1987

Predictive Questioning in Teaching Reading Comprehension to Intermediate Level Students

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PREDICTIVE QUESTIONING IN TEACHING READING COMPREHENSION TO INTERMEDIATE LEVEL STUDENTS

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Submitted in partial fulfillment of the requirements
for the Master of Arts in Education degree
Lindenwood College
1987

Accepted by the faculty of the Department of Education, The Lindenwood College, in partial fulfillment of the requirements for the Master of Arts in Education degree.

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Acknowledgements

First and foremost, I would like to thank Margaret Crawshaw, my mother, for all the love, fortitude, and encouragement she's given me, and for all the years of sacrifices she's made so that I could not only obtain a valuable education, but also be a productive, caring, and useful person.

Loving appreciation to my husband, Gene, for his constant understanding, support, and technical assistance.

In memorium, I'm very grateful to my aunt, Mildred Oglesby, for caring so much and helping me enjoy the past few years by being there to love and encourage me.

A heart-felt thank you to Mr. Wayne Gronefeld for giving me the chance to "add a few more colors to my teaching rainbow."

An indebted thanks to Mary Gismegian for reaching out and guiding me toward challenging educational opportunities.

Thanks to Dr. Janet Nemec for generating her enthusiasm, inspiration, and dedication to education.

Thanks to Dr. Richard Schuppan for his support, and to the Francis Howell School District for allowing me to do this project.

Finally, thank you to Dr. M. G. Henderson, Dr. Diane Denney, Dr. Jean Donovan, and Nancy Polette for the invaluable counseling, instruction, assistance, and friendship imparted to me. I truly treasure the time I spent at Lindenwood College.

ABSTRACT

This study involved nine sixth grade students in determining the effects of using predictive questioning techniques to improve reading comprehension in intermediate level students versus the results of using traditional reading methods. Present research gives supporting evidence that teachers spend too little time developing questioning abilities and therefore ask simple questions that require only literal comprehension skills. Although simple questioning has been found to improve the reader's ability to recall specific information from the text, it is a teacher-centered process that allows students to take a passive role in reading comprehension. The need for the focus of reading comprehension instruction to be shifted away from teaching isolated skills to a reader-centered process prompted the initiation of this study using predictive questioning to teach reading comprehension.

Predictive questioning is a process whereby specific questions are developed and presented for the purpose of eliciting inferential, analytical and evaluative responses. This process was used to involve students in justification procedures which required a more in-depth, focused view of story events. Consequently a greater attentiveness to text was demanded.

For purposes of this study, the predictive and traditional methods of instruction were alternated throughout an eight week period so that students would not accustom themselves to only one procedure. Following each procedure, students were given a comprehension test compiled by the Houghton Mifflin Company, the publishers of the reading text, to determine the level of significance of predictive versus traditional strategies. The data results were based on four predictive and four traditional session results. A t-test was calculated to determine the level of significance of predictive versus traditional strategies. The t-value was calculated to be 1.87265835. Given the degrees of freedom, the p was .04785 which was significant at the .05 level. This significant gain at the .05 level supported the hypothesis that there would be a significant difference in those students' reading comprehension scores who had four weeks of predictive questioning instruction as compared with students receiving traditional instruction for the same period of time.

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CHAPTER I

INTRODUCTION

General Area of Concern

The present lament of educational observers is that teachers are doing very little to develop various types and levels of thinking. With regard to reading, there has been some evidence that teachers spend very little time developing comprehension abilities. They tend to ask questions requiring only literal comprehension skills (Guzak, 1967; Durkin, 1981). In fact the 1987 results of the Missouri Mastery Achievement Tests support this concern. One of the major areas in which students scored poorly was critical thinking.

In 1917, Thorndike outlined a classic definition of reading in three words when he said, "Reading is thinking." That statement was made seventy years ago and yet present day education is still concerned with reading as thinking and how a variety of reading-thinking skills can be developed within the classroom. Since questions tend to be the prime thinking stimulus that teachers use to instruct and develop comprehension, the use and effectiveness of predictive questioning strategies was selected to be studied.

The Problem to be Studied

"Questioning students on what they've read is the most extensively used form of comprehension guidance" (Beck and McKeown, 1981, p. 913). However, a study done by Durkin (1978-79), concluded that most questions asked in reading classes do not promote comprehension because they dwell on literal comprehension--questions that require only simple recall answers. Concentration seems to focus on right and wrong answers rather than questioning to form a cohesive story line (Walker and Mohr, 1985).

Students seem to become very adept at knowing what kinds of questions that teachers will ask. Students therefore tend to "assume a passive role" (Walker & Mohr, 1985, p. 4). They rely on the teacher not only to set the purpose for reading, but to direct the learning, monitor the understanding, and provide feedback. Although simple questioning has been found to improve the reader's ability to recall specific information from the text, it is a "teacher-centered process." The focus of reading comprehension instruction needs to be shifted away from teaching isolated skills and directed towards a "reader-centered process" (Shanahan, 1985, p. 2).

This shift in focus would involve guiding and training the reader in the basics of comprehension through a continuum of task responsibility until the student can develop enough sensitivity to take control of comprehending print at all levels. In order for students to develop this sensitivity, the instructional methods must be such that they guide the students to raise their subconscious comprehension processes to a level of conscious awareness and control so they can become aware of what is known and what is not known during reading--this is called metacognition, or more recently metacomprehension (Fitzgerald, 1983). Present literature suggests that one of the most important metacognitive skills that children must acquire is the ability to accurately gauge their level of understanding. One of the best ways to accomplish this is by self-questioning (Andre & Anderson, 1978-79). However, one must also be aware that the ability to ask the right questions is a crucial component in being able to assess the level of one's understanding as well as one's mastery of the material. As Collins, Brown, and Larkin (1980) suggest, many failures of comprehension may be due to a failure to ask the right question.

Purpose of the Project

A review of related literature supported the following premises: first, a taxonomy of thinking skills exists through which one progresses; second, effective instruction

accommodates the level at which the student is functioning; and finally, that one's movements through the levels of thinking can be accelerated by means of questioning (Walker & Mohr, 1985; Friedman & Rowls, 1980; Pearson & Johnson, 1978; Barrett, 1967; Sanders, 1966). With regard to reading comprehension, an effective instructional approach based upon these premises has been identified as "predictive questioning" (Friedman & Rowls, 1980; Nessel, 1987).

Predictive questioning is a process whereby specific questions are developed and presented for the purpose of eliciting inferential, analytical, and evaluative responses. Thereby, students are involved in justification procedures which require a more in-depth, focused view of story events. Consequently, a greater attentiveness to text is demanded and a noticeable increase in comprehension results as compared to the results obtained following a traditional reading session. The purpose of this study, therefore, was to evaluate the effects of a predictive questioning approach to the teaching of reading comprehension upon intermediate level students.

