolding-providing support that is temporary, interactive and adjustable;
2. Practice with concrete strategies-training of summarizing, questioning, predicting, and clarifying skills;
3. Cooperative learning discussions-providing social support through collaboration of the expert and student.

Numerous studies (Brown & Palincsar, 1982; 1986; Palincsar & Brown, 1984; Palincsar, unpublished manuscript, 1986) have been conducted to test the reciprocal teaching method. Overall group gains have been reported in comprehension immediately following twenty days of intervention as well as significant effects approximately 8 weeks after the procedure. At baseline, the typical student scored 45% accuracy on the criterion-referenced measure of comprehension. After reciprocal teaching, 71% of the experimental group achieved a criterion of at least 70% accuracy in contrast to only 19% of the control group. These gains were maintained over time (8 weeks) and were transferred to content areas in the regular classroom (science, social studies) as indicated by changes in percentile rankings among all seventh grade students.

The literature suggests that individual differences among students present a problem to educators. Students' individual predispositions condition their readiness to learn from particular instructional environments (Snow, 1987). A clear understanding of behavior must take into account mediating processes that influence the individual's perception of the task, their ability to meet the challenge of the task, and self-preoccupations about these perceptions (Sarason, 1987).

Dweck's (1986) recent research focuses on one mediating process that is relevant to education: motivation (causal attribution). In short, Dweck's model shows that the particular goals children pursue on

specific cognitive tasks are manifested in an adaptive or maladaptive pattern.

Two goal orientations, that are correlated with children's theories of intelligence, have emerged from Dweck's research program (Bandura & Dweck 1985; Leggett, 1985; 1986; Elliott & Dweck, in press):

1. performance goals (fixed idea of intelligence)-goal is to gain positive judgment and avoid negative judgment;
2. learning goals (incremental idea of intelligence)-goal is to increase competence.

Another specific mediating process to consider is cognitive style. Cognitive style may function in part as a controlling mechanism determining an individual's characteristic regulation and individualized approach to problem solving (Messick, 1984). Adaptive and maladaptive patterns of an individual's cognitive style (the tendency to have intrusive or non-intrusive thoughts) have been investigated. An effort has been made to empirically specify the cognitive events associated with performance on complex tasks. It has been reported that self-preoccupation interferes with thought and this in turn is associated with low levels of performance. Intrusive thoughts have been found to divide attention and create cognitive time-sharing (Sarason, Sarason, Keefe, Hayes, & Shearin, 1986).

Based on the findings reported above, it was expected that, in the present study, achievement scores, as measured by comprehension

passages, summary tasks, question generation tasks, and the Gates-MacGinitie Reading Tests over time, would be different across three (3) methods of instruction (reciprocal teaching, modeling only, control). It was further anticipated that cognitive style (as measured by the Thought Occurrence Questionnaire) and causal attribution (as measured by Leggett/Dweck Intelligence Scale) would differentially influence achievement scores. In the present study, 46 freshmen high school remedial students enrolled in a suburban high school near Chicago were tested on the above mentioned measures.

In sum, the study reported here was designed to focus mainly on variations in achievement over time when different methods of instruction were used as well as test the influence of individual differences on achievement. Specific research questions addressed in this study were: What kinds of instructional conditions lead to optimal achievement in a regular school setting? Does cognitive style or goal orientation have an influence on optimal achievement, and if so, under what situations?

CHAPTER II

REVIEW OF LITERATURE

Information about instructional models designed to integrate cognitive, conative (i.e., purposive, goal oriented, self-regulatory behaviors), and affective processes may provide clues of how to improve and individually adapt educational environments to incorporate important individual differences among learners (Snow, 1986). A strong, positive relationship between metacognitive processes and strategic behavior is becoming well established in the literature (Day, 1986). Overall expert learners have been reported to exhibit a greater awareness of the task, the materials, their own capabilities, and the activities necessary to accomplish the task. Purposeful activities reportedly develop as part of the acquisition of cognitive skills (Gitomer & Glaser, 1987).

Brown (as cited in Chipman & Segal 1985) has suggested that awareness and control of processes emerge only as knowledge and skills in a particular domain become well developed. Most successful cognitive skills training packages include the three components of skills training, self-control training, and awareness training (Brown, Palincsar & Armbruster, 1984). With this in mind, Brown and Palincsar

(1982; 1986) developed an instructional model that incorporates these three elements. This reciprocal teaching model was designed to encourage active involvement of learners in comprehension-fostering and comprehension-monitoring activities within a social setting.

In what follows, a selective review of the literature related to reciprocal teaching, individual differences of causal attribution, individual differences of cognitive style, and reading comprehension is presented. A special attempt was made here to describe the development of the reciprocal teaching model which was designed to facilitate optimal student achievement while at the same time taking into consideration the individual differences among learners.

Reciprocal Teaching: A Vygotskian Perspective

Brown and Palincsar (1982; 1986) designed an instructional model specially crafted to improve comprehension-fostering and comprehension-monitoring skills based on the theoretical concepts of the Russian psychologist, Vygotsky. Vygotsky emphasized that expert led social interactions have a central place in learning and that these interactions provide a push for cognitive growth. Learning and development become interwoven in a complex spiral pattern. Social mediation is the process through which cognitive skills are introduced. Vygotsky theorizes that all higher cognitive processes develop in social interaction (Day, 1983).

Furthermore, Vygotsky believed that the child's developing knowledge is organized through interactions with experts who serve as

models and monitor the state of the student's understanding. Through interaction, children acquire new ways of responding to people and materials around them. Experts mediate the environment for children, teaching the knowledge and the skills of their culture. A child's internalization of skills is a long developmental process in which learned skills undergo fundamental changes. However, before a skill is internalized, a student is capable of doing the activity with expert assistance. Development occurs only when the child is able to independently carry out the task. Vygotsky termed this construct internalization; inter becomes intra (Wertsch, 1985).

Vygotsky was also interested in how a child could become what he not yet is, in other words, how a child moved from a lower level to a higher functioning level. Vygotsky stated that it was important to "...concentrate not on the product of development but on the very process by which forms are established." (p.64).

The distance between a child's actual developmental level of independent problem solving and the higher level of potential development as determined by his problem solving skills with adult supervision was termed, the zone of proximal development. Wertsch (1985) cited factors that would encourage the transition between these two stages. They are:

1. Cognitive readiness on the part of the child;
2. Willingness on the part of the adult expert to transfer responsibility to the child;

3. Reflective assessments to inform the child of the significance of his behavior;
4. Explicitness of the adult's directions (p. 26).

Vygotsky emphasized that thinking is a social activity that is initially shared between people but is gradually internalized by the individual. Individual thinking is thus a re-enactment by the person of activities that were experienced with others.

From a Vygotskian perspective, the teacher becomes a model and a guide for the student's activities. The teacher helps to develop knowledge within the student by directing the student's thinking with questions and prompts.

In summary, Vygotsky believed that skills and knowledge are acquired through social interactions. Development takes place when a student can independently perform a task. Teachers can become expert models for students by guiding and monitoring their activities until internalization is completed.

A Description of the Reciprocal Teaching Method

Brown, Palincsar, & Armbruster (1984) reported that the most successful cognitive skills training packages have included three components:

1. Skills training: Practice in the use of appropriate skills;
2. Self-control training: Direct instruction in how to monitor effective use of skill;

3. Awareness training: Information dissemination concerning reasons why strategies improve skill and where strategies should be used.

Scardamalia and Bereiter (1985) have provided evidence supporting the notion that children become willing participants in the instructional process once they understand the goal of the instruction and are able to regulate their cognitive activity. Using this information combined with underlying Vygotskian principles, Brown and Palincsar (1982; 1986) devised a technique of guided learning that was termed reciprocal teaching. Reciprocal teaching includes three main components:

1. expert scaffolding;
2. guided practice in applying concrete strategies;
3. cooperative learning discussions.

Expert scaffolding is a process that enables a child to solve a problem or carry out a task that is beyond his unassisted efforts. Scaffolding provides support that is temporary, interactive, and adjustable. Through meaningful dialogue teachers and students interact and share responsibility for learning strategies. It is a collaborative effort that allows for the acquisition and refinement of cognitive strategies. Initially, the expert acts as a supportive model leading the learners to a level that is a comfortable challenge. Scaffolding provides a setting in which novices practice their emerging skills

without all of the responsibility of comprehending the task (Palincsar, 1986). Expert scaffolding forces student interaction but can be removed when help is no longer needed. If during instruction, a student was not able to independently perform a task, this would not be viewed as a failure but rather as an important source of information. This would alert the expert that some additional action was needed.

After an extensive review of the literature, a great deal of theoretical discussion, and numerous studies, Palincsar and Brown (1982; 1986) selected four particular concrete strategies for the training component. The four concrete activities are:

1. summarization-ability to attend to main content of text and integrate information presented;
2. question generation-ability to ask good questions about main ideas and monitor reader's current state of understanding;
3. clarification-ability to engage in critical evaluation while reading and if necessary take action to correct understanding;
4. prediction-ability to link previous knowledge with new knowledge by testing hypotheses about future text.

Good students routinely bring these four activities to the task of studying texts, while poor students rarely report using them. These strategies are used as tools and become but a means to an end. When these activities are practiced in an appropriate context with ongoing studying and not as isolated skill exercises, improvement in comprehension can be facilitated.

Cooperative learning discussions provide an alternative method of teaching the strategies. Cooperative learning discussions influence individual knowledge acquisition. Groups are said to provide social support for the efforts of the members. Collaboration between the members leads to enhanced performance and is particularly beneficial for students who are novices. The adult and student take turns leading cooperative discussions while feedback is designed to meet the current needs of the novice leader. Students can practice emerging skills. This is an example of a practical application of Vygotsky's principle of internalization. Group members share responsibility, by becoming active participants in the learning activity and in monitoring problem solving (Gitomer & Glaser, 1987). Overall, use of reciprocal teaching procedures have helped increase individual student achievement even under less than ideal circumstances (Palincsar & Brown, 1986).

Numerous studies (Brown and Palincsar, 1982; 1986; Palincsar & Brown 1984; Palincsar, unpublished manuscript, 1986) were conducted to test the reciprocal teaching method. After promising results were found in pilot studies, reciprocal teaching method was incorporated in school settings with real teachers and naturally occurring groups. Multiple measures of achievement were used to determine success of the intervention. Criterion-referenced tests as well as normed-referenced tests were used to measure comprehension gains. Meta-analysis of the results in this area indicate that there were overall group gains in comprehension immediately following twenty days of intervention as well

as significant effects at least eight weeks after the procedure. At baseline, the typical student was at least two years behind in reading comprehension as measured by the normed-referenced test and scored 45% accuracy on the criterion-referenced measure. After reciprocal teaching, 71% of the experimental group achieved a criterion of at least 70% accuracy in contrast to only 19% of the control group.

In studies in content areas (science, social studies) similar results were reported. Comprehension assessments of the reciprocal teaching group improved to 74% from a baseline measure of 57%. Even in heterogeneous groups of larger sizes ($N = 19$), significant results were reported. The analysis revealed a significant effect for group, ($F(1,5) = 8.97, p < .05$). Reciprocal teaching groups had an average increase in comprehension scores of 45% while the average increase in score of control subjects was 25%.

When reciprocal teaching methods were contrasted to other interventions that trained the identical strategies of question generation, summarization, clarification, and prediction, reciprocal teaching methods produced far better results than modeling or explicit instruction alone. Again these gains were maintained over time and were transferred to content areas in the regular classroom. Other interesting results from the method included a qualitative change in the student's questions, summaries, and dialogues. Classroom teachers even reported that they had fewer behavior problems.

The Brown and Palincsar studies are regarded as successful for

the following reasons:

1. The effect was large and reliable;
2. The effect was durable;
3. The effect generalized to the classroom setting;
4. Training resulted in reliable transfer to dissimilar tasks;
5. Improvements in standardized comprehension scores were recorded in the majority of students;
6. Intervention was successful in natural group settings conducted by regular teachers;
7. Teachers were uniformly enthusiastic about the procedure once they had mastered it (Palincsar & Brown, 1984).

In summary, reciprocal teaching is a comprehension-fostering and comprehension-monitoring procedure that has been found to be successful in improving comprehension achievement with students even under less than ideal circumstances. Reciprocal teaching employs the techniques of expert scaffolding, guided practice with concrete strategies, and cooperative learning discussions.

Individual Differences

Snow (1986) indicates that individual differences among students present a problem to educators. Students' individual predispositions condition their readiness to learn from particular instructional environments. Learning how to capitalize on individual strengths and how to promote a diversity of achievements poses a major challenge for educators. There is a need to integrate knowledge about individual

differences of learners and link these differences directly to the design of instructional systems.

Pellegrino and Glaser (1979) report that individual differences can be looked at in terms of processes that help or hinder cognitive performance. It is not just the speed at which a learner completes the task that is important, but also the self-control and management the learner uses to complete the task. The learner's self-regulatory skills can result in either an adaptive or maladaptive pattern of achievement behavior.

Sternberg (1987) reviews the historical relationship between non-cognitive variables as they relate to human intelligence. In the 1970's there was a neglect of non-cognitive variables. The great popularity of the information-processing model allowed little room for a research focus on personality and/or motivation. This resulted in separation of these variables from intelligence research. Interestingly in the 1980's, personality variables appear to be on the way back into the mainstream of research. This focus on non-cognitive variables would appear to be particularly relevant to providing an understanding of the importance of this flexibility of the learner with respect to adapting to differing tasks and situations.

Gitomer and Glaser (1987) suggest that proficient learners have a greater awareness of the demands of the task, the materials, and their own capabilities. They observed a relationship among knowledge of material, proficiency of the learner, and self-regulatory behavior in

both numerical and verbal domains. The good performers were able to adapt to the specific demands of the task whereas immature learners were more passive and did not appear to be as flexible. These individual differences of regulatory behavior can lead to adaptive or maladaptive behavior patterns that influence the acquisition of knowledge.

Two variables that are a potential part of self-regulatory behavior are causal attribution (motivation) and cognitive style (affect). In what follows a selective review of current research literature related to these two variables of causal attribution and cognitive style and their relationship to instruction is presented.

Causal Attribution: Goal Orientation

In the past ten to fifteen years a shift has taken place in the study of motivation. The emphasis has shifted to a social-cognitive approach. This approach emphasizes investigating specific mediating processes, which identify particular self-conceptions and relates these to behavior. Dweck suggests (1986) that factors other than ability influence whether students effectively acquire and use skills. Motivational processes have been shown to influence:

1. How well children can use their existing skills and knowledge;
2. How well they acquire new skills and knowledge;
3. How well they transfer these new skills and knowledge to novel situations.

Dweck's (1986) recent research focuses on a mediating process that

affects learning. She presents a research-based model of motivational processes. In short, this model shows that the particular goals children pursue on specific cognitive tasks are manifested in an adaptive or maladaptive motivational pattern. Children with maladaptive patterns are hampered in their acquisition of cognitive skills when they encounter obstacles. Children with adaptive patterns seem to have performance facilitated by challenges. Achievement situations present a student a choice of goals. It has been found (Bandura & Dweck, 1985; Leggett, 1985) that the goal the student chooses predicts the child's achievement pattern. Two goal orientations have emerged from this line of research:

1. Performance orientation: Goal is to gain positive judgment and avoid negative judgment;
2. Learning orientation: Goal is to increase competence

Elliott and Dweck (in press) suggest that students enter achievement situations predisposed towards one of these goals depending on their perception of intelligence or "smartness." Children who believe that intelligence is a fixed trait tend to focus on their ability level. This can result in a tendency to avoid and withdraw from challenge. Students who have low assessments of their ability choose tasks that are easy, ensuring success. Students with high assessments of their ability may avoid challenging tasks if there is a risk of error. Children with this orientation are more likely to interpret negative outcomes in terms of a lack of ability. This concern with ability may

lead the students away from the very tasks that will foster cognitive growth.

In contrast, students who believe that intelligence is incremental tend to focus on progress through effort. This creates a tendency for the students to seek challenges. Children with learning goals choose challenging tasks regardless of whether they believe themselves to have high or low ability. These students are willing to explore, initiate, and pursue tasks that will foster cognitive growth (Leggett, 1985; Dweck, 1987).

Leggett (1985; 1986) reports that overall there is a fundamental difference in the conception of the relationship between effort and ability, resulting in a different causal judgment. Children who reason differently about effort and ability interpret the same situation in different ways. In Study One, 61% and in Study Two, 69% of those students who endorsed the incremental theory of smartness chose the learning goal orientation. Of the students who endorsed a fixed theory of intelligence, 69% (Study One) and 63% (Study Two) chose the performance goal orientation. Leggett (1985; 1986) concluded that children's effort/ability inference are significant predictors of their causal attribution and are linked to children's goal orientations.

From what is reported above, it is well documented that social learning and performance goals may be useful in trying to understand different patterns of achievement. Depending on their goal orientation, students may manifest either an adaptive or maladaptive pattern. It has

been consistently reported in the literature that, a student's perception of the relationship between effort and ability, (smartness theory) can be a significant predictor of their goal orientation.

Cognitive Style: Cognitive Interference

Another potential mediating process to consider is cognitive style. Cognitive style is assumed to be inter-woven with affective, temperamental, and motivational structures. One's style implies a general orientation to tasks and situations. Cognitive style may function in part as a controlling mechanism determining an individual's characteristic regulation (self-control). Messick (1984) suggests that cognitive style can be thought of in terms of an organizing or controlling variable. By increasing student awareness of their cognitive style (thought interference) and the possible relationship of a particular cognitive style to learning, a teacher may better facilitate the development of self-management skills among their students.