The study was conducted using a Repeated Treatment Quasi-Experimental design of observation and treatment performed by this investigator. The study involved nine sixth grade students, during their regular reading classes, in determining

the effects of using predictive questioning techniques to improve reading comprehension in intermediate level students versus the results of using traditional reading methods. During the investigator's pre-determined predictive questioning reading sessions, students were asked to give predictive answers to several interspersed questions posed for the purpose of requiring students to use higher level thinking skills to predict and then justify answers. Students were tested, using comprehension tests compiled by the Houghton Mifflin Company at the conclusion of each predictive and each traditional reading session. Results were then compared to determine any effectiveness resulting from the predictive technique versus the traditional. While the results could not be viewed as totally conclusive, evidence was found to suggest that positive outcomes result from the use of predictive questioning to increase reading comprehension in intermediate level students.

Major Research Hypothesis

As students predict and justify various possible answers to questions that are constructed based on several levels of comprehension, they will be forced to think and thereby will comprehend more deeply than when involved with the traditional reading comprehension strategies of identifying and naming the new vocabulary, introducing the story, reading the story, and

post-questioning. Therefore, there will be a significant difference in students' comprehension test scores following predictive questioning instruction as compared to their scores following traditional instruction.

Significance of the Problem

Teaching reading comprehension to intermediate level students, at times, seems to be a very elusive and frustrating task to accomplish. How can an educator direct another individual's subconscious mind to become a deliberately self-controlled, conscious mind?

Research concludes that comprehension is a complicated process as well as a product. To comprehend, one must be able to think and reason. Thorndike (1917) pointed out that the word "reason," etymologically, comes from the word "ratio," which means to balance. So the reader must take control and balance his purposes, experiences, and knowledge against what is being read to discover logical relations or be able to rearrange logical patterns so that a conclusion can be drawn.

How can such a complex process be taught? At present there exists much confusion in teachers' minds with regard to the proper instructional strategies to be used to teach reading

comprehension. There are so many different ideas regarding classification of skills and the wording used to describe the skills, as well as the many variations of meaning used in describing the skills. If educators are confused as to the purpose of the strategy they are using, then what impact does this impose on students?

Comprehension can be simplified and taught more effectively if one reflects on Herber's words (1978):

> We must remember that our purpose is not to teach our students <u>about</u> reasoning; rather it is to teach them how to <u>apply</u> the process effectively. There is much more hope for success in teaching how to reason than in teaching what reasoning is. (p. 108)

The ultimate purpose of reading is understanding. Thus, comprehension is the goal of reading instruction, however, students most often experience difficulty with comprehension. Traditionally, reading comprehension instruction has utilized questions classified as detail, main idea, and vocabulary. Recently, in light of research of the taxonomy of thinking skills, a promising new approach has emerged which employs the use of predictive questioning (Nessel, 1987). Research on this approach has only been extensively employed during the last fifteen years. This limits knowledge of the potential of this

method. What has been done indicates much promise for the predictive questioning approach as an effective strategy for teaching reading comprehension.

CHAPTER II

REVIEW OF THE LITERATURE

When the history of reading research for this century is written, the decades of the seventies and eighties will be looked at with great irony (Flood, 1984a). In the past twenty years, the knowledge of the basic cognitive processes involved in reading comprehension have increased dramatically as did our knowledge about the basic teaching processes. However, our knowledge about teaching reading comprehension has grown very little. This may be due to the fact that comprehension is a very complex process making it very difficult to understand let alone try to teach and develop. Due to this complexity and our lack of understanding all the basic processes involved in causing comprehension to take place, much confusion has evolved in the minds of teachers and those educators who train teachers.

A major confusion abounding the teaching of reading comprehension stems from reading methods texts. Comparing any of these texts with each other, it should be noted that a given skill in one book will be labeled something else in the other text. There is not only conflicting terminology but conflicting scope and sequence charts. One series might involve first grade students in answering literal, interpretive, and critical thinking questions while the other series asks only literal recall questions in primary grades and reserves the higher-order for later years.

Controversy and confusion even exists as to whether comprehension can be taught. One extreme contends that we can only teach word identification processes and the rest is left up to the native intelligence and experience of the reader (Flood, 1984b). There are others who believe that comprehension can be taught directly, but educators must become aware of the complex processes involved in comprehension.

Durkin conducted a landmark study in 1978-79 that revealed only a small amount of classroom time was being spent on comprehension instruction. Since that time, educators have shifted their instructional emphasis away from isolated skills and toward the comprehension of print (McNeil, 1984). Educators agree that students need better critical reading skills, but presently many teachers have only been given vague notions of ways to truly develop comprehension. They are unaware of the relationship of reading to thinking. In 1917 Thorndike stated very simply that "Reading is thinking."

Critical reading was defined by Wolf, King, and Huck (1968) as an:

> analytical, evaluative type of reading in which the reader analyzes and judges both the content of the selection and the effectiveness with which it is stated. It involves searching for the purpose underlying the authors message and making rational judgments about what is read based upon valid criteria. Critical reading is critical thinking applied to all kinds of written materials: argumentative, information, or literary. (p. 442)

Reading is a complex, cognitive process that involves the reader in language, motivation, perception, and concept development--the same factors involved in problem solving (Flood, 1984a).

Early research in critical thinking was limited to the high school and adult level. However in 1945, Grener and Raths used a third grade class for a limited study of critical thinking. This study indicated that younger children could perform higher thinking processes. In 1964, Taba, Levine, and Elzey conducted a study which focused on the specific higher thinking skill of interpreting, inferring, and generalizing. They noted considerable growth in the transformation of concrete thought into formal thought from the second to the sixth grade. Their conclusions were that children can learn to make inferences, to generalize, and to make logical assumptions at an early age if they receive systematic instruction in thinking skills. In fact, their study affirmed the cognitive developmental sequence that was theorized by noted Swiss psychologist Piaget. However, the age placement of thought processes on Taba, Levine, and Elzey's study was different. They found that the beginnings of formal thought processes was in grade two rather than grade twelve as stated by Piaget. Other researchers have evidence that children can handle aspects of critical thinking even before that time. Wann and his associates (1962) have reported

that children are capable of a wide range of thought processes between the ages of of three and five, and that this ability can be influenced positively by knowledgeable teachers. These studies resulted in the common finding that instruction accelerates the thinking process. Therefore, if children are capable of advanced critical thinking abilities, it would seem important to begin instructing and developing these thinking skills rather than allowing the students to slip into the undeveloping pattern of becoming nothing more than passive participants in the reading process--that is reading only to satisfy the teacher purpose.