Messick (1987) purposes that affect (cognitive style) serves two key functions in cognition: as a disruption or interference with the process and as a signal that there is a need to protect the process because of the interference. There is a need to understand the integration of these systems and their place within the overall instructional model.

McKeachie (1987) stated that cognitive style plays a central role in one's response to environmental context. As individuals become more aware of their cognitive style, they should become more effective

in choosing appropriate situations within which they function best (an adaptive behavior pattern). The current trend in this line of research is toward linking process theories with theories of individual differences. For example, Sternberg (1987) defines cognitive style as the flexibility a learner has with respect to differing tasks and situations. Flexibility or one's self-regulatory skills link cognitive style to intelligence research. Cognitive style unites intelligence with personality and motivation.

Sarason et al. (1987) summarize previous studies of cognitive interference. The results of these studies indicate that the behavior pattern one adopts will depend on the task, situation, and person. Students bring to tasks a distinct set of dispositions that influence their perception of the situation and how they approach the task (readiness). Adaptive and maladaptive patterns of thoughts emerge as a student is presented with a task. Sarason (1987) indicates that task-oriented thinking directs energy to the task at hand (adaptive pattern). Intrusive thoughts, whether or not they are associated with the task or are irrelevant to the task, make demands on the learner's attention and distract energy from the tasks (maladaptive pattern).

Sarason et al. (1986) have attempted to empirically measure cognitive interference (the tendency to have intrusive thoughts) and to examine the relationship with various types of instructional conditions. The Thought Occurrence Questionnaire (TOQ) was designed to measure the general tendency to misappropriate attention to off-task

thoughts. Results from studies using the TOQ suggest that people who say they generally experience cognitive interference report higher interference on demanding tasks than do people who describe themselves as not having interference in their daily life. It is further reported that when an additional stressor was included, the performance of those students who experience high cognitive interference, deteriorates even more.

In subsequent studies, Sarason et al. (1986) report that subjects who scored high on the TOQ (tendency to have intrusive thoughts) performed best under the condition of task oriented instructions, whereas low scoring students (tendency to have non-intrusive thoughts) did best under neutral conditions ($F(2,93) = 3.19, p < .05$). This suggests that students with high TOQ scores (tendency to have cognitive interference) can perform better if their attention is focused to the task away from distracting factors. Cognitive interference assessment can provide useful information to the learner and teacher about individual differences of self-regulation that can lead to adaptive or maladaptive achievement behavior.

In summary, it appears that one potential mediating process that has an influence on achievement is cognitive interference. Depending on a learner's tendency to have intrusive or non-intrusive thoughts, he or she will manifest an adaptive or maladaptive behavior pattern of achievement. Students who tend to have intrusive thoughts that interfere with achievement can improve their performance if instructions

related to the task are explicit; directing the students' attention to the task at hand (Sarason et al., 1986).

The selective review of the literature related to self-regulatory behavior reported in the subsection above, indicates that individual differences of learners, in particular self-regulatory behaviors of causal attribution and cognitive style, influence the achievement performance of learners. A better understanding of the whole student is possible as students and teachers are provided with information about individual differences. Continued collaborative efforts among researchers in diverse fields (instructional psychology, social psychology, differential psychology) provides an improved knowledge base that has the potential to develop educational environments that allow for optimal achievement.

Models of Reading Comprehension

Although there is no unified theory of reading at the present time, reading skills are being reconceptualized. Traditional models emphasized teaching decoding skills to students in order to recognize individual words and then combine these words into sentences. Comprehension was assumed to automatically follow (Orasanu & Penney, 1986). Today the emerging model of comprehension defines reading as a more active process in which the reader constructs meaning and monitors their own state of understanding (Farr, Carey, & Tone, 1986). Comprehension is viewed as the purpose of reading. In order to glean meaning from the author's words, the student must acquire multiple strategies

that will not only utilize the written words of the text but will relate this information to previously acquired knowledge (Orasanu & Penney, 1986). Virtually all contemporary models of reading comprehension characterize reading as a process of coherence building. In this process the new information is linked to knowledge already in place and new connections are formed between the knowledge elements (Resnick, 1984).

Metacognition plays a particularly important role in reading. It is reported that successful readers plan their strategies, monitor their understanding of the text, and accordingly adjust their efforts (Brown, Armbruster, & Baker, 1986). A student must be aware of his failure of understanding in order to take corrective action. One must "know what it is you know and what it is you need to know" (p.8) (Chipman & Segal, 1985). Paris and Lipson (cited in Wilson & Anderson, 1986) report that training students in metacognitive problem solving strategies that use a high degree of involvement in the learning task has a strong facilitative effect on reading comprehension. This effect has been reported to be durable even after a year.

Wilson and Anderson (1986) suggest that comprehension can also be improved if students are given direct instruction in techniques that actively involve students in reasoning. Direct instruction is defined by Resnick (1984) as any attempt to intervene in learning so that the outcome of the learner's process will be a particular form of knowledge or skill. Direct instruction may help the individual to focus on

knowledge that is relevant for the task at hand or set up the process for the student to discover new expert forms of knowledge.

Questions are widely used to assess reading comprehension. In a study conducted by Davey and McBride (1986), they explored the effects of training in question generation on comprehension question performance. The reported results of the study indicated that the training was significant ($F(8,226) = 9.19, p < .05$). From these results, they concluded that effective question generation involves the reader in active comprehension, a deeper processing of the text. Furthermore, the skill familiarizes students with the demands of answering questions and promotes a self-awareness of comprehension adequacy (a metacognitive feature).

A review of literature in reading education suggests that monitoring and modeling of comprehension is not a new idea but has been a recurrent theme since the 1950's (Brown, Palincsar, & Armbruster, 1986). However, up to this point, the instructional models have not considered the learner to be an active participant. The conceptual shift in reading comprehension leads to a changed student-teacher relationship along with different instructional approaches (Farr, Carey, & Tone, 1986). In summary, it appears that most reading experts believe that comprehension is the key to successful reading skills and that comprehension is best taught through interactive teaching models that include self-regulation.

Recapitulation

In the selective review of the literature presented here, an attempt was made to highlight the notion that instructional models need to include more than just the cognitive learning component. An overall general improvement in instruction reportedly requires looking at the student as a complete person (Snow & Farr, 1987).

Reciprocal teaching is one potential interactive instructional method, with a focus on the Vygotskian principles of cooperative learning environments and interpersonal relations, that can be used as a framework within which to integrate cognitive (reading comprehension strategies), conative (causal attribution), and affective (cognitive style) variables with achievement.

Reciprocal teaching employs the techniques of expert scaffolding, guided practice with concrete strategies, and cooperative learning discussions. The results of the research studies utilizing the reciprocal teaching method of instruction indicate that the procedure improves reading comprehension-fostering and comprehension-monitoring skills. These improvements, reportedly have been found to be durable over time. Furthermore, student improvement generalized to classes in other content areas (social studies, science). Furthermore, reciprocal teaching has been found to be successful in natural settings, conducted by regular teachers, under less than ideal circumstances (Brown & Palincsar, 1982; 1986).

Many investigators have reported that individual difference variables (causal attribution, cognitive style) influence optimal achievement. Two potential mediating variables that may be linked to instruction are: Causal attribution (goal orientation) and cognitive style (thought interference). Adaptive or maladaptive self-regulatory behaviors may develop depending on the tendencies of the individual learner.

Causal attribution (in particular, goal orientation) may be measured by a student's perception of smartness. If a student believes that intelligence is fixed, he or she will tend to approach tasks with a performance goal orientation, interpreting outcomes in terms of ability. In contrast, students who believe intelligence can be improved, tend to approach tasks with a learning goal orientation, interpreting outcomes in terms of effort. Therefore, a student's perception of the relationship between effort and ability can lead to the development of an adaptive (learning goal) or maladaptive (performance goal) behavior pattern (Dweck, 1986; Leggett 1985; 1986).

Cognitive style (in particular, thought interference) as measured by the tendency to have intrusive or non-intrusive thoughts may lead to adaptive or maladaptive behavior patterns of self-regulation. Those learners, who have a tendency for intrusive thoughts, reportedly direct their attention away from demanding tasks (maladaptive), while learners with non-intrusive thoughts reportedly attend to the task at hand

(adaptive). However, improvement in performance can occur for students with maladaptive regulation when instructions are task oriented (Sarason et al., 1987).

That said, reciprocal teaching appears to be one interactive instructional model that has considerable potential for facilitating the development of optimal achievement in reading comprehension skills, while at the same time successfully accounting for and adjusting for the individual differences among learners with respect to their self-regulatory behaviors (in particular; causal attribution and cognitive style). The overall instructional model related to the present investigation is presented in Table 1.

Table 1

A Vygotskian Based Instructional Model

 Cooperative social learning environment with expert scaffolding

Fostering activities

Monitoring activities

Skill & awareness trainingSelf-control training

Cognitive

Conative

Affective

Specific strategiesCausal attributionCognitive style

Reading comprehension

Goal orientation

Cognitive interference

1. summarizing

1. adaptive behavior
pattern1. adaptive behavior
pattern2. question
generationincremental theory
of intelligencenon-intrusive
thoughts

3. predicting

learning goal
orientation2. maladaptive
behavior pattern

4. clarifying

2. maladaptive behavior
patternintrusive
thoughtsfixed theory of
intelligenceperformance goal
orientation

CHAPTER III

METHOD

Hypotheses

The following null hypotheses were tested:

1. There will be no significant difference in achievement scores (comprehension passages, question generation tasks, summary tasks, Gates vocabulary, Gates comprehension) across methods of instruction (reciprocal teaching, modeling only, control) over time.

2. There will be no significant difference in achievement scores (comprehension passages, question generation tasks, summary tasks, Gates vocabulary, Gates comprehension) across dimensions of causal attribution (learning goal orientation, performance goal orientation) over time.

3. There will be no significant difference in achievement scores (comprehension passages, question generation tasks, summary tasks, Gates vocabulary, Gates comprehension) across cognitive style (tendency to have intrusive or non-intrusive thoughts) over time.

4. There will be no significant difference in achievement scores (comprehension passages, question generation tasks, summary tasks,

Gates vocabulary, Gates comprehension) across phases of the investigation (treatment, maintenance).

5. There will be no significant interaction effects on achievement measures among methods of instruction (3), causal attribution (2), cognitive style (2), and phases of the investigation (5).

Subjects

The subjects in this study were 46 freshmen high school students enrolled in three intact English Plus classes of a suburban school district comprised largely of lower middle class families. The students enrolled in these English Plus classes were considered to be poor comprehenders but adequate decoders. On the average, all students performed at least 2 years below grade level in reading comprehension as determined by standardized test scores and/or eighth grade teacher recommendation.

Sixteen students served as subjects in the reciprocal teaching group (group 1). The modeling only group (group 2) included twenty students and the control group (group 3) included ten students. One of the students from the control group was dropped from the study before the follow-up phase of the investigation due to excessive absences. The composition of the classes was similar with respect to race and sex. It should be noted that the majority of students were enrolled in the Chapter 1 remedial program.

Procedure

Phase 1: Pretesting

A general description of the study was presented to the students and questions regarding grades and the conditions of participation were systematically addressed. In September 1987, prior to the initiation of the study, the investigator administered the following measures to all students:

Gates-MacGinitie Reading Tests

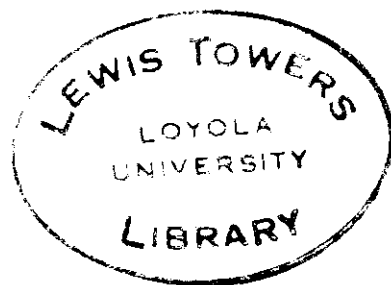
Leggett/Dweck Intelligence Scale

Passages with Questions

Question Generation Tasks

Summary Tasks

Thought Occurrence Questionnaire



The data was collected over a period of five days.

Phases 2 & 3: Intervention

After the baseline data was collected, the 3 intact classes were assigned to either the reciprocal teaching condition (group 1), modeling only condition (group 2), or control condition (group 3). Instruction was done on a daily basis for approximately 20 consecutive school days. Furthermore, it should be noted, that the investigator served as the teacher for the intervention phases. The daily teaching sessions lasted thirty minutes. At the completion of the instruction, assessment passages with 10 comprehension questions were distributed to the groups. The students read each passage silently but were permitted to request assistance with unfamiliar vocabulary. Questions were

completed from recall. Upon completion of the task, scores and graphs depicting daily percentage correct were made available to all students.

Reciprocal Teaching Treatment Condition (Group 1)

On the first day, a general discussion took place related to why it is sometimes difficult to comprehend written material. The four strategies of summarizing, questioning, clarifying, and predicting were explained. Each strategy was introduced and modeled. Student worksheets (See Appendix A) were examined to assess student understanding of the tasks. The presentation of the strategies format was taken directly from the scripts used by Palincsar (unpublished manuscript, 1986).

Each day a new passage was systematically introduced. A segment of text was assigned to be read silently. Initially, after the reading, the investigator modeled the appropriate activity and encouraged the students to participate. It is important to note that, the procedure was modified for the large group (i.e. group 1) whereby the adult and student read passages silently and wrote down questions, summary statements, or predictions in preparation for group discussion. An attempt was made to clarify any difficulties. The group discussed responses until a consensus on the best response was reached. At the beginning of each session, the investigator modeled the appropriate activity and gradually the students assumed the role of the expert. The adult provided guidance and feedback necessary for the student expert to successfully complete the activities.

Throughout the treatment, the students were explicitly told that these instructional strategies could be used anytime while reading. At the end of every session the assessment passage and questions were completed and evaluated by an experienced teacher.

Modeling Only Treatment Condition (Group 2)

Students in this group were treated the same as those students in the reciprocal teaching group, in that they were exposed to the four strategies of summarizing, questioning, clarifying, and predicting. However, during training, after reading the assigned segment of text, these students merely observed the investigator modeling the strategies. They did not actively participate in assuming the role of the expert. Instead, the students simply responded to questions posed by the adult expert. Daily assessment passages were completed and evaluated in the same manner as in the reciprocal teaching treatment condition.

Control Treatment Condition (Group 3)

Students in this group used the same materials (training passages and assessment passages) as the reciprocal teaching group and the modeling only group. However, unlike the reciprocal teaching group and the modeling only group, subjects in the control group were not exposed to the four strategies of summarizing, question generation, predicting, and clarifying.

A more traditional approach, utilizing paper-pencil tasks, was used for instruction on the training passages. These tasks were taken

from the district curriculum (i.e. elements of a short story, spelling, writing paragraphs). Daily comprehension assessments were completed and evaluated in the same manner as the reciprocal teaching treatment group and the modeling only treatment group.

Phase 4: Maintenance

At the completion of the twenty days of intervention all the students entered a maintenance phase lasting five days. In November 1987, they completed the following:

Passages with Questions

Question Generation Tasks

Summary Tasks

Phase 5: Posttesting

In January 1988, after a period of ten weeks, the following measures were administered to all students:

Gates-MacGinitie Reading Tests

Leggett/Dweck Intelligence Scale

Passages with Questions

Thought Occurrence Questionnaire

It should be noted that, the time period between the completion of intervention and follow-up was extended by two additional weeks because of Christmas vacation.

Preparation of Reading Materials

A total of 10 training passages of approximately 1500 words in length were selected from the school district curriculum materials

pool: Stories That Live (Cutlip, 1973); Stories of Surprise and Wonder (Potter, 1979); A Matter for Judgment, Stories of Moral Conflict (Spielgler & Goodman, 1985); Action Stories of Yesterday and Today (Cutlip, 1971); and American Biographies (Christ, 1987). The passages included a wide range of topics, for example: greed, capital punishment, Eskimo culture, and environmental issues. The passages conformed to a sixth-seventh grade reading level according to the Fry Readability Formula (See Appendix B for details).

A total of 40 shorter assessment passages were selected from additional materials: Reading Comprehension in Varied Subject Matter (Ervin, 1985); Serendipity (Durr, Pescosolido, & Poetter, 1974); Ventures-New Directions in Reading (Stanchfield & Gunning, 1986). The passages included a range of topics: lightning, Hinduism, reptiles, the origins of Halloween, volcanoes, computers, Indians, and sports. The passages were written at a sixth-seventh grade reading level according to the Fry formula and ranged in length from 450-500 words (Refer to Appendix C for an example).

Ten comprehension questions per passage were constructed using the Pearson and Johnson (1978) classification of question type. The ten questions included:

1. four text explicit questions-answer is explicitly mentioned in text;
2. four text implicit questions-answer is inferred by integrating information presented in text;

3. two script implicit questions-answer is inferred by relating text to prior knowledge concerning the topic.

Two independent raters (experienced reading teachers) agreed upon the classification of questions and level of difficulty (easy, moderate, difficult). Eight questions were reworked until agreement was reached across raters.

In addition to the passages, student worksheets for the activities of summarizing, questioning, clarifying, and predicting as well as directions regarding the daily procedures of strategy training were obtained from Palincsar (unpublished manuscript, 1986).

Instrumentation

Gates-MacGinitie Reading Tests-Level E3 (MacGinitie, Kamons, Kowalski, MacGinitie, & MacKay, 1978)

The test consists of two subtests; vocabulary and comprehension. The subtests consist of 45 and 43 items respectively. The vocabulary subtest samples the student's vocabulary. It is a test of word knowledge rather than a test of decoding. The comprehension subtest measures student's ability to read complete prose passages with understanding. The tests were standardized on approximately 5,500 students obtained from a stratified sample based on the US Census data. Alternate-forms and Kuder-Richardson Formula 20 reliability coefficients were computed by MacGinitie et al (1978) for each test level. The Kuder-Richardson coefficient for vocabulary ranged from .90 to .95, while the range for comprehension was .88 to .94.

Leggett/Dweck Intelligence Scale (1985) (See Appendix D)

This scale was developed to measure an individual's belief about his own effort/ability relationship. The questionnaire measure consists of 10 forced-choice items. Each item includes two contrasting statements, one representing the idea that intelligence is changeable and the other idea that intelligence is fixed. Each student receives a cumulative score of 0-10 with the higher score representing the incremental position.

Reliability analysis of the theory of intelligence scale was moderately high, Cronbach $\alpha = .79$. Recent research data compiled by Leggett (1985; 1986) and Dweck (1987) suggest that this scale is a valid measure of the construct: children's effort/ability inference rule. Furthermore, these rules are reported to be significant predictors of causal attribution and achievement patterns.

Question Generation Task

In order to assess the students' independent ability to generate questions, criterion-referenced measures were selected in a manner similar to the work of Brown and Palincsar (Brown & Palincsar, 1982; 1986; Palincsar & Brown, 1984). Passages of approximately 500 words were used for the task. The students were asked to write ten questions a teacher might ask if he or she were testing the students on the material in the passage. They were told not to ask true/false or fill in the blank questions. The students' questions were rated in the following manner:

Main idea question	2 points
Detail question	1 point
Paraphrased	1 point
Directly lifted from text	0 points
Question which rater would ask	1 point
Quality of question	1-5 points
	poor to excellent

Points were added to obtain a total score (See Appendix E).

Summary Task

In order to measure students' independent ability to summarize, criterion-referenced measures were selected in a manner similar to the work of Palincsar and Brown (1984). Expository stories of 500 words were used for the students to demonstrate their skills in summarization. The texts, obtained from Day, (Brown, Day, & Jones, 1983) were constructed so that the student could apply each rule at least three but never more than five times on any given text (Brown & Day, 1983). The students' summaries were rated on the rules in the following manner:

Select topic sentence-very important	2 points
Select topic sentence-important	1 point
Invent topic sentence-very important	2 points
Invent topic sentence-important	1 point
Cross out lists	1 point
Name lists	1 point

Delete trivial sentence 1 point

Delete redundant sentence 1 point

Points were added to obtain a total score (See Appendix F).

Thought Occurrence Questionnaire (TOQ) (Sarason et al., 1986)

(See Appendix G).

The TOQ was designed to measure the tendency to misappropriate attention to off-task thoughts. The TOQ consists of 28 items. The range of scores for each item is 0 to 4, the maximum score is 112. Each student receives a cumulative score of 0-112, with the higher score representing the tendency to experience intrusive thoughts.

The 28 items of the TOQ were factor analyzed by Sarason et al. (1986) and yielded 3 significant factors: thoughts of social relations and emotions unrelated to task, thoughts of escape from task, and task relevant worries. All items loaded greater than .50 except Item 7 (.40) and Item 9 (.44). Cronbach α for the total test was .93 while test-retest reliability was .81.

Description of Pilot Study

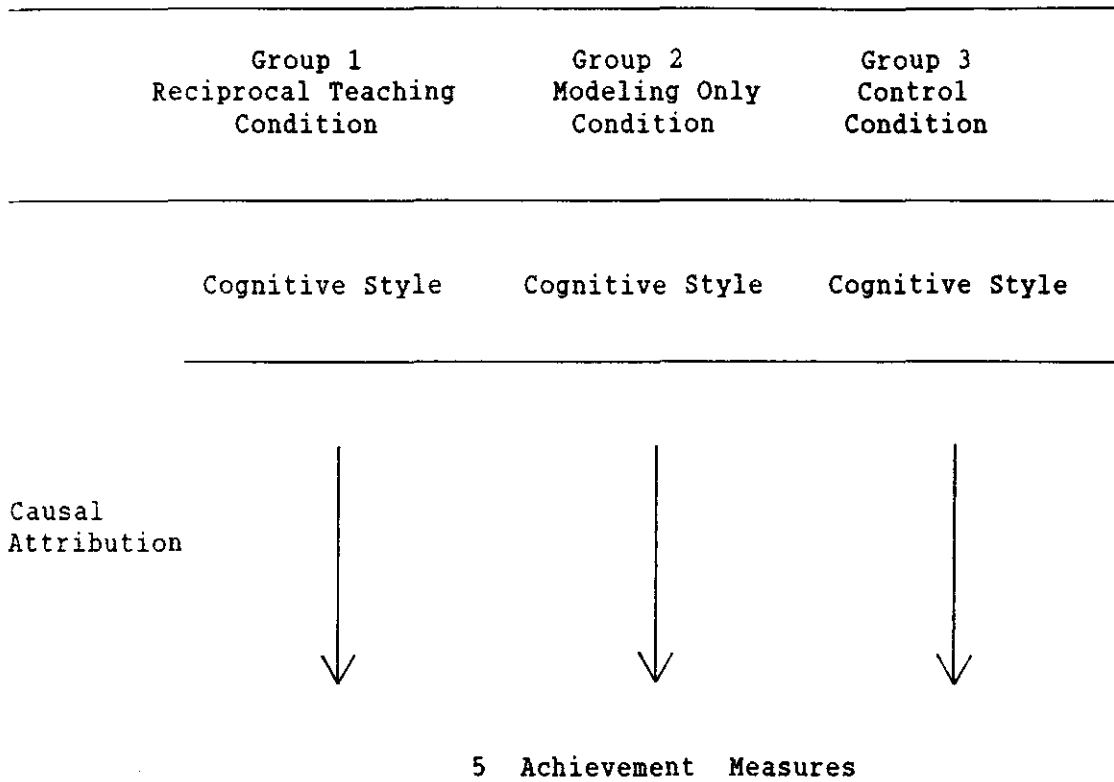
A pilot study was conducted in May 1986, with nine seventh grade students. These students were considered to be poor reading comprehenders and were receiving remedial services. The basic pilot procedure employed an adult expert (the teacher) who modeled the activities of predicting, questioning, summarizing, and clarifying after silently reading an assigned passage. Gradually the students were instructed to assume the role of expert. At first the students appeared to be

reluctant to engage in these activities but with teacher encouragement and continual feedback, the students became active and willing participants. At the completion of each pilot session, the students were given a passage to read independently and ten comprehension questions to respond to from memory.

The students responded to the tasks as expected with the exception of one of the instruments, the Embedded Figures Test (EFT). The EFT had been included in the pilot to assess cognitive style. However, instead of helping to establish rapport with the students, the administration of the instrument appeared to have the reverse effect. The majority of the students appeared anxious about their performance and refused to complete the EFT task. Given the difficulties encountered with the EFT in the pilot study, the Thought Occurrence Questionnaire was used as a replacement to assess cognitive style in the regular investigation.

Design and Statistical Analysis

The overall analytic paradigm related to the investigation is presented below:



Independent Variables

Group

1. Reciprocal teaching condition (group 1)
2. Modeling only condition (group 2)
3. Control condition (group 3)

Causal Attribution (measured by Leggett/Dweck Intelligence Scale)

1. Incremental theory of intelligence/learning goal oriented
2. Fixed theory of intelligence/performance goal oriented

Cognitive Style (measured by Thought Occurrence Questionnaire)

1. Intrusive thoughts
2. Non-intrusive thoughts

Phase

1. Pretest (baseline)
2. Intervention (training first ten days)
3. Intervention (training second ten days)
4. Maintenance (week following intervention)
5. Posttest (10 weeks after completion of intervention)

Dependent Variables

Achievement	Phase
1. Passages	1,2,3,4,5 (criterion-referenced measure)
2. Summary Task	1,4 (criterion-referenced measure)
3. Question generation	1,4 (criterion-referenced measure)
4. Gates-vocabulary	1,5 (standardized instrument)
5. Gates-comprehension	1,5 (standardized instrument)

To test the first null hypothesis, a repeated measures procedure was run on the dependent variables, (consisting of the 5 measures of achievement over time), with the independent variable being method of instruction.

Hypothesis 2 was tested by using a repeated measures procedure run on the dependent variables (consisting of the 5 measures of achievement over time), with the independent variable consisting of the causal attribution measure (Leggett/Dweck Intelligence Scale).

The third null hypothesis was tested by using a repeated measures procedure run on the 5 dependent measures of achievement over time, with the independent variable being the cognitive style measure (Thought Occurrence Questionnaire).

To test the fourth null hypothesis, the repeated measures results related to the 5 achievement measures across the 5 phases of the investigation were examined to ascertain significance of interrelationships among the measures.

Finally, a repeated measures procedure was run to test the fifth null hypothesis. An overall repeated measures procedure was run on the 5 achievement measures across the 4 independent variables (method of instruction, cognitive style, causal attribution, and phase of the investigation).

CHAPTER IV

RESULTS

This study was designed to investigate the effects of different methods of instruction, causal attribution, and cognitive style on achievement over time. The purpose was to determine whether the reciprocal teaching method of instruction would improve achievement as effectively as modeling only, or a control group condition. In addition, the influence of individual differences on achievement was systematically explored.

The dependent variables used in this study were 5 measures of achievement over time. They were passage comprehension (measured at phases 1,2,3,4,5), question generation tasks (measured at phases 1,4), summary tasks (measured at phases 1,4), Gates-MacGinitie vocabulary subtest (measured at phases 1,5), and Gates-MacGinitie comprehension subtest (measured at phases 1,5). Percentage scores were used for the passage comprehension variable, raw scores were used for question generation and summary tasks, and standard scores were used for the Gates-MacGinitie subtests. The means, standard deviations, and sample sizes for the experimental and the control groups are presented in Tables 2-4.

Table 2

Means, Standard Deviations, and Sample Sizes of PassageComprehension Scores

Group	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
	Pretest	Tenth Day	Twentieth Day	Maintenance	Delayed Post
1	$\bar{X} = 54.25$ SD = 14.33 N = 16	61.25 19.95 16	66.87 18.15 16	63.91 16.56 16	63.12 24.41 16
2	$\bar{X} = 58.00$ SD = 11.535 N = 20	70.00 16.54 20	62.00 22.61 20	63.81 11.51 20	63.00 18.09 20
3	$\bar{X} = 64.70$ SD = 7.11 N = 10	64.00 16.46 10	57.00 21.10 10	55.82 17.30 10	55.55 17.40 9
Total	$\bar{X} = 58.15$ SD = 12.23 N = 46	65.65 17.84 46	62.60 20.70 46	62.11 14.78 46	61.55 20.22 45

Group 1 = Reciprocal teaching

Group 2 = Modeling only

Group 3 = Control

Table 3

Means, Standard Deviations, and Sample Sizes of Question Generation and Summary Tasks Scores

Group	Phase 1		Phase 4	
	QG Pretest	QG Maintenance	Sum Pretest	Sum Maintenance
1	$\bar{X} = 27.31$ SD = 9.48 N = 16	41.96 6.34 16	11.15 3.28 16	11.87 3.42 16
2	$\bar{X} = 27.27$ SD = 11.82 N = 20	31.62 10.19 20	11.90 2.95 20	11.55 4.70 20
3	$\bar{X} = 26.90$ SD = 11.74 N = 10	26.10 8.78 10	12.65 3.72 10	10.65 4.24 10
Total	$\bar{X} = 27.20$ SD = 10.80 N = 46	34.02 10.56 46	11.80 3.21 46	11.46 4.13 46

Group 1 = Reciprocal teaching

Group 2 = Modeling only

Group 3 = Control

QG = Question generation tasks

Sum = Summary tasks

Table 4

Means, Standard Deviations, and Sample Sizes of Gates-MacGinitieTests Scores

Group		Phase 1	Phase 5	Phase 1	Phase 5
		GV Pretest	GV Delayed Post	GC Pretest	GC Delayed Post
1	$\bar{X} =$	34.68	32.12	29.25	30.37
	SD =	10.28	11.34	10.10	10.96
	N =	16	16	16	16
2	$\bar{X} =$	35.80	32.55	32.85	31.25
	SD =	11.43	6.70	15.12	12.26
	N =	20	20	20	20
3	$\bar{X} =$	33.60	32.88	33.80	28.00
	SD =	16.90	12.25	5.73	10.79
	N =	10	9	10	9
Total	$\bar{X} =$	34.93	32.46	31.80	30.28
	SD =	12.18	9.52	11.87	11.34
	N =	46	45	46	45

Group 1 = Reciprocal teaching

Group 2 = Modeling only

Group 3 = Control

GV = Gates vocabulary

GC = Gates comprehension

The independent variables used in this study were method of instruction [reciprocal teaching group (1), modeling only group (2), control group (3)], causal attribution [performance goal orientation (F), learning goal orientation (I)], cognitive style [intrusive thoughts (I), non-intrusive thoughts (N)], and phase of investigation (1,2,3,4,5). The frequency distribution of causal attribution and cognitive style are presented in Tables 5 and 6. A complete summary of all the dependent and independent variables used in this study is presented in Appendix H.

Table 5

Frequency Distribution of the Relationship Between Causal Attribution and Group

	Group 1		Group 2		Group 3		Total	
	Pre-test	Delayed Post	Pre-test	Delayed Post	Pre-test	Delayed Post	Pre-test	Delayed Post
F	2	1	2	6	2	2	6	9
I	14	15	18	14	8	7	40	36
Total	16	16	20	20	10	9	46	45

F = Fixed theory of intelligence/performance goal

I = Incremental theory of intelligence/learning goal

Table 6

Frequency Distribution of the Relationship Between Cognitive Style and Group

	Group 1		Group 2		Group 3		Total	
	Pre-test	Delayed Post	Pre-test	Delayed Post	Pre-test	Delayed Post	Pre-test	Delayed Post
N	11	11	11	9	5	5	27	25
I	5	5	9	11	5	4	19	20
Total	16	16	20	20	10	9	46	45

N = Tendency for non-intrusive thoughts

I = Tendency for intrusive thoughts

To test the first, second, and third null hypotheses, repeated measures procedures were performed on each dependent variable with the independent variables being method of instruction, causal attribution, and cognitive style respectively. To test the fourth null hypothesis, the repeated measure results related to the 5 achievement measures across time were examined and comparisons were made between different combinations of phases. Finally, an overall repeated measures procedure was run on the 5 achievement measures across the 4 independent variables.

Results Related to Testing Null Hypothesis 1

The first null hypothesis states that there is no significant

difference in achievement scores (comprehension passages, question generation tasks, summary tasks, Gates vocabulary, Gates comprehension) across methods of instruction (reciprocal teachings, modeling only, control) over time.

For the dependent achievement measure of comprehension passages (3 groups by 5 times), the groups by phase interaction was found to be significant, $F(8,78) = 2.547$, $p = 0.016$. The results indicated that there was significant variation between methods of instruction over time on passage comprehension, thus leading to the rejection of the first null hypothesis with respect to the achievement measure of passage comprehension. The results of this analysis are presented in Table 7.

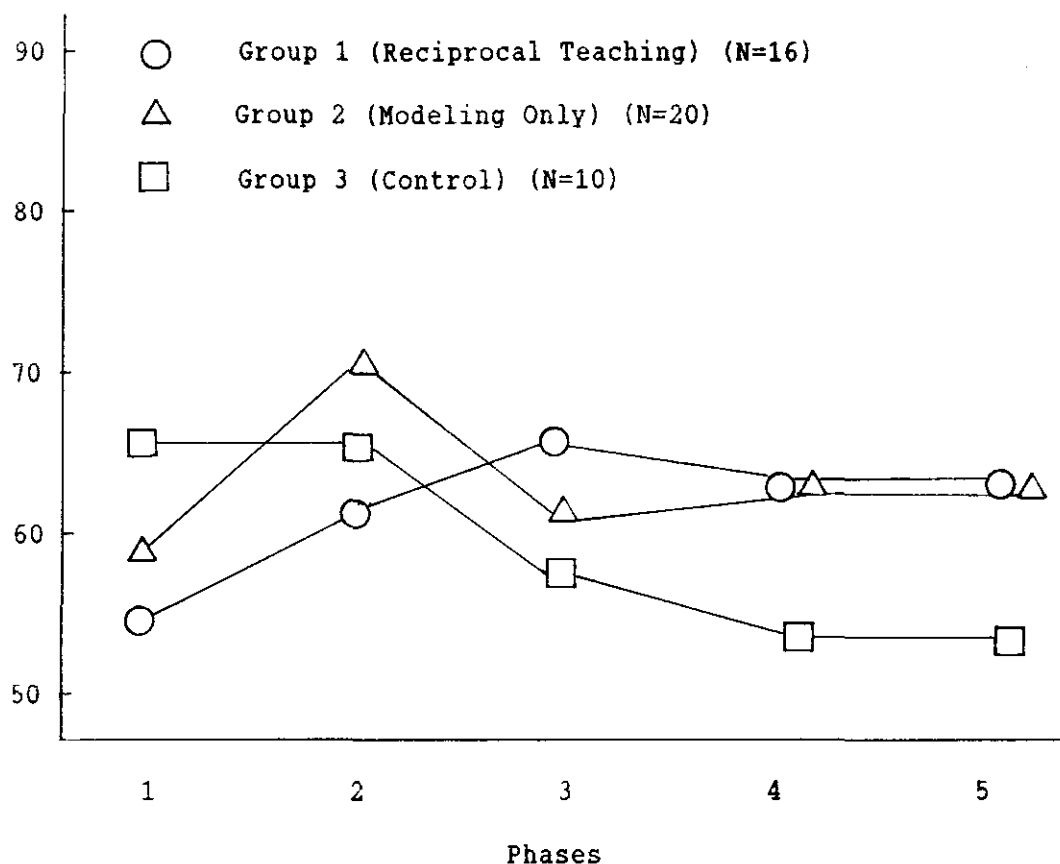
Table 7

Summary Table of Repeated Measures Analysis of Passage Comprehension by Group Model

Variable	Hypothesis df	Error df	F	P
Comprehension				
Group x Time	8	78	2.547	0.016

The comprehension passages (measured at phases 1,2,3,4,5) means for each group are shown in Figure 1.