Teachers, too frequently, have stressed the mechanics of reading and neglected the thinking aspect. The assumption that whatever is written is correct information leads students to develop a non-questioning attitude towards their reading. Stauffer and Cramer (1969) have suggested that the aims of a reading lesson should be twofold:

> The first aim is to teach children the skill of extracting information of predictive value from a given text, either fictional or non-fictional in nature. The information extracted will depend upon knowledge pupils bring to the reading situation. The second aim is to provide, through the group medium, ways of behaving as a thinking reader that would be useful to pupils when reading on their own. The ultimate goal of reading instructions is to develop independence so that the reader can, in the privacy of his own study, read materials in a critical and creative fashion. (p. 34)

According to Pearson and Johnson (1978), "Whatever influences general thinking or problem solving ability also influences comprehension" (p. 9). Comprehension is being able to build bridges between the new and the already known. Comprehension refers to the student's ability to extract meanings from the printed word rather than just identifying and naming words. Factors that can influence comprehension are found both inside and outside of one's head. For instance, factors that are inside the head can be listed as: the reader's linguistic ability--what is known about the language; interest--how much the reader "cares" about the various topics encountered; motivation--how much the reader "cares" about the task and his or her attitude or mood about reading and school; and ability--how well the reader can read. The factors outside one's head that can influence comprehension are: (a) the "elements on the page"--such as difficulty of text, and the way the text is organized (the kind of help provided by headings, charts, etc.); and (b) the "qualities of the reading environment"--such as what the teacher does before, during, or after reading to help the student "understand" what is in the text, and the ways that other students react to the task at hand.

Since comprehension cannot be directly observed because it takes place inside the head, teachers have utilized questioning strategies to determine whether students are "understanding" (Beck and McKeown, 1981). Questioning is an everyday occurrence that most individuals are accustomed to. "Questioning is the most accessible of all methods involved in teaching reading comprehension" (Van Jura, 1982, p. 214). A study done by Durkin (1981) suggested that "a question increases the cognitive effort that a reader gives to what is considered relevant to his or her own purpose" (p. 37).

In 1964, Taba, Levine, and Elsey determined from their research in children's thinking that teachers' questions were the most important aspect of the classroom language (Wolf, et al., 1968). Questioning during a reading lesson involves the student in focusing on the story and events that have taken place. Therefore, questioning would seem to be a very natural tool to use to develop comprehension. However, according to (Walker and Mohr, 1985), questioning can also cause readers to focus only on the passages related to the pre-posed questions. Students might learn to read simply to satisfy the teacher's purpose rather than their own. Therefore a method of questioning desired to develop comprehension more fully would be one that involves putting the reader in an active role in the process of getting the meaning of what is read.

In order for the reader to become more directly involved, a purpose must be set forth by that reader causing their reading-thinking ability to become deliberate and controlled. In the 1910 edition of How We Think, John Dewey declared that thought may be directed by five steps:

> i) a felt difficulty; ii) its location and definition; iii) suggestion of possible solution; iv)) development of reasoning of the bearings of the suggestion; v) further observation and experiment leading to its acceptance or rejection; that is the conclusion of belief or disbelief. (cited in Stauffer, 1969, p. 11)

Teachers can help students increase their comprehension by helping them become independent readers. Students should be allowed to take control of the task of comprehending print at all the levels of thinking. Comprehension strategies used in the classroom should provide models and opportunities for students to develop a "sensitivity to what is known" (Shoop, 1986, p. 670).

Shoop (1986) compares training students to comprehend with pilots being taught to fly:

> While students are learning the basics of comprehension, teachers act as flight trainers, modeling comprehension processes and providing opportunities for practice. After sufficient ground school instruction and demonstration runs, students must be allowed to become the pilots. Teachers must then serve only as navigators, implementing strategies which allow students to take responsibility for comprehension and being available for direction as needed. The

> teacher's goal in guiding comprehension is moving the students to the point of flying solo, comprehending print independently. (p. 671)

Independent readers can be molded by instructing students on how to ask questions that "get somewhere" (Donlan, 1978, p. 536). The practice of encouraging students to set their own purposes, "asking questions that get somewhere," (Cramer, 1970, p. 260) for reading can lead to growth in critical reading and critical thinking abilities.

Prediction is one such strategy that involves the reader in setting purpose for reading. It places a strict reading-thinking demand on the reader. It sets forth a problem that demands a solution.

Prediction encourages the student to think beyond the information given. Inferences are made and modified. The reader must continually re-examine what is being read and re-evaluate predicted inferences and hypotheses. "A reader who can predict where the story will go has an effective technique for making accurate evaluations while he is reading because it requires him to examine the adequacy of his own set for reading while he reads" (Cramer, 1970, p. 260).

Since students tend to emulate their teachers, predictive questioning strategies can best be developed by teachers constructing their own questioning strategies that will "provide for the literal, the interpretive, and the applied," levels of comprehension (Donlan, 1978, p. 540).

Guzak (1967) stated that although many appear to recognize the importance of questions, "few have taken the steps in teacher education to assist teachers in acquiring the knowledge about the kinds of questions they can ask" (p. 108). He also concluded that with a means of relating questions to one another, "teachers could employ strategies that would challenge students to think more deeply about their reading material." He warned that caution must be exercised in using questioning. He stated that, "simply because questions are widely used is no evidence of their quality, importance, or appropriateness" (p. 108).

Questioning has always been a prevalent instructional practice and a noteworthy topic for investigation. The studies revolving around questioning deal with the idea of the existence of several levels of comprehension from the simple to complex (Beck and McKeown, 1981). Several taxonomies have been developed describing these levels (Pearson and Johnson, 1978; Herber, 1970; Barrett, 1967; Sanders, 1966; Taba, 1965; Bloom, 1956). These taxonomies are somewhat different in the given names and numbers of levels of comprehension, but their overall design is similar. (See Appendix B, p. 43).

"Although it is a valid point that questioning should attend to more than literal ideas from a story, attention to taxonomic levels is not sufficient for creating questions that best promote comprehension" (Beck & McKeown, 1981, p. 914).

Pearson and Johnson (1978) stated that questions cannot be classified in isolation. "Questions which on the surface may look like they require simple, straightforward, literal recall of factual details may in fact require a complex set of inferences which involves textual and scriptal information" (p. 164).

Specific faults of taxonomies were diagnosed by Beck and McKeown (1981):

> Taxonomies do not encompass certain dimensions of relationship between questions and a text, dimensions that could be critical to comprehension. One such dimension is the role within the text of information tapped by questions. As an illustration of this dimension consider two hypothetical questions for the story "The Three Little Pigs": "What did the third little pig use to build his house?" and "How many bricks did the third little pig use?" The two questions would be equated in a taxonomic view since both query literal information from the story. Yet the latter question is trivial while the former is based on information of central importance to the story. Similarly, questions from higher taxonomic levels do not necessarily imply greater story comprehension. For example, less processing of text ideas would be required to answer an appreciation level question such as "How would you have felt if you had been Goldilocks?" than to give a summary or synthesis of story events. Yet appreciation is a higher level in a comprehension taxonomy than is synthesis or reorganization. (p. 914)

Keeping the limitations of the taxonomies in mind, these taxonomies can be used as guides to develop questioning strategies.

Research studies consistently show that both pre and post questions will help students remember material (Vacca, 1981). These studies also suggest that placement of questions affect what is retained by the reader. When deciding on the types of questions to use, Vacca (1981) states that it is necessary to consider what students are to learn:

> If your instructional purpose is to help students acquire as many facts as possible then consider interspersing factual post-questions throughout the reading design. If your instructional purpose is to help students interrelate information and derive generalizations, then consider using pre-questions that require an interpretive level of response. (p. 181)

Questions to promote comprehension cannot focus on isolated items. The overall concept of the story must be considered (Beck & McKeown, 1981). Students must become actively engaged in predicting. As a tool to develop comprehension, it is most important that questions be used as an aid to build meaning--"comprehension." Guzak (1967) concluded that most elementary classrooms use questioning only as an assessment of comprehension. Since students tend to model their questions after their teacher's questions (Donlan, 1978) the way a teacher uses questions takes on more importance in the instruction of comprehension. Research consistently indicates that students retain more about a text when questions are used. Both oral and written questions can help students "Learn to read to learn" (Van Jura, 1982, p. 214).

Reading specialists have recognized the importance of predicting for some time. It is generally held that people solve problems by sampling and testing hypotheses. Friedman and Rowls (1980) noted that "Not only are individuals motivated to make predictions, but once they make a prediction, they are motivated to confirm it. It is through the confirmation of their predictions that individuals learn that their perceptions of reality are correct," (p. xvii).

We predict while thinking and while reading. The ability to predict is an essential factor in effective thinking and reading. Learning in general and reading in particular involves the understanding of sequences and the discovery of how things, events, and ideas are patterned, and programmed. This ability to discover patterns and sequence underlies our ability to make accurate predictions.

Research concludes that good thinkers and readers are good predictors. Goodman (1965; 1970) found that an important connection between prediction and reading existed. He maintained that "reading is not the precise, detailed, and sequential perception of letters and larger units that other researchers have described it to be." He insisted that reading is a "psycholinguistic guessing game" (1970, p. 259). Goodman (1970) defined reading as:

> a selective process. It involves partial use of available minimal language cues selected from perceptual input on the basis of the reader's expectations. As this partial information is processed, tentative decisions are made to be confirmed, rejected or refined as reading progresses. (p. 260).

The proficient reader uses the least amount of information to make the best possible guesses. Terms like "reader's expectations," "hypotheses," and "guesses" are common in the present literature on reading. Common to all these activities is the ability to predict.

Students who are poor readers have difficulty recalling what they have read. They are so engrossed in the decoding process that meaning and the assimilation of meaning become secondary. Research supports the notion that accurate predictions and reading ability go hand in hand. Greeno and Noreen (1974) conducted an experiment which required subjects to read in order to develop predictions concerning material yet to be read. Then additional information was supplied that was either consistent or inconsistent with the material already covered. They concluded that "inconsistent reading material (that is, material of low predictability significantly increased the amount of time required to do the reading" (p. 119). In 1968, Henderson and Long studied the relationship between reading ability and the ability to predict story outcomes. They had readers at various levels of proficiency read the title of a

story and rate thirty possible outcomes in terms of their likelihood. Then, all subjects read half of the story and rated a second set of outcomes in the same manner. Henderson and Long concluded that superior readers had much greater ability to predict than did poor or average readers.

Prediction allows students to regain focus and attention on the information being presented by the author. Most evidence indicates that prediction is highly involved in reading and "there is much to be gained by focusing on prediction in the teaching of reading" (Friedman & Rowls, 1980, p. 9).

CHAPTER III

METHODOLOGY

Restatement of Major Hypothesis

As students predict and justify various possible answers to questions that are constructed based on several levels of comprehension, they will be forced to think and thereby will comprehend more deeply than when involved with the traditional reading comprehension strategies of identifying and naming the new vocabulary, introducing the story, reading the story, and post-questioning. Therefore, there will be a significant difference in students' comprehension test scores following predictive questioning instruction as compared to their scores following traditional instruction.

Procedures

The research was conducted using a Repeated Treatment Quasi-Experimental design of observation and treatment performed by the teacher (see figure 3-1).

Figure 3-1

$$X\ O_1\ X\ \bar{O}_2\ X\ \bar{O}_3\ X\ O_4\ X\ \bar{O}_5\ X\ O_6\ X\ \bar{O}_7\ X\ O_8$$

A time-line of sixth grade reading text stories was developed to designate which stories would be read utilizing the predictive questioning and which would involve the traditional method of developing comprehension (see Table 3-1).

Table 3-1

TEACHING STRATEGY TIME-LINE

DATE	BEACONS STORY	TREATMENT
April 14	"Chuckwalla Camp"	Predictive
April 23	"Sounds of Sea Mammals"	Traditional
April 28	"Rescued by Dolphins"	Traditional
April 30	"The Night of the Leonids"	Predictive
May 5	"They Called Her Moses"	Traditional
May 7	"The Lady in Black of Boston Harbor"	Predictive
May 12	"The Last Take"	Traditional
May 14	"The Silent Valley"	Predictive

Tuesdays and Thursdays, during regularly scheduled 50 minute reading periods from 12:28 PM until 1:18 PM, were chosen as observation and treatment days since they appeared the least affected days by schedule changes due to school activities or holidays. The regular sixth grade classroom was used as the

experimental setting. The room had no windows and a solid door with only a small narrow window. Therefore, distractions were minimized. The project began on a Tuesday using the predictive questioning strategy devised predominantly by Walker and Mohr (see Appendix A, p. 40) based on several taxonomies of reading comprehension and questioning (see Appendix B, p. 43). Reading sessions continued on Thursday using the traditional method of instruction. The traditional method of teaching reading comprehension basically consisted of identifying new vocabulary, previewing the story by looking at the title and any drawings, pictures, or other pertinent information. A short discussion then occurred to introduce the story and was concluded by posing one or two questions to guide the students' reading. Finally, the students were given post questions after the oral reading session. The predictive and traditional procedures were alternated so that students would not accustom themselves to only one procedure.

Predictive Instructional Model Procedures

1. The teacher initially took control of instruction by modeling self-questioning procedures that should take place in the reading-thinking process. This allowed students to see a model of the steps of active comprehension. As the instructional procedures continued, the teacher and students exchanged responses, thereby continuing the modeling.

2. The student assumed control by self-questioning. The strategy of predicting was encouraged by requiring inferences as to what would occur, judgments, and evaluations.

3. Students made inferences related to teacher's questions by using information already known and clues from the text to support the inference.

4. Students then evaluated their responses by discussing how important text information fit or agreed with their inference. If the inference did not agree with textual information, they were asked to revise their inference based on new information presented in the text. A major factor stressed was assuring students that it was acceptable and part of the prediction process to change their inferences. Inferences are not always correct initially. New information can change the setting and inferences must then be revised. See Appendix A (p. 40) for an outline of the basic procedure used in this study.