Figure 1. A graphic presentation of phase 1 to phase 5 changes in mean score performance on the comprehension passages.



For the dependent achievement measure of question generation tasks, groups (3) by time (phases 1,4), the groups by phase interaction was found to be significant, $F(4,84) = 6.238, p = 0.001$. The results indicated that there was significant variation among methods of instruction over time on the question generation tasks, thus leading to the rejection of the first null hypothesis with respect to the achievement measure question generation tasks. The results of this analysis are presented in Table 8.

Table 8

Summary Table of Repeated Measures Analysis of Question Generation by Group Model

Variable	Hypothesis df	Error df	F	P
Question Generation				
Group x Time	4	84	6.238	0.001

On the dependent achievement measure of summary tasks, no significant interaction effect was found for groups (3) by time (phases 1,4). The results indicated that there was no variation across methods of instruction on the summary tasks, thus rejection of the null hypothesis with respect to the achievement measure summary tasks was not supported.

On the dependent achievement measure of the Gates-MacGinitie subtests of vocabulary and comprehension, no significant interaction effect for groups (3) by time (phases 1,5) was found. The results indicated that there was no variation across methods of instruction on the subtests of vocabulary and comprehension, thus the rejection of the null hypothesis with respect to the achievement measures of vocabulary and comprehension was not supported.

In summary, the findings related to testing Hypothesis 1 indicated that significant differences existed across methods of instruction over

time for two of the dependent variables (passage comprehension, question generation tasks) thus leading to the rejection of the first null hypothesis. However, the findings indicated no significant differences existed across methods of instruction over time for three of the dependent variables (summary tasks, Gates vocabulary, Gates comprehension) thus, rejection of the null hypothesis was not supported with respect to these dependent measures.

Results Related to Testing Null Hypothesis 2

The second null hypothesis states that there is no significant difference in achievement scores (comprehension passages, question generation tasks, summary tasks, Gates vocabulary, Gates comprehension) across causal attribution measures (learning goal orientation, performance goal orientation) over time.

For the five dependent achievement measures, the results indicated that there were no significant interactions among the causal attribution measures over time. Thus, rejection of the second null hypothesis was not supported.

Results Related to Testing Null Hypothesis 3

The third null hypothesis states that there is no significant difference in achievement scores (comprehension passages, question generation tasks, summary tasks, Gates vocabulary, Gates comprehension) across cognitive styles (tendency to have intrusive or non-intrusive thoughts) over time.

The results indicated that for the five dependent achievement

measures over time, there was no significant interaction among the cognitive style measures over time. Thus, rejection of the third null hypothesis was not supported.

Results Related to Testing Null Hypothesis 4

The fourth null hypothesis states that there is no significant difference in achievement scores (comprehension passages, question generation tasks, summary tasks, Gates vocabulary, Gates comprehension) across phases of the investigation (treatment 1,2,3; maintenance 3,4,5).

For the dependent achievement measure of comprehension passages, groups (3) by time (phases 1,2,3), the groups by phase interaction was found to be significant, $F(4,84) = 2.797$, $p = 0.031$. The results indicated that there was significant variation among groups over the treatment phase (1,2,3) of the investigation. Thus, the fourth null hypothesis with respect to the achievement measure of comprehension passages was rejected. The results of this analysis are presented in Table 9.

For the dependent achievement measure of comprehension passages, groups (3) by time (phases 1,2), the groups by phase interaction was not found to be significant. The results indicated that there was no significant variation among groups over the first ten days of the treatment. Thus, it was not possible to reject the fourth null hypothesis with respect to the achievement measure of comprehension passages. However, it is important to note that the probability of

significant differences ($p = 0.083$) closely approximates the .05 level of significance. The results of this analysis are presented in Table 10.

Table 9

Summary Table of Repeated Measures Analysis of Passage Comprehension for Group by Time (phases 1,2,3) Model

Variable	Hypothesis df	Error df	F	P
Comprehension				
Group x Time	4	84	2.797	0.031

Table 10

Summary Table of Repeated Measures Analysis of Passage Comprehension for Group by Time (phases 1,2) Model

Variable	Hypothesis df	Error df	F	P
Comprehension				
Group x Time	4	84	2.136	0.083

Table 11 shows that for the dependent achievement measure of comprehension passages, groups (3) by time (phases 2,3), the groups by

phase interaction was not found to be significant. The results indicated that there was no significant variation among groups over the second ten days of treatment. Thus, it was not possible to reject the fourth null hypothesis with respect to the achievement measure of passage comprehension.

Table 11

Summary Table of Repeated Measures Analysis of Passage Comprehension for Group by Time (phases 2,3) Model

Variable	Hypothesis df	Error df	F	P
Comprehension				
Group x Time	4	84	1.276	0.286

For the dependent achievement measure of comprehension passages, groups (3) by time (phases 3,4,5), the groups by phase interaction was found to be not significant. The results indicated that there was no significant variation among groups over the maintenance phase (3,4,5) of the investigation. Thus, as anticipated, it was not possible to reject the null hypothesis with respect to the achievement measure comprehension passages. The results of this analysis are presented in Table 12.

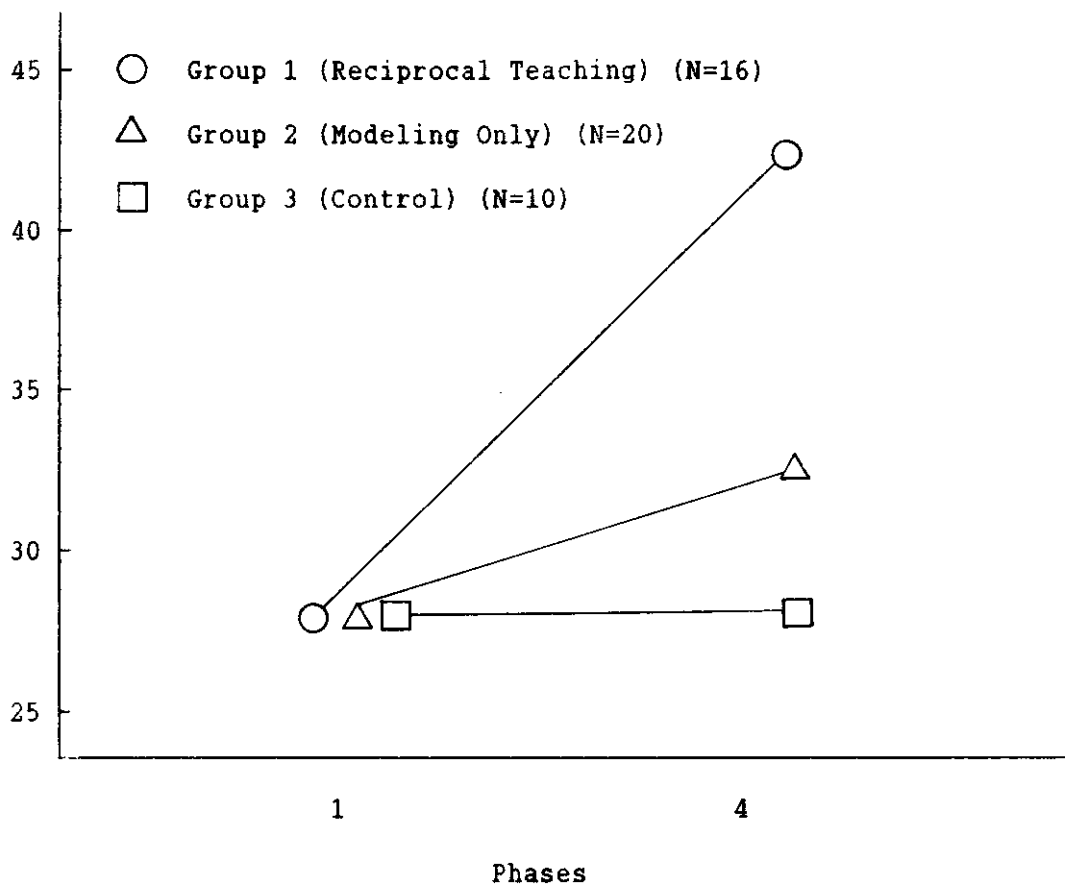
Table 12

Summary Table of Repeated Measures Analysis of Passage Comprehension for Group by Time (phases 3,4,5) Model

Variable	Hypothesis df	Error df	F	P
Comprehension				
Group x Time	4	82	0.135	0.969

Significant differences were found in the dependent achievement measure of question generation tasks across groups (3) over time (phases 1,4). These differences are presented in Table 8 ($F(4,84) = 6.238, p = 0.001$). These results indicate that significant variations in achievement scores existed between the phases of pretest and maintenance. Thus, rejection of the null hypothesis with respect to the achievement measure of question generation tasks is supported here. The question generation tasks (measured at phases 1,4) means for each group are presented graphically in Figure 2.

Figure 2. A graphic presentation of phase 1 to phase 4 changes in mean score performance on the question generation tasks.



For the dependent achievement measures of summary tasks (phases 1, 4), Gates vocabulary, and Gates comprehension, (phases 1,5), there were no significant differences found over phases. The results indicated that no significant variation in achievement scores existed between the time interval of pretest (1) and maintenance (4) on the summary tasks, and pretest (1) and delayed post (5) on the Gates subtests. Thus, the fourth null hypothesis was not rejected.

In summary, for the dependent measure of achievement (passage comprehension), it was possible to reject the fourth null hypothesis for the treatment phase of the investigation (1,2,3). However, it was not possible to reject the fourth null hypothesis for the first half of treatment (phases 1,2) or for the second half of treatment (phases 2,3). As anticipated, it was not possible to reject the fourth null hypothesis for the maintenance phase of the investigation (phases 3,4,5). For the dependent measure of achievement (question generation) it was possible to reject the fourth null hypothesis because there were significant variations on achievement scores between the phases of pretest (1) and maintenance (4). For the 3 dependent measures of achievement (summary tasks, Gates vocabulary, Gates comprehension) there were no significant differences across phases. Therefore, it was not possible to reject the fourth null hypothesis with respect to these dependent measures.

Results Relating to Testing Null Hypothesis 5

The fifth null hypothesis states that there is no significant interaction effects among the achievement measures across methods of instruction (3), causal attribution (2), cognitive style (2), over phases of the investigation (5). The total model of interaction among the three independent variables across time on the 5 dependent achievement variables could not be computed because of insufficient sample sizes within certain cells.

There was a significant interaction among groups (methods of instruction), cognitive style, and time (phases 1,2,3,4,5), on the dependent achievement measure of comprehension passages, ($F(8,64) = 2.167, p = 0.042$). The results indicated that a significant interaction among groups, achievement, and cognitive style existed and thus led to the rejection of the fifth null hypothesis with respect to the dependent measure of comprehension passages.

There was a significant interaction among groups (methods of instruction), causal attribution, and time (phases 1,4) on the dependent achievement measure of question generation, ($F(4,70) = 2.483, p = 0.051$). Thus, with respect to the achievement measure of question generation, hypothesis five was also rejected.

For the other 3 dependent measures of achievement (summary tasks, Gates vocabulary, Gates comprehension), no significant interaction effects among the independent variables methods of instruction, cognitive style, causal attribution, and time. Thus the data analysis does not support the rejection of null hypothesis five, with respect to these dependent measures.

In summary, it was possible to reject the fifth null hypothesis for the interaction among methods of instruction, cognitive style, and time on the dependent achievement measure of comprehension passages and for the interaction among methods of instruction, causal attribution, and time on the dependent achievement measure of question generation. There was no support offered here leading to the rejection of the fifth

null hypothesis for interaction among any of the 3 remaining dependent measures (summary tasks, Gates vocabulary, Gates comprehension).

Overall, there were significant differences found among methods of instruction over time for the dependent variables of passage comprehension and question generation. There were no significant differences found among causal attribution or cognitive style measures over time on the 5 dependent variables of achievement. However, there were significant interactions found across methods of instruction and the cognitive style measure over time on the dependent variable of passage comprehension and among methods of instruction and causal attribution over time on the dependent variable of question generation.

Post Hoc Tests

A number of post hoc tests were performed in order to examine the different interrelationships among methods of instruction over time. In particular; tests for contrasts between group 1 (reciprocal teaching) and group 2 (modeling only); group 1 (reciprocal teaching) and group 3 (control); and group 2 (modeling only) and group 3 (control) for passage comprehension and question generation were performed.

To determine differential treatment effects across methods of instruction, canonical correlation coefficients were examined. It should be noted that the canonical correlation coefficient squared (R_c^2) is similar to the (R^2) value commonly used in multiple regression analysis.

Table 13 shows the results of the analysis of paired group contrasts for passage comprehension over time (phases 1,2,3,4,5). It is interesting to note that the R_c^2 for group 1 (reciprocal teaching) and 3 (control) comparison was .336; the group 2 (modeling only) and 3 (control) comparison R_c^2 was .227. This indicated that the amount of variance in the dependent measure accounted for by differences in the method of instruction was 34% for the group 1 and 3 contrast and 23% for the group 2 and 3 contrast.

Table 13

Post Hoc Contrast Analysis Procedure of Passage Comprehension for Group by Time (phases 1,2,3,4,5) Model

Variable	R_c	R_c^2	Hypothesis df	Error df	F	P
Comprehension						
Groups 1 & 2	.363	.131	5	38	1.152	0.350
Groups 1 & 3	.580	.336	5	38	3.858	0.006
Groups 2 & 3	.477	.227	5	38	2.241	0.070

Table 14 shows the results of the analysis of paired group contrasts for the treatment phases of the investigation (1,2,3) on the dependent variable of passage comprehension. It is particularly interesting to note that the R_c^2 for group 1 and 3 was .212; accounting

for 21% of the variance in the dependent measure of achievement due to differences in method of instruction.

Table 14

Post Hoc Contrast Analysis Procedure of Passage Comprehension for Group by Time (phases 1,2,3) Model

Variable	Rc	² Rc	Hypothesis df	Error df	F	P
Comprehension						
Groups 1 & 2	.320	.102	3	41	1.554	0.215
Groups 1 & 3	.461	.212	3	41	3.698	0.019
Groups 2 & 3	.381	.145	3	41	2.316	0.090

The second dependent measure of achievement to be examined was question generation. Comparisons of group contrasts were examined for the dependent variable over time (phases 1,4). The results presented in Table 15 indicated that the R_c^2 for group 1 and 2 comparison was .272 and for group 1 and 3 comparison, the R_c^2 was .374. This indicated that a greater amount of variance in the dependent measure of question generation was accounted for by method of instruction in group 1 and 3 contrast (37%), than in group 1 and 2 contrast (27%), or group 2 and 3 contrast (07%).

Table 15

Post Hoc Contrast Analysis Procedure of Question Generation for
Group by Time (phases 1,4) Model

Variable	Rc	Rc ²	Hypothesis df	Error df	F	P
Question Generation						
Groups 1 & 2	.522	.272	2	42	7.866	0.001
Groups 1 & 3	.612	.374	2	42	12.606	0.001
Groups 2 & 3	.267	.071	2	42	1.606	0.213

In sum, post hoc comparisons of specific group contrasts over phases of the investigation indicated that more variance in achievement scores was accounted for in the group 1 (reciprocal teaching) and 3 (control) comparison, than in group 1 (reciprocal teaching) and 2 (modeling only) comparison, or the group 2 (modeling only) and 3 (control) comparison for the dependent variables of passage comprehension and question generation.

CHAPTER V

DISCUSSION

This chapter presents a discussion of the results related to testing each of the five null hypotheses. In this section, an attempt is made to integrate the findings of this study with the findings reported in Chapter II. A general discussion of the results and suggestions for future research is also presented here.

The present study was designed to test for variations in achievement across different methods of instruction (reciprocal teaching, modeling only, control) in addition to exploring the influence of selected individual differences (causal attribution; goal orientation, cognitive style; thought interference) on achievement. In particular, the study focused on the utility of using the reciprocal teaching method on reading comprehension with remedial high school students.

Discussion Related to Null Hypothesis 1

The first null hypothesis states that there is no significant difference in achievement scores (comprehension passages, question generation tasks, summary tasks, Gates vocabulary, Gates comprehension) across methods of instruction (reciprocal teaching, modeling only, control) over time.

The first dependent variable examined as a measure of achievement was passage comprehension. A repeated measures analysis indicated that there was a significant interaction effect for groups (3) by time (5) on passage comprehension. In other words, there was a significant variation in the mean scores of passage comprehension among the groups of students from the beginning of the investigation (phase 1) to the completion of the investigation (phase 5).

Examination of group means indicated that the reciprocal teaching group (group 1) began the investigation with the lowest comprehension score among the groups. As the investigation progressed, the reciprocal teaching group continued to improve until the end of the intervention (phase 3). At that phase of the investigation, the reciprocal teaching group had the highest mean passage comprehension score among the groups. Group 1 students' improved level of performance was durable, lasting to the follow-up session.

As the investigation progressed, the students in the reciprocal teaching group attempted to answer more of the questions instead of just leaving no response or reporting "I don't know." In addition to improvement in the quantitative scores on passage comprehension, there was improvement in the quality of the answers. Examples of student responses from the reciprocal teaching group are presented in Tables 16 and 17.

Table 16

Examples of Student Answers to Daily Passage Questions at Pretest

Student	Questions and Answers
1	What is one example of why White Thunder was unexpectedly frightened? because he taught he would be taken over.
2	What could our leaders today learn from the story A Panther of War? They fought and killed
3	What could our leaders today learn from the story A Panther of War? About the

Table 17

Examples of Student Answers to Daily Passage Questions after Twentieth Day of Intervention

Student	Questions and Answers
1	<p>Why do you think that a future archaeologist would like to visit Pompeii?</p> <p>because it was one of the oldest ghost towns and it might explain where they went when the volcano erupted.</p>
2	<p>What are ghost towns?</p> <p>Towns that are deserted</p>
3	<p>How did Pompeii turn into a city of stone?</p> <p>A volcano erupted and covered the town.</p>

It is particularly interesting to note, that at the beginning of the training session, students in the reciprocal teaching group appeared to be reluctant to participate. The teacher had to call on students to participate because no one would volunteer. The students appeared to be nervous about sharing their responses with the class. As the sessions continued, the students appeared to become familiar with the routine and were more willing to interact. Student responses became more like those of the adult expert. However, it is important

to note that there were some students (2 out of 16) who remained non-participants throughout the training sessions.

The results further indicated that the modeling only group had a mean gain of 4 points on the passage comprehension measure ($\bar{X} = 58.00$, $\bar{X} = 62.00$) over training (phases 1,2,3). On the other hand, the control group which had the highest percentage comprehension score at the beginning of the investigation, showed a decrease in achievement over the training interval ($\bar{X} = 64.70$, $\bar{X} = 57.00$). At the end of intervention, the control group had the lowest comprehension mean score among the three groups. This group maintained their low performance position over the maintenance interval (phases 3,4,5). Taken as a whole, these findings are consistent with the results obtained by Brown and Palincsar (1982; 1984) in their research studies of reciprocal teaching. Students who were exposed to the technique of reciprocal teaching showed a significant improvement on achievement scores of reading comprehension.

The next dependent variable examined as a measure of achievement was question generation. A repeated measure analysis indicated that there was a significant interaction effect for groups (3) by time (2) on question generation. In other words, there was significant variation in the mean scores among the groups of students from the beginning of the investigation (phase 1) until maintenance (phase 4).

These findings were also consistent with the results of the Brown and Palincsar studies (1982; 1986). Brown and Palincsar chose question

generation as one of the tasks used to measure transfer skills. Even though the question generation task incorporated the trained skill, the task formats were quite distinct between training and transfer.

At the beginning of the investigation, all three groups had essentially the same mean score on the question generation tasks (\bar{X} = 27.31, 27.27, 26.90). After the intervention took place, the reciprocal teaching group had a mean gain of 14 points, the modeling only group had a mean gain of 4 points, while the control group showed a mean loss of 3 points.

The improvement in achievement for the reciprocal teaching group can be explained by the fact that the students actively engaged in asking questions throughout the training sessions. Practice of the skill appeared to influence the transfer performance level of the students. It appeared that the students in the reciprocal teaching group had become experts in the skill of question generation and were able to monitor and regulate their knowledge of this skill to new situations. This is consistent with the findings reported in reviews of the literature of cognitive skills training programs (Gitomer & Glaser, 1987; Brown, Palincsar & Armbruster, 1984; Scardamalia and Bereiter, 1985).

It should be noted that a qualitative change in question generation, for the reciprocal teaching group, was seen as well as a quantitative change. The number of non-questions, questions that could be answered by yes or no, and questions that were directly lifted from

the text decreased over time in the reciprocal teaching group, while the number of questions that expressed main ideas and were paraphrased increased over time for this group. Examples of questions generated by students in the reciprocal teaching group are presented in Tables 18 and 19.

Table 18

Examples of Student Generated Questions at Pretest

Student	Questions
4	How long ago did the writers say this story took place? Where did the deer come from at every jumping point?
5	Where does it take place? Was she successful before this happened?
6	Weair did they meat. What did he say would happe they keep danceing.

Table 19

Examples of Student Generated Questions at Maintenance

Student	Questions
4	What are some of the diseases vaccination shots cure? What are antibodies for?
5	What is one defense against disease? What happens after antibodies are produced?
6	What dose the body produce to fight disease. Why do you get injections.

The second task used to measure transfer skills was the summary tasks. A repeated measures analysis indicated that there were no significant differences in achievement across the three methods of instruction over time (phase 1,4). An examination of the means of the summary tasks for the three groups indicated that there was no improvement over time for group 1 (reciprocal teaching) or group 2 (model only), while group 3 (control) showed a decrease (-2) in mean score over time. It is interesting to note that the students repeatedly asked the teacher for help on these tasks and appeared resistant to completing the summary tasks.

Brown and Palincsar (1982; 1984) also looked at improvement in standardized test scores over time. The dependent variables of Gates

vocabulary and Gates comprehension measured this achievement construct over time (phase 1,5). Brown and Palincsar (1982; 1984) reported no improvement on the vocabulary measure and gains in comprehension (months) for a majority of students.

Examination of group mean scores indicated no gain on the vocabulary measure for all groups. Mean scores of comprehension achievement indicated no change in scores for group 1 (reciprocal teaching) or group 2 (modeling only), group 3 (control) did have a mean decrease (standard mean scores = 33.80, 28.00) Even though these results do not replicate those of Palincsar and Brown (1984), it is important to note that the Gates-MacGinitie Reading Tests were administered in a group setting as opposed to the one-to-one basis reported by Palincsar and Brown (1984). Furthermore, the follow-up sessions took place the week following the students' semester exams which could possibly explain the low performance level of the students.

Taken as a whole, results of the present investigation related to testing Hypothesis 1, indicated that there were significant differences across methods of instruction (3) over time (5) for the dependent variables of passage comprehension and question generation. However, there were no significant differences across methods of instruction (3) across time (5) for the dependent variables of summary tasks, Gates vocabulary, and Gates comprehension.

Discussion Related to Null Hypothesis 2

The second null hypothesis states that there is no significant

difference in achievement scores (comprehension passages, question generation tasks, summary tasks, Gates vocabulary, Gates comprehension) across causal attribution measures (learning goal orientation, performance goal orientation) over time.

A repeated measures analysis indicated that there were no significant interaction effects for causal attribution over time on any of the five dependent achievement measures. In other words, there were no significant variations found in the mean scores of achievement measures among the learning goal oriented students and the performance goal oriented students over time.

Discussion Related to Null Hypothesis 3

The third null hypothesis states that there is no significant difference in achievement scores (comprehension passages, question generation tasks, summary tasks, Gates vocabulary, Gates comprehension) across cognitive style measures (tendency to have intrusive or non-intrusive thoughts) over time.

A repeated measures analysis indicated that there were no significant interaction effects for cognitive style by time on any of the five dependent achievement measures. In other words, there were no significant variations in the mean scores of achievement measures between students who tended to have non-intrusive thoughts and those students who tended to have intrusive thoughts.

Discussion Related to Null Hypothesis 4

The fourth null hypothesis states that there is no significant

difference in achievement scores (comprehension passages, question generation tasks, summary tasks, Gates vocabulary, Gates comprehension) across phase of the investigation (treatment, maintenance).

The first dependent variable examined as a measure of achievement was passage comprehension. A repeated measures analysis indicated that there were significant interaction effects across groups (3) over time (training-phases 1,2,3) and no significant interaction effects across groups (3) over time (maintenance-phases 3,4,5) on passage comprehension. In other words, there was a significant variation in the mean scores of passage comprehension across the groups of students during the intervention phase of the present investigation. Subjects in the reciprocal teaching group improved their comprehension scores by 12 points; the modeling only group improved their performance by 4 points, while those students in the control group lowered their performance by 7 points. This improvement can perhaps be explained by the fact that the reciprocal teaching technique led to significant improvement in reading comprehension skills.

Furthermore, the reciprocal teaching technique can be regarded as successful because the effects were found to be durable over time. That is to say that the mean scores among the three groups remained stable from the end of intervention until the follow-up session, which was ten weeks after intervention. Therefore the variation across the groups over the time phases of the investigation appears to be due to an increase of performance level during training rather than a decrease

in performance level during maintenance. These results are consistent with the research findings reported by Palincsar and Brown (1984).

The next dependent variable examined as a measure of achievement was question generation. A repeated measures analysis indicated that there were significant interaction effects across groups (3) over time (phases 1,4) on the question generation tasks. In other words, there was a significant variation in the mean scores of the question generation tasks across the groups of students between the pretest phase and the maintenance phase of the investigation. This significant interaction can perhaps best be explained by the fact that the reciprocal teaching procedure leads to reliable transfer to dissimilar tasks. As was previously stated, these results are consistent with the studies reported by Brown and Palincsar.

In sum, results of the investigation related to testing null Hypothesis 4, indicated that there were significant differences across methods of instruction (3) during the intervention phase of the study but no significant differences across methods of instruction (3) during the maintenance phase interval for the dependent variable of passage comprehension. In addition there were significant differences in the dependent variable of question generation across methods of instruction (3) between pretest and maintenance phases of the study.

Discussion Related to Null Hypothesis 5

The fifth null hypothesis states that there is no significant interaction effects on the achievement measures across methods of

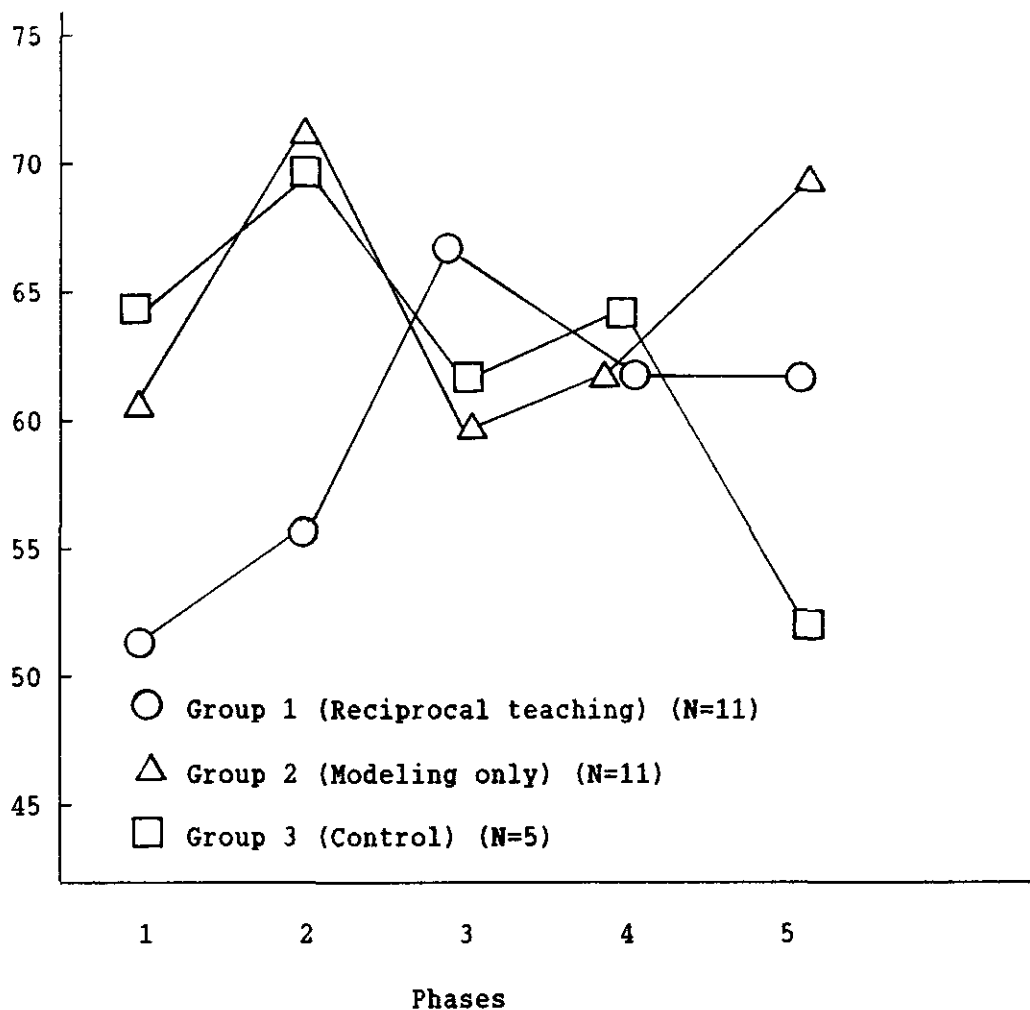
instruction (3), causal attribution (2), cognitive style (2), over phases of the investigation (5).

The first dependent variable examined as a measure of achievement was passage comprehension. A repeated measures analysis indicated that there were significant interaction effects across groups and cognitive style over time on the dependent measure passage comprehension. These interaction effects are presented graphically in Figures 3 and 4.

Examination of Figure 3 indicates that those students in the reciprocal teaching group who tended to have non-intrusive thoughts improved their comprehension achievement performance during training and maintained their improved level of performance. It appeared that the achievement performance of the students in the modeling only group (with non-intrusive thoughts) was random. The students in the control group (with non-intrusive thoughts) showed a decrease in performance over time. In other words, at the end of the investigation group 1 (non-intrusive thoughts) had higher mean scores on passage comprehension and group 3 (non-intrusive) had lower mean scores on passage comprehension.

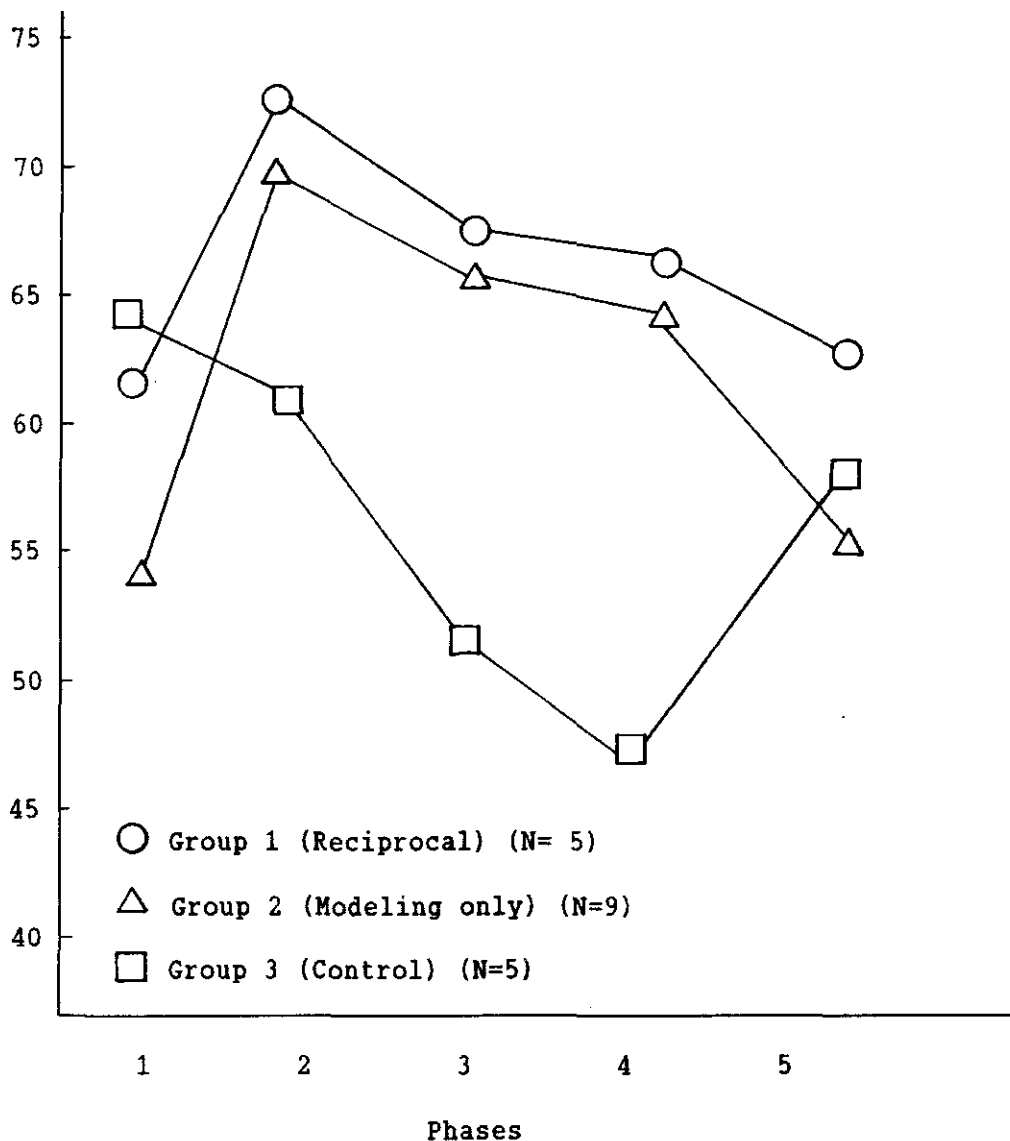
Examination of Figure 4 indicates that differences existed across methods of instruction for students who tended to have intrusive thoughts. Groups 1 (reciprocal teaching) and 2 (modeling only) appeared to be different from the control group. In other words, at the end of intervention (phase 3) groups 1 and 2 had higher mean scores on passage comprehension, while group 3 had a lower performance level

Figure 3. A graphic presentation of phase 1 to phase 5 changes in mean score performance of cognitive style (non-intrusive) by group on passage comprehension.



on passage comprehension achievement. These results are consistent with findings reported by Sarason et al. (1986). Sarason suggested that students who tend to have intrusive thoughts can improve their achievement if the instructions are task-oriented (i.e. direct the students' energies to the task). During the intervention phases of the

Figure 4. A graphic presentation of phase 1 to phase 5 changes in mean score performance of cognitive style (intrusive) by group on passage comprehension.



investigation, students in the reciprocal teaching group and the modeling only group were given specific instructions regarding the usage of the trained skills (summarizing, questioning, clarifying, predicting) whereas, the control group students received no help.