Subjects

This project was a study composed of nine sixth grade students from a self-contained class in a middle-school located in a residential and service area. The students were assigned to this group, prior to the decision to initiate this study, based on previous elementary teacher, counselor, or principal recommendations. Students who were expected to have more difficulty coping in a middle-school setting were placed in this

self-contained class in an effort to provide the structure and guidance needed to enable them to make a smooth transition from elementary to middle-school. The socio-economic status of the families was varied including professional and white collar occupations. The students were considered "poor readers" based on their Comprehensive Tests of Basic Skills total reading scores. Six out of nine students had scores below the 50th percentile and four of those same nine scored below the 32nd percentile (see Table 3-2).

Table 3-2

STUDENTS' CTBS READING PERCENTILES			
N = 9			
	VOCABULARY	COMPREHENSION	TOTAL READING
A	68	95	87
B	50	47	47
C	44	50	47
D	64	87	79
E	60	60	60
F	32	28	29
G	8	30	18
H	46	26	32
I	32	24	27

Materials

The stories read by the students were from the sixth grade reading textbook Beacons published by the Houghton-Mifflin Company. The comprehension tests given to evaluate the effectiveness of using the predictive questioning techniques versus the traditional methods were comprehension tests printed and published by Houghton-Mifflin Company.

Data Analysis Procedures

All raw score points from each test were totaled and percentages were calculated. A graph was then made to determine if any immediate evidence could be observed of the effects of predictive versus traditional strategies (see table 4-1, p. 31). Then each individual student's raw score test results taken from the comprehension tests given following predictive questioning were totaled, as were the raw score test results following traditional methods (see Table 4-3, p. 75). Means, standard deviations, and a t-test were then calculated to determine if there was a significant difference between the predictive and traditional strategies (see Table 4-2, p. 33).

CHAPTER IV

RESULTS

The purpose of this study was to develop and evaluate students' comprehension capabilities by the use of effective predictive questioning strategies that allow students to progress through the taxonomy of thinking skills. Using several taxonomies of reading comprehension and questioning as guides, questions were developed that would encourage students' responses to be inferential, analytical, and evaluative in nature. Students were expected to justify their responses by referring to information in the text. Therefore, as they predict and justify various possible answers to the questions, they are forced to think and thereby comprehend more deeply than when involved with traditional reading comprehension strategies of identifying and naming the new vocabulary, introducing the story, reading the story, and post questioning.

Restatement of Major Hypothesis

As students predict and justify various possible answers to questions that are constructed based on several taxonomic levels of comprehension, they will be forced to think and thereby will comprehend more deeply than when involved with the traditional reading comprehension strategies of identifying

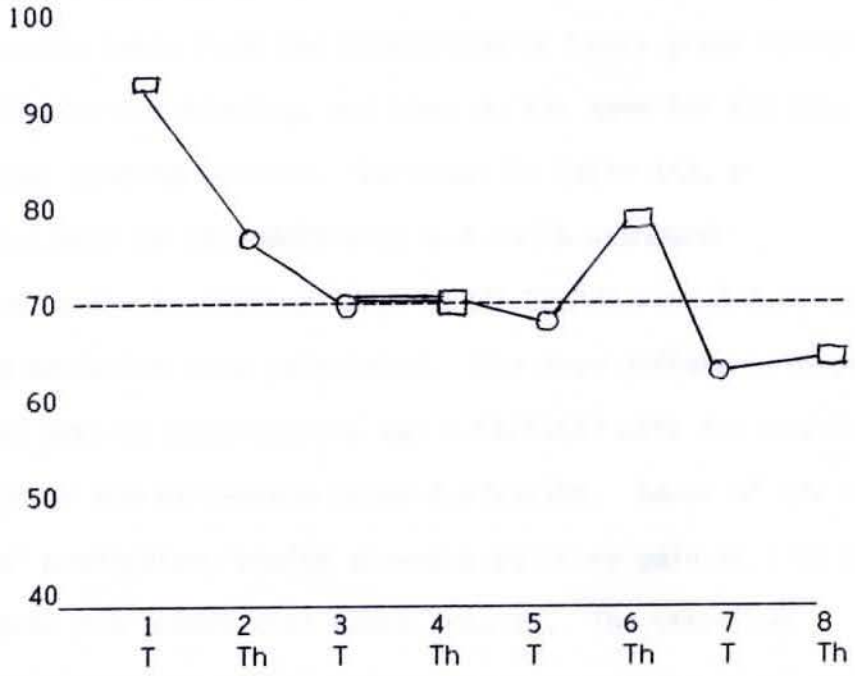
and naming the new vocabulary, introducing the story, reading the story, and post-questioning. Therefore, there will be a significant difference in students' comprehension test scores following predictive questioning instruction as compared to their scores following traditional instruction.

Data Analysis

Originally, the study was to have been based on the findings resulting from ten observations. However, due to threats of internal validity, two sets of test scores were eliminated in correlating data. The first predictive questioning test score results were eliminated due to instrumentation. All students scored perfectly on the test. Therefore, the test was considered to be too easy and consequently unreliable and invalid. The first traditional session test scores were also eliminated due to mortality, since three of the nine participants were absent. The data results were based on four predictive questioning and four traditional session results. The raw scores for each test were totaled and percentages calculated. The graph in Table 4-1 represents those percentages.

Table 4-1

Tests' Percentages Graph



X Testing Sessions
Y Class Percentages
Predictive
Traditional

T Tuesday
Th Following Thursday
-------- Median

Three out of the four predictive scores were at or well above the median. Two of those three scores were above the median. On the four traditional test scores, one set of results was at the median score and one was slightly higher than the median. The graph hints at positive results from predictive questioning but does not demonstrate conclusive evidence.

The next step taken was to total each student's four raw score results taken from the comprehension tests given following the predictive questioning, and then do the same for the four traditional testing results. As shown in Table 4-2, a predictive mean of 29.888889 with a 4.19656 standard deviation, and a traditional mean of 27.222222 with a 6.70406 standard deviation were calculated. The mean difference between these two sets of observations was 2.66666667 with the standard deviation of the difference being 4.27200188. Seven of the nine students' predictive results showed a positive gain of 1 to 9 points over the traditional score results. The other two students' predictive scores showed negative results of -1 and -5. A t-test was then calculated to determine the level of significance of predictive versus traditional strategies. The t-value was calculated to be 1.87265835. Given the degrees of freedom, the p was .04785 which was significant at the .05 level.

Table 4-2

RAW TEST SCORE TOTALS

N = 9			
	PREDICTIVE	TRADITIONAL	DIFFERENCE
Total Possible	(40)	(40)	
A	36	34	+2
B	34	30	+4
C	30	29	+1
D	34	31	+3
E	31	36	-5
F	28	19	+9
G	24	16	+8
H	26	27	-1
I	26	23	+3
MEAN	29.888889	27.222222	
S.D.	4.19656	6.70406	
t-Value	1.87265835		
df	8		
probability	.04785		

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The results of the data analyses indicate that the use of predictive questioning was more effective than the traditional methods used to increase reading comprehension. The overall conclusions drawn from the data analyses support the hypotheses that as students predict and justify their answers, they comprehend more deeply.

A factor to be considered as a major element contributing to the increase in comprehension abilities was the range of thinking levels through which students were forced to progress. They did not just answer questions that were simple, isolated bits of information, but instead had to put all the pieces together to make inferences and evaluations. Students had to contribute opinions and then give supporting arguments. The more they argued the pros and cons of their predictions, the deeper they were able to delve into the story. They were then better able to put the information into the proper perspective. They not only had to recall specific details but they needed to consider the author's meaning, and had to recognize underlying assumptions. This clearer understanding of the story and the

significance of the information led to greater levels of reasoning which were then forcibly used to analyze, to make judgments, or to evaluate. This in-depth look at and understanding of the story led to greater comprehension.

Limitations

1. This study dealt with only one self-contained class in the Francis Howell School System and was carried on by the classroom teacher. It cannot be generalized to other classes or schools.

2. The total population was small. Eleven students were in the class at the beginning of the study. Due to frequent absences, two students' scores were eliminated from the data to be analyzed. The scores of 9 students were used to calculate data results for this study.

3. Time constraints of a strict 50 minute reading session may have produced a hurried atmosphere for the longer stories--particularly the last story which had to be done over a two-day period. Scores were noticeably lower on this final comprehension test even though predictive questioning strategies were used.

4. No attempt was made to account for the comprehension that results from information stored in the reader's brain rather than on the printed page.

Conclusions

1. Significant gain at the .0473 level was calculated to support the hypothesis that there would be a significant difference in those students' reading comprehension scores who had four weeks of predictive questioning instruction as compared with students receiving traditional instruction for the same period of time.

2. No obvious reasons surfaced to explain why two students' scores showed a negative impact of -1 and -5. Possible explanations for the negative results might be: (a) the 50 minute time constraints causing the students to feel rushed or more concerned with the time than with the task at hand, (b) possible test-taking fears, (c) the students' inability to transfer mental thought into written communication, (d) the students' weakness in using higher-level thinking skills and the need for more time to develop the skills.

Personal Observations and Conclusions

1. Students were more interested in the story--rarely caught daydreaming or at wrong place when called upon to read.

2. Students were "ready" to take comprehension tests after predictive questioning--a marked improvement over previous comprehension testing sessions when students asked to be allowed to use their books. All comprehension test questions were not

only answered, but all tests were completed within 15 minutes of test starting time. On previous tests and those following traditional method sessions, students often pondered too long when trying to answer the questions, and often did not answer several questions.

3. A more active role for the reader is an important factor in increasing comprehension. Readers who can learn to control their subconscious minds to accurately gauge what they do and do not know during reading can develop a greater sensitivity to the printed material and take more control of comprehending.

4. Questioning is an important tool that can be used to develop this sensitivity.

5. Asking the right questions is an important component in the students being able to assess or make accurate judgments.

Summary

In reviewing the data compiled from this study, the results were statistically, significantly better using the predictive questioning approach to teaching reading comprehension versus the traditional method of simply identifying and naming new vocabulary, introducing the story, reading the story, and post questioning. Seven out of nine students showed a positive difference of 1 to 9 on the predictive results versus the

traditional results. The t-test value was 1.87265835 showing a p .04785. Therefore, the data supports the conclusion that predictive questioning can be considered an effective means of teaching reading comprehension to intermediate level students.

Recommendations for Further Research

1. A study, similar to this one, is needed in which the sample is larger and selected randomly.

2. A study is needed in which the experimental process is carried out for a longer period of time.

3. A study is needed to determine if the use of prediction strategies in school settings leads to improved comprehension of other passages in other situations.

4. A study is needed to determine the time length of the effectiveness of using prediction strategies. That is, if comprehension improves when tested immediately after prediction activities, then to what extent of time can predictive questioning still be considered effective.

5. A study is needed to determine the effectiveness of using prediction strategies with students who possess limited background experiences versus varied experiences upon which they can base their predictions.

APPENDIX A

PREDICTIVE-QUESTIONING STRATEGY FOR RESEARCH

PREDICTIVE-QUESTIONING STRATEGY FOR RESEARCH

Walker, B.J., & Mohr, T. (1985). The effects of ongoing self-directed questioning on silent comprehension. (ERIC Document Reproduction Service No. ED 262392).

Step I -- Problem Definition

A. Teacher controlled
   1. What must I do?
   2. I must guess what the author is going to say. A good strategy is to use the title of the story.
   3. So from the title of the story what guess would you make?

B. Student models inference
   1. From the title, I guess that . . .

Step II -- Plan of Action

A. Teacher models
   1. What plan will be used to make a good inference or guess?

B. Student responses
   1. To make any guess, I already know that . . .
   2. To prove my guess, I must look for clues in the story. . .

Step III -- Self-Questioning

A. Teacher models
   1. I wonder how your inference fits the author information?

B. Students responses
   1. It fits because . . .
   2. This information must be important because the author keeps talking about it.

Step IV -- Re-evaluation

A. Do you still agree with your inference?

B. Student responses
   1. I was right about . . . but wrong about . . .
   2. From the new information read, I guess that . . .

APPENDIX B

Taxonomies Compared

TAXONOMIES

SIX THEORIES ON LEVELS OF QUESTIONS

Levels of Comprehension	Bloom 1956	Taba 1965	Sanders 1966	Barrett 1967	Herber 1970	Pearson 1978
Literal	Knowledge Comprehension	Forming Concepts	Memory Translation	Recognition Recall	Literal	Textually Explicit
Interpretive (Inferential)	Application Analysis Synthesis	Interpreting Concepts	Interpretation Application Analysis Synthesis	Inference	Interpretive	Textually Implicit
Critical	Evaluation	Applying Concepts	Evaluation	Evaluation Appreciation	Applied	Scriptally Implicit

APPENDIX C

QUESTIONING STRATEGIES

STRATEGY I

Pearson, P. D. (1985). Changing the face of reading comprehension instruction. The Reading Teacher, 38, 724-737.

Developing questions to invoke prior knowledge and engange in prediction requires:

1. Read the Text
2. Decide on a few (2-4) key ideas, ideas which which usually represent the theme or moral, the main character's basic problem, or a key action, event, or feeling.
3. For each key idea, ask "Have you ever. . .?" and "What do you think X will do . . .?"
4. Before reading, spend a few minutes discussing each of the two questions for each key idea.
5. (Optional) After reading, return to the predictions to discuss reasons for differences or similarities between predictions and what actually happened.
6. Somewhere discuss why you are doing all this.

In trying to reconcile the available data on what promotes better understanding of textbook selections with conventional practices, Pearson (1985) derived the following instructional guidelines.