It is interesting to note, that by the time of the follow-up (phase 5), all three groups appeared to have equal performance levels on passage comprehension. It would appear that once the specific instructions were not given to the students in groups 1 and 2, their energies were directed away from the task and their achievement performance decreased. Thus, it would appear from the results reported here, that interaction of cognitive interference, group, and time influenced the achievement of passage comprehension.

The next dependent variable examined as a measure of achievement was question generation. A repeated measures analysis indicated that there were significant interaction effects on achievement measures across groups, causal attribution measures over, time on the dependent measure question generation. These interaction effects are presented in Figures 5 and 6.

Examination of Figures 5 and 6 indicates that the performance level of the students, who tended to have a fixed theory of intelligence (performance goal orientation), depended on the treatment group to which they belonged. Groups 1 (reciprocal teaching) and 2 (modeling only) improved their mean scores, while those students in the control group showed a decrease in their mean scores. Students who perceived

intelligence as incremental (learning goal orientation) showed a constant level (groups 2 and 3) or improved level (group 1) of performance on the dependent measure of question generation.

Figure 5. A graphic presentation of phase 1 to phase 4 changes in mean score performance of causal attribution (performance goal) by group on question generation.

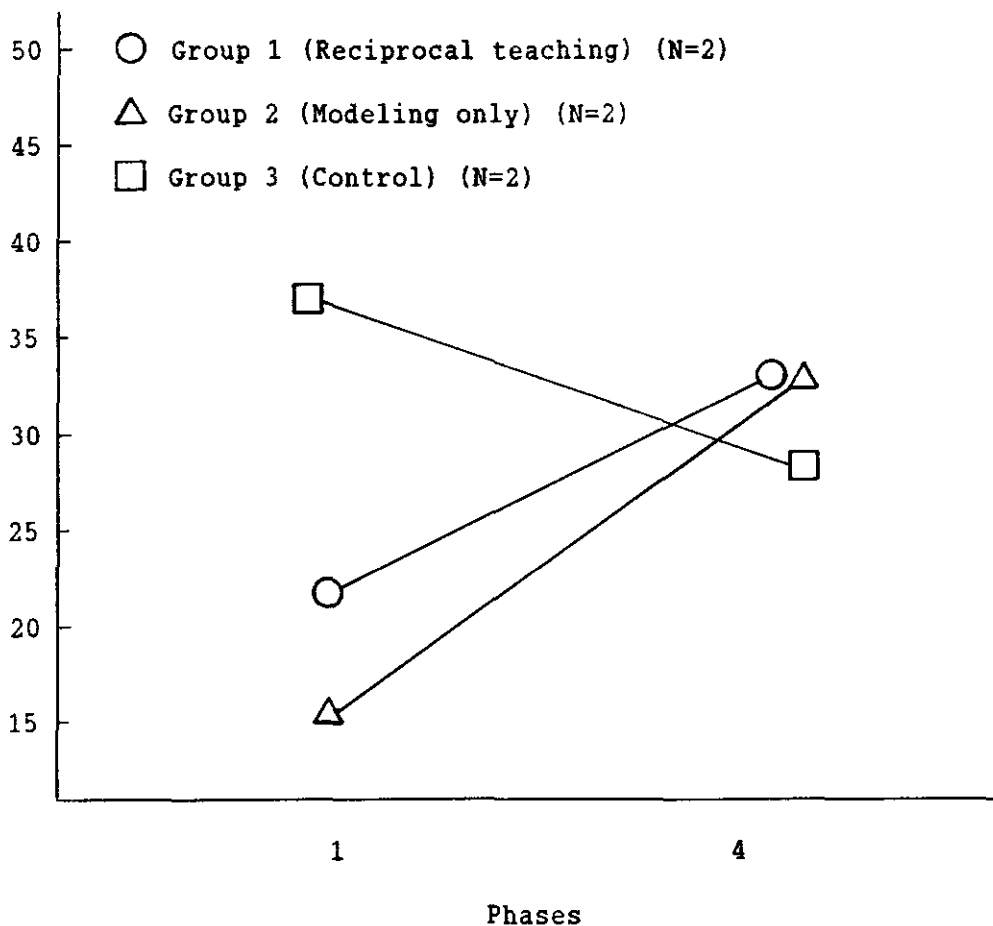
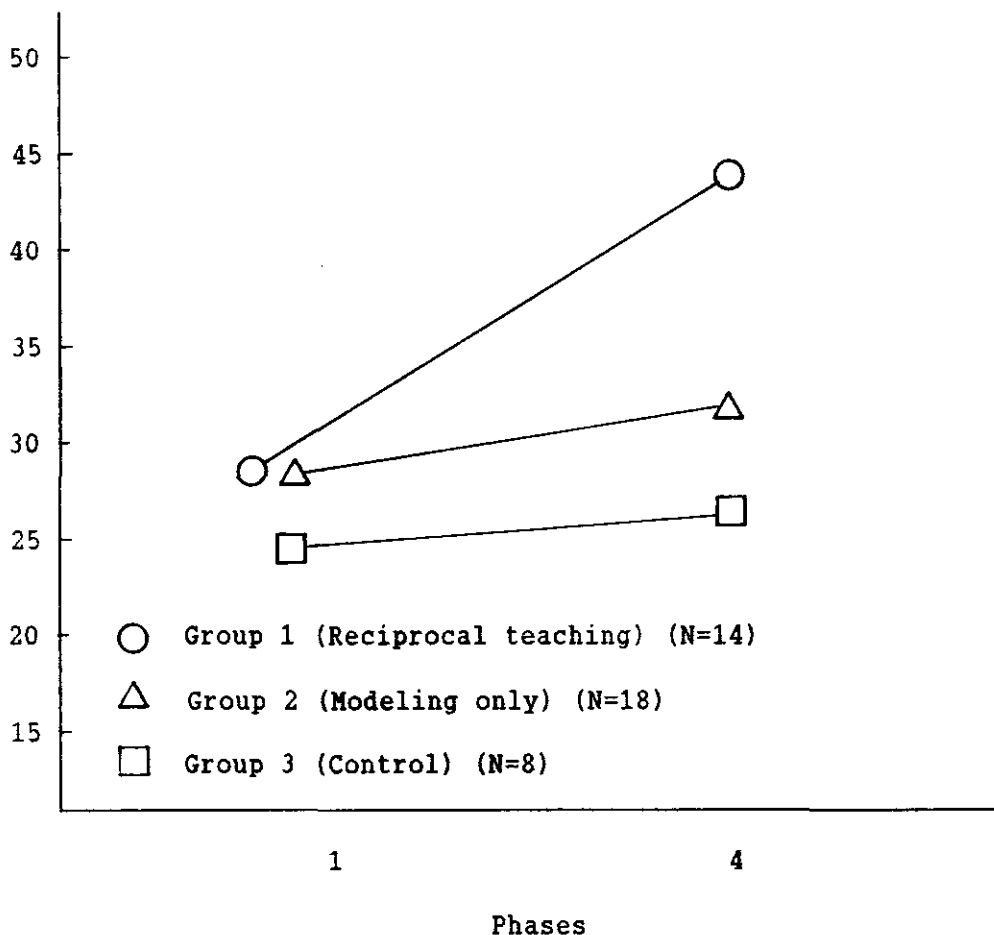


Figure 6. A graphic presentation of phase 1 to phase 4 changes in mean score performance of causal attribution (learning goal) by group on question generation.



The above mentioned results are consistent with the findings reported by Dweck (1986) and Leggett (1985). Students reason differently about their ability and approach the tasks in different ways, depending on their goal orientation. Children who believe their intelligence is fixed are concerned with their ability level, while

children who believe their intelligence is incremental are concerned with learning and effort.

It is interesting to note, however, that neither cognitive style nor causal attribution alone had a significant effect on achievement. Significant differences in achievement existed when the methods of instruction and individual differences were integrated. These results are consistent with suggestions which emphasize that in the development of instructional models that a special attempt be made to integrate aspects of the individual learner (Snow & Farr, 1987).

Overall, the results related to testing null Hypothesis 5, indicated that there were significant interaction effects across methods of instruction and cognitive style measures over time on the dependent measure of passage comprehension; and across methods of instruction, causal attribution, and time on the dependent measure of question generation. However, there were no significant interaction effects for the three remaining dependent variables (summary tasks, Gates vocabulary, Gates comprehension).

Discussion Related to Post Hoc Tests

The first dependent variable which was examined as a measure of achievement was passage comprehension. A post hoc analysis (simple contrasts) indicated that the amount of variation accounted for by method of instruction was greater for the group 1 and 3 comparison than for the group 1 and 2 comparison or group 2 and 3 comparison. In other

words, the reciprocal teaching method of instruction produced greater differences in achievement than modeling only or control conditions over time (phases 1,2,3,4,5).

These results are consistent with the findings reported of Brown and Palincsar (1986). They conducted various studies using different control groups (modeling only, explicit instruction, locating information). The various control groups received training on the identical strategies of summarizing, questioning, predicting, and clarifying. However, the control groups did not have the social interaction component. From the reported results, Brown and Palincsar (1986) concluded that not all methods of strategy training were equal and that the reciprocal teaching method (interactive and directed instruction) was the superior method.

The second dependent variable examined as a measure of achievement was question generation. A post hoc analysis indicated that the amount of variance accounted for by method of instruction was greater for the group 1 and 3 comparison (37%) than for the group 1 and 2 comparison (27%), or the group 2 and 3 comparison (07%). In other words, the reciprocal teaching method was more effective than the modeling only or control conditions on the transfer task of question generation. Again, these results are consistent with the results reported by Brown and Palincsar (1986). The students who were in the reciprocal teaching group were better able to transfer the trained cognitive skills to different situations.

In summary, the results of the present investigation related to the post hoc tests, indicated that the amount of variance accounted for by method of instruction was greater for the reciprocal teaching group than for modeling only condition or control condition as measured by the dependent variables of passage comprehension and question generation.

General Discussion of Results

The present study was designed to compare the effects of reciprocal teaching and modeling only treatment conditions against a control condition. Reading comprehension achievement was the dependent measure and remedial high school students served as subjects. The individual difference influences of causal attribution and cognitive style on achievement were also examined. Overall, the results reported here indicated that the reciprocal teaching technique was a success for the following reasons: Reading comprehension scores significantly improved; the training was conducted with naturally occurring groups under less than ideal circumstances; the results were durable; and the students transferred their cognitive trained skills to new tasks.

Reading comprehension scores improved significantly during the training session for the reciprocal teaching group. In addition, this improved level of performance was maintained for a period of ten weeks after the completion of the intervention phases. The students in the reciprocal teaching group successfully enhanced their comprehension, by utilizing the concrete strategies of predicting, clarifying,

questioning, and summarizing. They monitored their comprehension by integrating achievement and self-regulatory behaviors. The reciprocal teaching technique was found to be superior to the modeling only condition and the traditional teacher directed instruction condition (i.e. control group).

The reciprocal teaching procedure provided the students with a co-operative learning environment, within which the students were able to practice their skills. As the students became experts, the learning strategies became part of their knowledge base. This enabled the students, in the reciprocal teaching group, to significantly improve their achievement on the question generation tasks. Quantitative as well as qualitative changes occurred over time on this transfer task. Over the course of the investigation, the student dialogue became more like that of the expert teacher. No change in achievement scores was seen with either the modeling only group or the control group.

Cognitive style (cognitive interference) and causal attribution (goal orientation) appeared to have some influence on the achievement scores of all students. However, neither individual difference measure was found to be directly related to achievement. That is to say that achievement patterns depended on the method of instruction as well as the particular measure of achievement. In particular, two significant interaction effects were found. Interaction effects were found among methods of instruction, cognitive style, and time for passage

comprehension and among method of instruction, causal attribution, and time for question generation.

Significance of the Study

The results of the present study have shown that reciprocal teaching is a viable instructional technique that can be implemented with various populations in the real world. The results reported here offer evidence for the effectiveness of reciprocal teaching, thus corroborating the findings of Palincsar and Brown (1982; 1986). Furthermore, the results add to the growing foundation of research in cognitive instructional psychology.

The findings reported here have provided empirical support for the development of an instructional model that links the individual differences of causal attribution and cognitive style to the curriculum design. The reciprocal teaching technique described here employed self-monitoring and self-fostering activities in a cooperative learning environment. The skill training component of the model included the cognitive strategies of summarizing, question generation, predicting, and clarifying reading comprehension. The self-control component of the model included the individual differences of causal attribution as determined by goal orientation and cognitive style as determined by thought interference. This instructional model integrates three areas of psychology: social psychology, cognitive instructional psychology, and differential psychology. Student achievement is explained in terms of multi-faceted processes instead of just cognitive ability.

Interestingly, the model generated from the present study can be used in the field of school psychology as a diagnostic and consultative tool. As a diagnostic tool, the model can be used to explain the learning process in terms of observable behaviors instead of just a test score. This information, which might help explain behaviors that interfere with learning, can be given to teachers, students, and parents in order to choose more appropriate tasks. Through the use of reciprocal teaching, daily assessments of maladaptive achievement patterns can be observed and immediately corrected.

As a consultative tool, the school psychologist could use the reciprocal teaching procedure to facilitate the design and implementation of intervention programs. Reciprocal teaching is an easy process and can be adapted to existing curricula with a wide variety of school populations. The model generated from the present study includes variables other than cognitive skills and provides a more realistic view of the whole student. Once maladaptive patterns of achievement are identified, remedial plans can be generated to correct these patterns. In a cooperative learning environment, the students are able to practice their emerging skills and avoid the stigma of failure. The group provides social support and influences individual knowledge acquisition.

Suggestions for Future Research

It would be interesting to systematically replicate this study in other content areas with remedial high school and elementary students

so that detailed comparisons could be made among the groups. The length of the training intervention could be changed (eight weeks, a semester). It would be particularly interesting to see if a longer training session would in fact produce better and more durable results. The number of subjects in such a study should be increased ($N = 100$) so that interaction comparisons would be possible. Different populations of learners could also be examined (special education students, gifted students, remedial adults) to determine if the reciprocal teaching method is effective with various types of subjects. The investigation of the influence of individual differences on achievement and the instruments that are used to measure these constructs needs to be greatly expanded. It would be worthwhile to conduct a study to determine which individual differences (intelligence, memory, motivation) have the most influence on achievement. Furthermore, a study could be conducted to determine if individual difference patterns could be changed with the reciprocal teaching technique.

References

- Bandura, M. & Dweck, C. (1985). Self-conceptions and motivation: Conceptions of intelligence, choice of achievement goals, and patterns of cognition, affect, and behavior. Manuscript submitted for publication.
- Brown, A., Armbruster, B. & Baker L. (1986). The role of metacognition in reading and studying. In J. Orasanu (Ed.), Reading comprehension: From research to practice (pp. 49-75). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Brown, A. & Day, J. (1983). Macrorules for summarizing texts: The development of expertise. Journal of Verbal Learning and Verbal Behavior, 22, 1-14.
- Brown, A., Day, J., & Jones, R. (1983). The development of plans for summarizing texts. Child Development, 54, 968-979.
- Brown, A. & Palincsar, A. (1982). Inducing strategic learning from texts by means of informed, self-control training. Topics in Learning and Learning Disabilities, 2, 1-17.
- Brown, A. & Palincsar, A. (1986). Guided, cooperative learning and individual knowledge acquisition (Tech. Rep. No. 372). Champaign: University of Illinois, Center for the Study of Reading.
- Brown, A., Palincsar, A., & Armbruster, B. (1984). Instructing Comprehension-fostering activities in interactive learning situations. In H. Mandl, N. Stein, & T. Trabasso (Eds.), Learning and Comprehension of text. (pp. 255-286). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Chipman, S. & Segal, J. (1985). Research trends and implications. In S. Chipman, J. Segal, & R. Glaser (Eds.), Thinking and learning skills (Vol 2) (pp. 19-35). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Davey, B. & McBride, S. (1986). Effects of question-generation training in reading comprehension. Journal of Educational Psychology, 78, 256-262.
- Day, J. (1983). The zone of proximal development. In M. Pressley & J. Levin (Eds.), Cognitive strategy research; Psychological Foundations. (pp. 155-176). NY: Springer-Verlag.

- Day, J. (1986). Teaching summarization skills: Influences of student ability level and strategy difficulty. Cognition and Instruction, 3, 193-210.
- Dweck, C. (1986). Motivational processes affecting learning. American Psychologist, 41, 1040-1048.
- Elliott, E. & Dweck, C. (in press). Goals: An approach to motivation and achievement. Journal of Personality and Social Psychology.
- Farr, R., Carey, R., & Tone, B., (1986). Recent theory and research into the reading process: Implications for reading assessment. In J. Orasanu (Ed.), Reading comprehension: From research to practice (pp. 135-150). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Gitomer, D. & Glaser, R. (1987). If you don't know it, work on it: Knowledge, self-regulation and instruction. In R. Snow & M. Farr (Eds.), Aptitude, learning and instruction (Vol. 3) (pp. 301-325). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Glaser, R. (1985). Learning and instruction: A letter for a time capsule. In S. Chipman, J. Segal & R. Glaser (Eds.), Thinking and learning skills (Vol 2) (pp. 609-618). Hillsdale NJ: Lawrence Erlbaum Associates.
- Leggett, E. (1985). Children's entity and incremental theories of intelligence: Relationships to achievement behavior. Paper presented at the meeting of the Eastern Psychological Association Boston, MA.
- Leggett, E. (1986). Goals and effort/ability inference rules: Mediators of achievement judgments. Paper presented at the meeting of the Eastern Psychological Association. Boston, MA.
- MacGinitie, W., Kammons, J., Kowalski, R., MacGinitie, R., & MacKay, T. (1978) Gates-MacGinitie reading tests technical manual. Iowa City, IA: Houghton Mifflin Company.
- Messick, S. (1984). The nature of cognitive styles: Problems and promise in educational practice. Educational Psychologist, 19, 59-74.
- Messick, S. (1987). Structural relationships across cognition, personality, and style. In R. Snow & M. Farr (Eds.), Aptitude learning, and instruction (Vol 3) (pp. 35-75). Hillsdale, NJ: Lawrence Erlbaum Associates.