1. Ask questions that encourage children to relate the story to prior experiences.
2. Then, try to elicit predictions about what story characters will do in similar circumstances.
3. Ask purpose setting questions that persist as long as possible throughout the reading of a selection.
4. Immediately after reading, return to the purpose.
5. Use a story map to generate guided reading questions.
6. Include follow-up tasks that encourage synthesis of the entire story (retelling, dramatizing, summarizing).
7. Reserve comparison questions (with prior knowledge and other stories) for a second pass through.
8. Reserve authors craft questions (e.g., techniques for persuasion) for a second (even a third) pass.

STRATEGY II

Fitzgerald, J. (1983). Helping readers gain self-control over reading comprehension. The Reading Teacher, 37(3), 249-253.

Fitzgerald (1983) expounded on five activities to develop comprehension based on tasks used in recent research on metacomprehension--a reader's awareness and self-control of their understanding and of strategies that facilitate comprehension (Baker and Brown, 1980; Brown, 1980; Collins and Smith, 1980; Davey and Porter, 1982; Raphael, 1982).

1. Watching the teacher model comprehension.

In this activity, the teacher reads a selection aloud, commenting on his/her own monitoring and hypotheses while reading. The students do not see the text, but just listen. For example, the teacher might read aloud:

> He jumped out of the seat. He tried to get her to sit down so he could push her, but she refused. So the next time they were on the playground, he let her swing very high for a long time.

The teacher could begin the lesson by saying, "When we are trying to read something, it is very important to think about what we are reading and to realize what we understand and don't understand. When I read, I try to keep track of what I am reading and about what I understand. Let's all try to do that. Let me show you what I mean.

After reading the first sentence aloud, the teacher might ask questions such as "Where is this person?" and then make guesses or hypotheses such as "He's in a wagon or at school or church." Then the teacher lists all the things that are known under the word "Know" on a chart or the board and some of the unknown things under "Don't Know."

The cycle is repeated for the next sentences, with the teacher showing how, as more information is added, some of the "Don't Know" items are moved to the "Know" column. Then the teacher summarizes by explaining that while reading, he/she tried to keep track of what was known and not known, stressing the importance of doing so.

In follow-up lessons, the teacher can gradually involve the students in self-monitoring of comprehension by: 1) repeating the first lesson with a second similar text, but eliciting hypotheses and guesses from the students; 2) pairing up students and asking them to take turns practicing the self-monitoring technique aloud with a third and fourth text; 3) asking students to practice the procedure on their own with a fifth text.

2. Rating their own confidence in what they've read.

For this activity students read a passage that is difficult to understand. Then the teacher asks questions about the passage, and the students write their answers and rate their confidence in their answers on a scale of 1 "not sure at all" to 5 "very sure." Answers, and ratings are discussed. In a manner similar to the earlier demonstration using confidence ratings, the teacher shows how the ratings, in relation to the answers, reflect awareness of what the reader knows and doesn't know. . . . Students must be convinced that a low rating only indicates that more information is needed and, indeed, is a positive response because it shows awareness of comprehension.

3. Rating the adequacy of instructions.

In this task, students rate the adequacy, on a scale from 1 "very bad" to 5 "really good," of a set of incomplete or misleading instructions. Then they rewrite the instructions so that other students their own age could read and understand them. Reasons for low ratings for the original material are discussed and listed under a heading "Don't Know." Salient information that was known is listed under a heading "Know." Rewritings are shared orally, and it is noted how most (or all) changes and additions supplied needed information from the "Don't Know" column. The teacher then points out that to do the task, the students had to be aware of their comprehension, and awareness of comprehension is very important in reading.

Materials might include incomplete card game instructions, faulty recipes, directions for assembling a toy, or instructions for giving a hair permanent. The activity could be introduced as a large or small group activity and then done individually.

4. Questioning themselves while reading.

In this activity, students are divided into pairs and read the first section of a story. Together they make up and write down three questions about important information in the material for another pair of students to answer. They repeat the question writing process for the next section of the story. By writing questions for several sections of the text, students perceive the importance of self-questioning throughout the text.

When the students feel they are ready, the questions are swapped back again, and each pair gives the other pair oral feedback on the appropriateness of the answers. Finally, the teacher talks with the students about the importance of trying to ask themselves the same kinds of questions when reading on their own, because self-questioning helps create an awareness of comprehension and miscomprehension, that is, you have to be aware of what you know and don't know in order to form the question.

5. QARs--Knowing where answers may lie.

The QAR or question-answer relations technique (Raphael, 1982) teaches children a strategy for answering questions about text. Through a series of lessons, students are taught that answers to some questions are "right there" in the text, so the reader's strategy is merely to find the explicit answer in the material. Answers to a second type of question require a "think and search" strategy, whereas answers to a third type require an "on your own" strategy in which the reader puts together some information in the text with knowledge he/she already has.

For example, take this text: "Susan brought an umbrella to school today. It was small." A "right there" QAR would be "What did Susan bring to school today?" A "think and search" QAR would be "What size was the umbrella?" An "on your own" QAR would be "Why did Susan bring an umbrella to school today?"

STRATEGY III

Friedman, M. I., & Rowls, M. D. (1980). Teaching reading and thinking skills, p. 37-40. New York: Longman.

Friedman and Rowls (1980) state that in an instructional setting, we can enhance the reader's ability both to identify and predict the author's message by the following strategy:

THE PREDICTION PROGRAM

Stage 1: Identifying Initiating Events

Initiating events are the things that stimulate our interest. We attempt to identify them in order to deal with them.

Stage 2: Predicting Coming Events

Once we have identified what is happening, we are prompted to predict what will happen. We look for current trends as a basis for making predictions. The sentence "I am going on vacation," conveys a thought that matches a program generating a sequence of expectations. We expect the person to pack, to leave home, to take some means of transportation, to arrive at a vacation spa, to seek fun, to return home, and to resume the usual routine. Although particulars may vary, we expect this general sequence of events to occur. Predicting coming events is so natural that we often overlook it as an important mental function or tend to believe that it is a great intellectual feat achieved only by geniuses.

Stage 3: Predicting the Consequences of Intervention

As the author's message unfolds, new information is given which intervenes on our thinking. As a result we attempt to predict the consequences of these interventions. As a story is told, trends keep shifting because the characters in the story are intervening and taking action to produce the outcomes they prefer.

Stage 4: Identifying to Test Predictions

After predictions are made we monitor ensuing events for feedback to determine whether our predictions are correct.