- McKeachie, W. (1987) Discussion. In R. Snow & M. Farr (Eds.), Aptitude, learning, and instruction (Vol 3) (pp. 327-331) Hillsdale, NJ: Lawrence Erlbaum Associates.
- Orasanu, J. & Penney, M. (1986). Introduction: Comprehension and how it grew. In J. Orasanu (Ed.), Reading comprehension: From research to practice (pp. 1-9). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Palincsar, A. (1986). The role of dialogue in providing scaffolding instruction. Educational Psychologist, 21, 73-98.
- Palincsar, A. (1986). Interactive cognition to promote listening comprehension. Paper presented at the meeting of the American Educational Research Association, San Francisco, CA.
- Palincsar, A. & Brown A. (1984). Reciprocal teaching of comprehension fostering and comprehension-monitoring activities. Cognition and Instruction, 1, 117-175.
- Palincsar, A. & Brown, A. (1986, April). Interactive teaching to promote independent learning from text. Reading Teacher, pp. 771-777.
- Pearson, P. & Johnson, D. (1978). Teaching reading comprehension. New York: Holt Rinehart, & Winston.
- Pellegrino, J. & Glaser, R. (1979). Cognitive correlates and components in the analysis of individual differences. In R. Steinberg and D. Detterman (Eds.), Human intelligence: Perspectives on its theory and measurement. (pp. 61-88). Norwood, NJ: Ablex Publishing Corporation.
- Resnick, L. (1984). Comprehending and learning: Implications for a cognitive theory of instruction. In H. Mandl (Ed.), Learning and comprehension of text (pp. 431-444). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Sarason, I. (1987). Test anxiety, cognitive interference, and performance. In R. Snow & M. Farr (Eds.), Aptitude, learning and instruction (Vol 3) (pp. 131-142). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Sarason, I., Sarason, B., Keefe, D., Hayes, B., & Shearin, E. (1986). Cognitive interference: Situational determinants and tractlike characteristics. Journal of Personality and Social Psychology, 51, 215-226.

- Scardamalia, M. & Bereiter, C. (1985). Fostering the development of self-regulation in children's knowledge processing. In S. Chipman, J. Segal, & R. Glaser (Eds.), Thinking and learning skills (Vol 2) (pp. 563-578). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Snow, R. (1986). Individual differences and the design of educational programs. American Psychologist, 41, 1029-1039.
- Snow, R. (1987). Aptitude complexes. In R. Snow & M. Farr (Eds.), Aptitude, learning, and instruction (Vol 3) (pp. 11-34). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Snow, R. & Farr, M. (Eds.), (1987). Aptitude, learning, and instruction Volume 3: Conative and affective process analyses. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Sternberg, D. (1987). Intelligence and cognitive style. In R. Snow & M. Farr (Eds.), Aptitude, learning and instruction (Vol 3) (pp. 77-97). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Vygotsky, L. (1978). Mind in society: The development of higher psychological processes (M. Cole, V. John-Steiner, S. Scribner & E. Souberman, (Eds. and Trans.)). Cambridge, MA: Harvard University Press.
- Wertsch, J. V. (1985). Vygotsky and the social formation of mind. Cambridge, MA: Harvard University Press.
- Wilson, P. & Anderson, R. (1986). What they don't know will hurt them: The role of prior knowledge in comprehension. In J. Orasanu (Ed.), Reading comprehension: From research to practice (pp. 31-48). Hillsdale, NJ: Lawrence Erlbaum Associates.

APPENDIX A

Student Worksheets-Questioning

1. The falcon is a female hunting bird.
What _____?
2. In medieval times, in Europe, only members of a royal family could own falcons.
Who _____?
3. The falcon bathes in shallow streams to control bird lice that live in her feathers.
Why _____?
4. A falcon prefers to hunt for its prey in open areas.
Where _____?
5. In the 1950's the falcon populations in North America and Central Europe dropped suddenly.
When _____?
6. The falcon hunts by swooping down on her prey and grabbing it with her sharp talons.
How _____?
7. Although animals don't have language as we do, they communicate with each other by signals of some kind.
_____?
8. Scientists study animal communications through experiments and observations.
_____?
9. Because snakes are totally deaf, it is the movement of the snake charmer that charms the snake, not the music the snake charmer plays.
_____?

10. Some ants give off a special alarm odor that warns nearby ants of danger.

11. The sounds made by bats, moths, and whales are too high for humans to hear.

What

12. Deaths from snakebite have been cut down in recent years by the use of antivenoms--medicine that work against snake poisons. There are now few deaths from snakebite in the United States and Canada.

1. Why do snakes bite people?
2. In what countries do few people die from snakebite?
3. Why do fewer people die from snakebite these days?

13. Contrary to what some people believe, snakes do not sting with their tongues. Their tongues are used to sharpen their sense of smell. The snakes pick up tiny particles of matter in the air and put them in two tiny holes at the bottom of their nostrils so that he can smell better.

___1. How many holes does a snake have at the bottom of his nostrils?

___2. What does a snake use its tongue for?

___3. Why do people use the expression, "he speaks with forked tongue?"

14. The smallest snake is just the size of a worm. The largest snake has been known to reach thirty feet in length which is almost as long as two station wagons. There are many varieties of snakes and they come in many lengths.

___1. How long do snakes get?

___2. How many station wagons could you fit into 30 feet?

___3. Where would you find the longest snakes?

15. Snakes are very flexible because their body is like a rubber hose with many bones. In fact, a snake's backbone can have as many as 300 vertebrae, almost ten times as many as a human's. Because of all these bones, a snake can twist its body in almost any direction.

___1. Why can a snake move its body in so many ways?

___2. Do snakes ever need backrubs the way people do?

___3. How many vertebrae do snakes have?

16. While very small snakes eat very small insects or worms, large snakes can eat small deer, leopards, and goats. All snakes, regardless of size, eat living animals or animal eggs. In fact, some snakes swallow each other.

___1. What snake eats its neighbor snake?

___2. What do snakes eat?

___3. How is the diet of a small snake different from the diet of a large snake?

17. Camels have been helpful to people who live in deserts for thousands of years. They have carried people as well as their goods on their strangely shaped backs. They are able to cross deserts and mountains on trips that may take two months.

?

18. Scientists have studied the camel carefully to determine how it can live where other animals would die. They have found that the camel is especially well designed for its life in the hot, dry, sandy parts of the world. There are many characteristics of the camel that are useful to it including its feet, legs, eyelashes, and nostrils.

?

19. There have been many prominent women in America's history who have done much good for mankind. One of these women was Alice Hamilton. Dr. Hamilton was very concerned about the health of industrial workers. Through her research and leadership she was responsible for many changes that improved working conditions for laborers.
-
-

?

20. Scientists have been asking themselves what energy is for hundreds of years but no one has come up with a simple answer. About the only definition of energy that scientists can agree on is that energy is that something which enables people, machines, and objects to do work.
-
-

?

Student Worksheets-Summarizing

Rule 1: Identify the topic sentence.

1. Computers are very valuable machines because they work so fast. In the time it takes to push a few buttons, a computer can tell a store manager how many pizzas or cartons of Coke are on the shelves. In less than 15 seconds, telephone computers connect callers thousands of miles apart. These quick machines can do two million multiplication problems in one second!
2. In the fall, wild animals begin to stock food and grow long coats of hair. Many birds fly south. The leaves turn beautiful colors, then die and fall to the ground. The days become shorter and the weather gets cooler. Many signs tell us winter is coming.

Rule 2: Invent a topic sentence if there isn't one.

3. When a volcano erupts, melted rock, steam and ashes are forced through the top of the mountain. The area around the volcano is sprayed with ashes and boiling liquid called lava. Trees and buildings in its path are destroyed. Wildlife and people are killed.
 - A. The Island of Hawaii was formed by volcanic eruptions.
 - B. Towns near erupting volcanoes can be covered with ashes.
 - C. When a volcano erupts, it destroys both land and people surrounding it.
4. Volcanoes add to the surface of the earth. Many islands in the Pacific Ocean, such as Hawaii, were completely formed by volcanic eruptions. In some parts of the world, steam from active volcanoes is used to run power plants for factories and homes. When lava settles into the soil, it leaves minerals which make the soil rich and fertile. The cooled lava is also used as a road building material.
 - A. Many volcanoes have become tourist attractions.
 - B. Lava and steam from volcanoes can be helpful to man.
 - C. Lava adds surface and minerals to the earth.

5. Caffeine and sugar in cola drinks can actually eat away your teeth. A friend of mine used to be a "cola addict." I guess she drank about 6 or 7 colas a day from early childhood. At age 22 she discovered that she was losing the enamel on her teeth. Her doctor told her that the loss of enamel was due to her drinking so many colas.

Topic _____

Topic Sentence: _____

Rule 3: Leave out unimportant information

6. Amelia has three pairs of Levis. One pair is navy blue. One pair is light blue (to match her eyes). The third pair is green. She likes them all.
7. England is noted for its delicious breakfasts. It is a hearty meal. One should plan to take a full hour to eat it. It consists of juice, cereal, milk, bacon, eggs, toast, jam and tea. Every taste is so special that it is difficult to skip anything.

The topic is _____

The main idea sentence is _____

Sentences that describe the main idea:

Rule 4: Give steps or lists a title

8. After you read cake recipe, gather your ingredients together. First cream the butter and sugar. Next add the eggs. Then sift the flour. Then mix in all the dry ingredients. Finally, add the liquid. The liquid can be water. Stir the mixture vigorously. Pour the mixture into a baking pan. Bake at 350 degrees for one hour.

9. It's always great fun to watch a pizza being made. The pizza maker first grabs a lump of dough and pats it into a flat cake. Then he slips it on his closed fist and twirls it around in the air until it becomes a large pancake. After that, the pancake is tenderly placed on a baker's shovel and covered with cheeses and meats and tomato sauce. Finally, the pizza maker slides the shovel into a special hot oven. In five minutes it becomes bubbly hot and brown crusted.

This paragraph told _____

10. When Julie goes to the zoo she enjoys most seeing the parakeets, canaries, parrots, and peacocks.

Title of list _____

11. Nutritionists are interested in evaluating the vitamins and minerals that are found in pizza, hot dogs, hamburgers, and tacos.

Title of list _____

12. Much of our nation's food is grown in Illinois, Iowa, and Kansas.

Title of list _____

Rule 5: Leave out redundant information

13. The North Pole is one of the coldest regions on earth. The temperature often drops below 0 degrees. Weathermen often report freezing temperatures there. The winds are very strong on the North Pole gusting up to 60 miles an hour. It is quite windy on the North Pole.
14. Many languages are spoken in Africa. In West Africa 126 major languages are spoken. Each tribe speaks a different language. Arabic is the leading language in northern Africa, while eastern Africans speak mainly Swahili. Africa is a continent of many languages. Northern and eastern Africans speak different languages.

Student Worksheets-Predicting

1. Journey into Jazz

This story will probably be about:

- a) A trip to the city of jazz
- b) The history of jazz style music
- c) A trumpet player.

I predict this information may be included in the article:

2. Is Seeing Believing?

This story will probably be about:

- a) How your eyes can be tricked by optical illusions
- b) How seeing-eye dogs help the blind
- c) How wearing glasses can improve one's eyesight.

I predict this information may be included in the article:

3. Looking to the Stars

I predict this story will be about: _____

What do you know about the predicted topic? _____

4. I Climbed Everest Alone

I predict this story will be about: _____

What do you know about the predicted topic? _____

5. _____

1. World Series
2. Super Bowl
3. Davis Cup
4. Stanley Cup

6. Pioneer Chores

1. _____
2. _____
3. _____

7. _____

1. Caterpillar
2. Cocoon
3. Butterfly

8. Early Morning Routines of Middle School Students

1. _____
2. _____
3. _____

9. My friend, Annemarie, loves to combine food in unusual ways. Yesterday she mixed 7-up with cranapple juice and added a slice of lemon. For breakfast she sometimes sprinkles chocolate chips on her omelet. She's also crazy about strawberries. For dinner last night, she ate spaghetti noodles, but can you guess what she topped them with?

What do you predict that the author will say next? _____

10. Before television, people used to listen to the radio for entertainment. There were mystery, spy, and science fiction stories. As you listened, you might have heard Clark Kent change into Superman and take off after some robbers. How could you have heard him change into Superman?

What do you predict the author will tell next? _____

11. We frequently read about fires that do extensive damage. Many are caused by careless smokers or electrical shorts. Did you know that legend says a cow was responsible for the worst fire in Chicago?

I predict the author will discuss _____

What do you already know about what he will tell next? _____

12. Easter Island is a small, but famous island in the Pacific Ocean. Sleeping volcanoes dot this remote island where only 1100 people live. There are more horses on the island than there are people. Tourists do not come to sun bathe on the beaches or to enjoy food at restaurants. What is it then that makes Easter Island so famous?

I predict the author will discuss _____

What do you know about what he will tell next? _____

Student Worksheets-Clarifying

1. There are animals called lemmings that have very unusual behaviors. Every couple of years they are observed to throw themselves into committing what appears to be suicide.
2. A coral reef is actually a collection of many sea animals living together. One of the most important animals found on the coral reef are sponges. They attach themselves to reefs and provide them with food.
 - a. They refers to _____.
 - b. themselves refers to _____.
 - c. them refers to _____.
3. Whenever she injured herself, Washoe the chimpanzee learned to make the sign for "hurt" or "pain". Later when she saw people with red stains on their bodies, she would sign "hurt".
 - a. She refers to _____.
4. A bush baby is a small animal that belongs to the lemur family. Lemurs are a kind of monkey. It is about the size of a young kitten and has a face with an oddly human expression, very large round eyes, and small, pointed ears.
 - a. It refers to _____.
5. The Incas were famous for their building skills. Examples of their work are the ancient city of Machu Pichu and the world's oldest bridge that crosses the river San Luis.
6. People who are bilingual--that is people who speak more than one language--are in ever increasing demand. Their services are needed by airlines, schools, and the government.
 - a. bilingual means _____.
7. During the summer the birds molt or lose their feathers.
 - a. molt means _____.

8. The townspeople thought that the mountain had mystical (magical) powers.

a. mystical means _____.

9. NO LOUNGING. NO LOITERING. THIS IS NOT A WAITING ROOM.

a. Loitering means _____.

10. The speaker did not pay attention to the heckler who kept yelling rude comments from the back of the room.

a. A heckler is _____.

11. The artists put ink on the stone, placed paper on the stone, and then rubbed it with another stone. Good impressions were made on the paper.

a. Impressions are _____.

APPENDIX B

Training Passage

The Bet by Anton Chekov

CAPITAL PUNISHMENT! Cried someone in the room. "Why, it's something left over from the dim, dark ages. It isn't modern! It isn't right!"

A group of clever successful people had gathered at the home of a young banker. The talk had somehow gotten around to the death penalty. Now the host had a lively argument on his hands.

"I'm sorry, but I can't agree with you," the banker stated. "Of course, I've never suffered the death penalty myself. Neither have I ever suffered solitary confinement. But just think about it! Imagine yourself in prison for life, alone, totally alone. Putting a man to death seems a thousand times better than that. Now tell me, which is more kind? To end your life in one quick minute? Or to draw out your suffering year after wasted year--"

"No! No! They are both horrible," put in one of the guests. "But to take away a life--? Who should take life but the Lord? Why should the government have this power? Can the government restore life? No. The government is not God. It has no right to take human life."

Now it was a young lawyer's turn. "No doubt you are right," he said. He seemed to be thinking the matter over, deeply. "Both punishments are perhaps without justice. But as for me, I know which I would choose. Any kind of life is better than death. Even solitary confinement would be better than--"

"Nonsense!"

"It is so!"

"No!"

"Yes!"

Half a dozen voices all sounded at once. The host, a banker, banged on the table for silence. He stood looking at the lawyer.

"What you say is not true," stated the banker. "It is a stupid thing to say. Two million roubles! I'll bet you two million roubles that you can't stand solitary confinement. A lifetime? Bah! Just five years. Two million roubles for five of your years!"

"Do you mean that?" asked the lawyer.

"Two million roubles!"

"I accept your bet," said the lawyer simply. "And I'll give you more years-fifteen years. I will stay in solitary confinement for fifteen years. Then you will give me two million roubles."

"Fifteen! Fifteen!" cried the banker. He was now wildly excited, as though he had already won the bet. "I accept. The people here are our witnesses. I stake two million roubles. You stake fifteen years of your freedom."

It was a cruel, stubborn, senseless bet. Many of the guests tried to get them to forget it. But the banker would not forget. He had recently made a lot of money in a business deal. To him, two million roubles was nothing! All through dinner, he kept talking about the bet. Worse than that, he kept teasing the young lawyer.

"Well now, my friend," he would call across the table. "Have you changed your mind yet? Two million is nothing to me. But three or four years of your life! That's something to think about. That's right-I said three or four years. You'll never stick it out longer than that, I can tell you. And they'll just be wasted years. Not one penny do I give you if you leave early. Why, think of it, my friend! My jail will have no bars, no locks. You'll be able to walk out of it any minute. That thought will be like a poison to you. So you will walk out; I know that. Sooner or later, you'll walk out."

In a few days the "prison" was ready. It was in an old building in back of the banker's house. For fifteen years the lawyer was not to pass through its door. For fifteen years he was not to see any other human being. He was not to hear a human voice. He was not to receive letters or newspapers. Musical instruments, however, were to be permitted. So were books. So were wine and tobacco. Some other things he could order. He had only to pass his order note through a window. A guard would bring anything allowed.

Thus, the smallest details of the bet were discussed and settled. At twelve noon on November 14, 1870, the prison term began. It was to last until twelve noon on November 14, 1885. The lawyer must make no attempt to break the rules agreed upon. The slightest attempt would mean loss of the money.

The lawyer's first year was one of suffering. He grew bored. Even the piano did not cheer him. Wine he did not ask for, nor

tobacco. Short, easy novels were his only reading; he devoured them by the dozen. During the second year, the sound of the piano, once heard often, stopped completely. Great books of the world's literature became his only reading.

By the fifth year, the piano was heard again. One day he asked for wine. Was he doing better? Perhaps. But guards who peered into his room saw him banging the walls, kicking things. He often threw himself on the bed, to cry for hours. He seemed completely bored and hopeless. These moods would be followed by fits of anger. He would write for hours at his desk. Then, in a blind rage, he would tear his work into thousands of pieces.

But things grew better in the years that followed. He read the great books of history. He studied languages. He studied science. In just a few years he read over 600 difficult books. Genius seemed to have flared up in the prisoner. It burned steadily in him—a genius for study, knowledge, and thought.

More than ten years had now passed. One day he asked for the Bible. It was sent to him. And for a whole year—hour after hour, day after day—he studied it. Then came other books on religion. All kinds of literature. Medicine. More science. More art. He seemed surrounded by a sea of words.

At last the end grew near. Now it was twelve midnight, the night before the prisoner's term would end. The banker walked back and forth in his room. "I shall be without a penny tomorrow," he told

himself. "To pay off the bet, I must come up with two million roubles. What will be left? Nothing. I shall be ruined."

It was indeed true. The fifteen years had not been kind to the banker. His business deals had gone sour. His little worries had become fears.

"A bet, was it?" he asked himself. "It was not a bet! It was a suicide plan-for me. That man is going to destroy me. Only forty years old! Why, he will take my money and laugh in my face.

"No! No! He may not laugh. He may say, 'I owe it all to you, my friend. Here, take some of my money. Let me help you!' Oh, such shame!" To the banker, this thought was worse than the idea of being poor.

"This is too much to bear" the banker went on. "Too much for anyone. Ruin and shame! I must escape, even if he has to die-even if he has to die!"

The banker stopped still, the last words ringing in his ears. Long he stood there. As the clock struck three, noisy leaves argued with the night wind. A cold rain swept against the dark windows...And soon, outside, the rain beat against the banker's bare head. Quickly he reached the house of the prisoner. It stood quietly under the rain.

"Ivan! Ivan!" called the banker. The guard did not answer.

"Must be sleeping," the banker told himself. "Good, good. Now is the time! If only I have the courage, Ivan will get the blame.

There was no one at the door. It opened without a sound. The prisoner's room was lit by the light of a dying lamp. And there sat the prisoner at his desk. He looked asleep. The banker tapped on the door frame. No sign from the other. He looked like a skinny skeleton. Long, matted hair fell on his shoulders. His cheeks were sunken. His skin was yellow with the color of the earth—the earth from which it had come, and to which it would soon return. The prisoner's right hand rested on a sheet of paper in front of him. What a hand! A deathly hand. A deathly hand with a skeleton finger pointing at the prisoner's last words.

"Easy now, easy," the banker told himself. "He's not a strong man. I can smother him with a pillow. There will be no fight, no noise, no bloody wound. Nothing would look like a murder.

Softly, the banker crept forward. His eyes dropped to the paper. Very gently, he moved the pointing finger that hid some of the words:

Tomorrow, at noon, I am to have my freedom. But what a joke it is to me now! Why should I want that kind of freedom? I now know that it is worth nothing. For years I have known your world better than you who lived in it. I have traveled everywhere. I have done everything. I have seen the sun over Mount Blanc, and the sunset staining sky and ocean with purple. Spirits have spoken to me of God. Words have brought me wonder and wisdom.

And what have I learned? That your world is worthless. That the things you value are false and empty. Your history,

your so-called wisdom, your money-hungry race through life—to me these are no more than the story of mice that die under your floors. The only true freedom is freedom of the mind. To enjoy beauty! To learn! To think! To grow wise! You have exchanged the worth of heaven for the stuff of the earth. Tomorrow I should receive two million roubles. But they are without value. I shall gladly give them up. Five hours before noon I shall break the rules, and lose the bet. Nothing will be owing to me. For a moment the banker could hardly believe his eyes. His face grew red as he skimmed the letter again. Yes, it was true! He bent over and kissed the head of the strange man in front of him.

All that night, the banker lay crying tears of guilt and joy. In the morning, the guard came to tell him that the prisoner's cell was empty. The banker hurried to see if this were true. It was and the banker was happy to see that the note was still in place. Very carefully, he picked it up and made two neat folds. Back in his house, he locked the note in his safe. He had won the bet, hadn't he? And no rumors around town were going to tarnish his victory!

APPENDIX C

Daily Assessment Comprehension Passage

Michelangelo

In Italy on March 6th, 1475, a special child was born. He was to become one of the most remarkable artists of all time. His name was Michelagnuolo di Lodovico Buonarrotri-Simoni, but he was better known as Michelangelo.

Michelangelo's paintings and sculptures are praised all over the world today, and all of them have become treasured possessions. His most famous creation is the enormous ceiling of the Sistine Chapel at the Vatican in Rome. The ceiling depicts famous scenes from the Bible and mythology. It focuses on the creation of the world and of human beings, and shows the wonder and praise the artist felt for the subjects he painted. Michelangelo spent four years completing this ceiling. All this time, he had to work lying on his back on a scaffold hung from the roof. He nearly went blind from eyestrain and from the paint which fell in his eyes.

Michelangelo began drawing when he was very young, and even then he could depict people and scenes vividly and accurately. He would carefully observe the people and things around him and then practice drawing them in his sketchbooks; hands, faces, legs, bodies, limbs—all can be found sketched in great detail.

This careful observation bore fruit when he started to work in stone, which was his favorite material because he felt it offered a

greater challenge than paint. His carvings have never been surpassed, and seldom equalled. His statues, chiseled from marble, are so lifelike they almost seem to breathe.

In the city of Florence stands the gigantic statue of David, the character in the biblical story, "David and Goliath." Michelangelo carved this from a solid block of marble which other artists rejected as defective and useless. It has been copied many times, but none of the copies is as fine as the original.

People travel from all over the world to see Michelangelo's Pieta, the sculpture of Christ and his mother at St. Peter's Basilica in Rome.

Michelangelo was not only a painter and a sculptor, he was also a poet, an architect, and one of the nine citizens in charge of the defense of his native city, Florence. He was the friend of popes and princes, and the rival of another great artist of the time, Leonardo da Vinci. These men lived in a period that produced many people of genius. This is known as the Renaissance, which means "rebirth" because people felt that this was a time when the ancient glory of Rome was born again in Italy.

Comprehension Questions for Michelangelo

1. What is Michelangelo's most famous painting creation?
2. What does "Renaissance" mean?
3. Why are Michelangelo's statues so popular even today?
4. How did Michelangelo learn to be an artist?
5. Why was the painting of the Sistine Chapel ceiling such a difficult job?
6. Why was Michelangelo such a remarkable artist?
7. In what country was Michelangelo born?
8. Why do you think Michelangelo continued to work on the ceiling of the Sistine Chapel despite how difficult the work was?
9. Who was Michelangelo's rival and another great artist of the Renaissance time in Italy?
10. Why do you think that people today still go to Italy to see works of art that were created over 500 years ago?

APPENDIX D

Leggett & Dweck Intelligence Scale

People have different ideas about smartness. Read each pair of sentences below. Think about each one carefully because they may sound a lot alike. Decide which one you agree with most. Then circle A or B to show which sentence you agree with most.

1. A. Many smart grown-ups were not smart when they were children.
B. Smart grown-ups were usually smart kids.
2. A. If someone isn't very smart, they probably won't be much smarter when they're older.
B. If someone isn't very smart, they can be much smarter when they're older.
3. A. You can't really tell how smart you'll be when you get older.
B. You can tell how smart you'll be in the future by how smart you are now.
4. A. You can change how smart you are.
B. You can do things to get better grades, but you can't really become smarter.
5. A. You're a certain amount smart, and you can't really change that.
B. You can get much smarter.
6. A. How smart you will be in the future depends mostly on how smart you are now.
B. How smart you will be in the future depends mostly on what you do.

7. A. You can't tell who will be the smart ones in the years to come.
B. You can pretty much tell who will be smart later on by who is smart now.
8. A. Smartness is something that doesn't change a lot.
B. Smartness is something that always increases.
9. A. If you aren't as smart as you want to be, there isn't much you can do about it.
B. You can be as smart as you want to be.
10. A. You can learn new things, but how smart you are stays pretty much the same.
B. When you learn new things, you increase how smart you are.

APPENDIX E

Question Generation Task

Amelia Earhart-An Extraordinary Aviator

The year was 1932. It was 7:10 P.M. Amelia Earhart was strapped into the cockpit of her single-engine red Vega monoplane waiting to taxi down the runway. She was attempting to become the first woman to make a solo flight across the Atlantic Ocean. She was setting off from Newfoundland and heading for Paris, France.

Trouble started within a few hours after take-off. First, the altimeter broke so she could not gauge how high or low she was flying. Then, she flew into a violent storm with flashing lightning which buffeted her light plane as if it were made of paper. Next, the tachometer went, followed by the stick and rudder. Amelia Earhart could not believe her bad luck. But there was more to come, for the plane soon began to spin out of control. It dropped so low that she had visions of a watery death. Somehow she managed to right the plane and regain height.

As dawn approached, the exhaust manifold began to vibrate. Amelia Earhart's eyes started to burn. Escaping gasoline fumes were coming up through the cockpit floor from a leaking fuel tank. The flames from exhaust had melted a welded crack in the manifold. Things were now really serious, so she abandoned her plan to reach Paris and headed for the nearest land. After fifteen grueling hours she set down in Ireland.

Amelia Earhart's flight was a remarkable achievement, not only because few other people had flown across the Atlantic, but also because she had done it alone and under terrible conditions. It had required courage and determination, as well as knowledge and experience. Earhart demonstrated all of these traits.

Amelia Earhart had had her first plane ride in California when she was visiting her parents. The experience so thrilled her that she decided she would become a pilot herself. She earned her pilot's license, and with the help of her mother she bought a secondhand plane. Even in those days, she broke aviation records, becoming the first woman to fly to an altitude of 14,000 feet.

In 1928 she was the first woman to cross the Atlantic as a passenger. Amelia Earhart became the first person ever to fly solo to California from Hawaii.

And then Amelia Earhart decided to do what no one had done before: fly 27,000 miles around the world. As they covered the miles, she and her navigator faced storms in the air and unknown jungles and mountains below. Then, toward the end of the journey, her plane lost contact with the world and she disappeared somewhere over the South Pacific. Despite sixteen days of search, no trace of her or her plane was ever found. What happened to Amelia Earhart remains a mystery.

APPENDIX F

Summary Task-Monsters

Monsters are usually large and always scary creatures. There may be a few small monsters. But most of them are very big. Often it is their giant size that makes them so terrifying. And all monsters are scary. People don't like to be too close to monsters. At least not if the monster knows about them.

Monsters like Frankenstein, Count Dracula, Wolf Man, and Godzilla only exist in books and movies. Nobody expects to see one of them in real life. But what about other creatures? Some people think they have seen monsters—and not just in theatres either.

People have reported seeing monsters that look like elephants, kangaroos, and even rabbits. Some individuals have gone to the authorities with reports of monsters that look like frogs and birds too. Imagine how surprised you would be to see a giant bird fly over your head or a huge kangaroo hop towards you!

Giant apes, like Bigfoot and the Abominable Snowman, have been seen in Asia, Europe, Canada, and in the United States. That's quite a bit of territory! Even within the United States, some of these creatures have been seen in California and some in Minnesota. In fact, these beasts have been reported in Wisconsin, Oregon, and Missouri too. One has even been sighted in Illinois!

When most people see monsters they are out in the wilderness and all alone. By the time they are able to reach someone, the monster is long gone. Often, people get so excited that they forget to take a

picture of the monster. If they do think to snap a picture it usually isn't a good one. It is hard to figure out where the monster is in some of these pictures. Thus, evidence for these monsters really existing is weak.

Sailors used to tell tales of a giant squid and of a huge octopus. We don't know about the octopus, but we do know about the squid. The giant squid lives deep in the ocean. It is rarely seen at the surface. No one knows how large a squid can become. Some authorities think that it may reach a length of well over 200 feet. That would make it nearly as long as a football field.

Other very long scary beasts were reported by the early explorers of Africa and South America. The monsters they described looked like big snakes. But they were snakes that could be up to 100 feet long. And as if that were not scary enough, these snakes were big enough to eat a monkey, pig, small antelope, or baby deer. They regularly did too. Believe it or not, the explorers were not crazy. These snakes were called pythons and anacondas.

Finally, there have been reports of flying saucers. Many people believe we have been visited by other intelligent beings. Some people claim to have seen one-eyed giants, men 13 feet tall with ears like spurs and three sets of arms, semi-transparent men in robes and bright green creatures with red faces. Supposedly, all of these monsters have walked out of flying saucers. Thus, in addition to snakes and squid, some people have reported seeing spacemen.

APPENDIX G

Thought Occurrence Questionnaire (Sarason)

This questionnaire concerns the kind of thoughts that go through people's heads when they have to concentrate on something, such as working, reading directions, or reading a book. The following is a list of thoughts, which, in your experience, you may have had while working on various types of tasks. Please estimate how often each thought has occurred to you by placing the appropriate letter to the left of each item.

A = Never

B = Once

C = A few times

D = Often

E = Very often

- ___ 1. I think how poorly I am doing.
- ___ 2. I think about what someone will think of me.
- ___ 3. I think about how I should be more careful.
- ___ 4. I think about how well others can do on what I am trying to do.
- ___ 5. I think about how difficult what I am doing is.
- ___ 6. I think about my level of ability.
- ___ 7. I think about the purpose of what I am doing.
- ___ 8. I think about how I would feel if I were told how I performed.
- ___ 9. I think about how often I get confused.

- _____ 10. I think about other activities (for example, assignments, work).
- _____ 11. I think about members of my family.
- _____ 12. I think about friends.
- _____ 13. I think about something that makes me feel guilty.
- _____ 14. I think about personal worries.
- _____ 15. I think about something that makes me feel tense.
- _____ 16. I think about something that makes me feel angry.
- _____ 17. I think about something that happened earlier in the day.
- _____ 18. I think about something that happened in the recent past (for example, in the last few days).
- _____ 19. I think about something that happened in the distant past.
- _____ 20. I think about something that might happen in the future.
- _____ 21. I think about stopping.
- _____ 22. I think about how unhappy I am.
- _____ 23. I think about how hard it is.
- _____ 24. I think about how I can't stand it anymore.
- _____ 25. I think about quitting.
- _____ 26. I think about running away.
- _____ 27. I think about taking something (e.g. pills, a drink) to make it easier.
- _____ 28. I think about going to bed/or to sleep.

APPENDIX H

Summary Listing of Dependent and Independent Variables

Dependent Variables

1. Passage Comprehension

com_pre	Phase 1 (pretest)
com_ten	Phase 2 (tenth day)
com_twe	Phase 3 (twentieth day)
com_main	Phase 4 (maintenance)
com_post	Phase 5 (delayed post)

2. Summary Task

Sum_pre	Phase 1 summary task (pretest)
sum_post	Phase 4 summary task (maintenance)

3. Question Generation Task

qg_pre	Phase 1 question generation (pretest)
qg_post	Phase 4 question generation (maintenance)

4. Gates MacGinitie
Reading Test

Gv_pre	Phase 1 Gates vocabulary subtest (pretest)
Gv_post	Phase 5 Gates vocabulary subtest (delayed post)

5. Gates MacGinitie
Reading Test

Gc_pre	Phase 1 Gates comprehension subtest (pretest)
Gc_post	Phase 5 Gates comprehension subtest (delayed post)

Independent Variables

1. Group
 - 1 (reciprocal teaching condition)
 - 2 (modeling only condition)
 - 3 (control condition)
2. Causal attribution - (measured by Leggett/Dweck Intelligence Scale)
 - I (incremental idea of intelligence) learning goal orientation
 - F (fixed idea of intelligence) performance goal orientation
3. Cognitive style (measured by Thought Occurrence Questionnaire)
 - I (intrusive thoughts)
 - N (non-intrusive thoughts)
4. Phase
 - 1 (pretest)
 - 2 (tenth day of intervention)
 - 3 (twentieth day of intervention)
 - 4 (maintenance - week following intervention)
 - 5 (delayed post - ten weeks following intervention)

APPROVAL SHEET

The dissertation submitted by Rita T. Aaron has been read and approved by the following committee:

Dr. Ronald R. Morgan, Director
Associate Professor, Counseling and Educational Psychology,
Loyola

Dr. Jill N. Reich
Associate Dean, Graduate School and Associate Professor,
Psychology, Loyola

Loyola

Dr. William R. Watts
Adjunct Professor, Counseling and Educational Psychology,
Loyola

Dr. Martha E. Wynne
Associate Professor, Counseling and Educational Psychology,
Loyola

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Education.

Date 4 / 22 / 88


Director's Signature