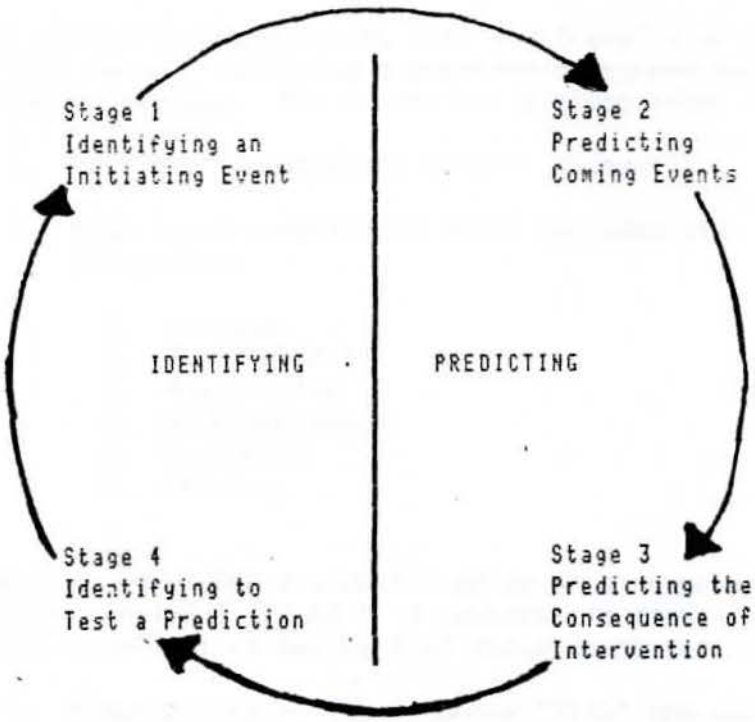


Diagram of Friedman and Rowl's Prediction Program
Strategy III

Note. From Teaching Reading and Thinking Skills (p. 40) by Myles I. Friedman and Michael D. Rowls, 1980, White Plains, NY: Longman Inc.

STRATEGY IV

Ryan, F. L. (1973). Differentiated effects of levels of education. Journal of Experimentl Education, 41(3), 63-66.

Ryan classified questioning into low (recall) or high (higher than recall) utilizing a questioning scheme patterned after Bloom's Taxonomy. His scheme was divided into:

1. Low level questioning (recall category)

2. High level questioning which included six categories:

    a. Process
    b. Relationship
    c. Application
    d. Educated Guess
    e. Synthesis
    f. Opinion

Ryan also developed a classification of a response called the "Question Analysis Scheme." A response is classified as "high" (vs. "low") if it has each of three characteristics:

1. Plausibility -- The response "fits" the question that was posed

2. Originality -- The response is a "fresh" versus repetitive, statement

3. Clarity -- The response is communicated in an "understandable" way.

In addition, some responses to some questions also required a fourth characteristic:

4. Support -- Reasons for a particular response were furnished.

STRATEGY V

Cramer, R. L. (1970). Setting purposes and making predictions essential to critical reading. Journal of Reading, 13(4), 259-262, 300.

Cramer listed the steps necessary to learn the processes required to build purpose setting prediction skills.

1. The teacher asks the reader to describe what he expects to happen in the piece which he is about to read; he asks again after the reader has begun reading.

2. The teacher requires the reader to examine the evidence in the text carefully to determine its relevance to his announced purposes and predictions. This action usually requires evaluation or judgment in terms of some norm or standard.

3. The teacher asks the reader to relate what he finds in the text and illustrations to his announced purposes and predictions in order to determine if his sense of form and his predictions were correct, incorrect, or partially correct; concomitantly, he asks the student to assess whether he has accomplished his purposes and what prevented or helped his accomplishing them. (The student, not the teacher, determines the adequacy of the "proof" of accomplishment of purpose. The teacher's role is to use questions deftly to lead the student to the realization of his own accuracy or lack of it.)

4. The teacher provides appropriate stopping points where the reader may confirm, modify, extend, refine, or reject his original purposes and predictions.

5. The teacher encourages the reader to suspend final judgment regarding the accuracy of his sense of what he is doing until he has examined all of the steps and missteps which were part of his reading.

STRATEGY VI

Guzak, F. J. (1967). Teacher questioning and reading. The Reading Teacher, 21(3), 227-234.

Guzak's initial research task was one of making a determination of what kinds of questions teachers ask about reading assignments. He made an exclusive survey of: reading-thinking skills as identified in basal series, reading-thinking skills as identified by reading authors, and representative thinking models. From these sources, the most pertinent conceptualizations of reading-thinking skills were synthesized into the model that subsequently was called the "Reading Comprehension Question-Response Inventory."

1. Recognition

These questions call upon the students to utilize their literal comprehension skills in the task of locating information from reading context. Frequently, such questions are employed in the guided reading portion of a story, i.e. Find what Little Red Ridinghood says to the wolf.

2. Recall

Recall questions, like recognition questions, concern literal comprehension. The recall question calls upon the student to demonstrate his comprehension by recalling factual material previously reaad. Generally, such activity is primarily concerned with the retrieval of small pieces of factual material, but the size of the pieces may vary greatly. n example of a recall question would be the following where the answer to the question is clearly printed in the text, i.e. What was Little Red Ridinghood carrying in the basket?

3. Translation

Translation questions require the student to render an objective, part-for-part rendering of a communication. As such, the behavior is characterized by literal understanding in that the translator does not have to discover intricate relationships, implications, or subtle meanings. Translation questions frequently call upon students to change words, ideas, and pictures into different symbolic form as is illustrated in the following from Bloom (1956).

Translation from one level of abstraction to another; abstract to concrete, lengthy to brief communication i.e. Briefly re-tell the story of Little Red Ridinghood.

Translation from one symbolic form to another, i.e. Draw a picture of the first meeting between Little Red Ridinghood and the wolf.

Translation from one verbal form to another; non-literal statements to ordinary English (metaphor, symbolism).

4. Conjecture

These questions call for a "cognitive leap" on the part of the student as to what will happen or what might happen. As such the conjecture is an anticipatory thought and not a rationale, i.e. What do you think that Little Red Ridinghood will do in the future when she meets a wolf in the forest?

5. Explanation

Explanation questions, like conjecture questions, are inferential in nature. However, the inference involved in the explanation situation is data-poor in terms of providing a rationale. Instances of explanatory behaviors are found in the following: explanations of value positions, i.e. Explain why you like Little Red Ridinghood best?; conclusions, i.e. Explain why the wolf wanted to eat Little Red Ridinghood; main ideas, What is the main idea of this story?

6. Evaluation

Evaluation questions deal with matters of value rather than matters of fact or inference and are thus characterized by their judgmental quality (worth, acceptability, probability, etc.). The following components of this category are adapted from a classification scheme by Aschner and Gallagher (1965).

Questions calling for a rating (good, bad, true, etc.) on some item (idea, person, etc) in terms of some scale of values provided by the teacher, i.e. Do you think that this was a good or bad story?

Questions calling for a value judgment on a dimension set up by the teacher. Generally, these are "yes" or "no" responses following questions such as "Would you have liked Tom for a brother?"

Questions that develop from conjectural questions when the question is qualified by probability statements such as "most likely." "Do you think that it is most likely or least likely?"

Questions that present the pupil with a choice of two or more alternatives and require a choice, i.e. "Who did the better job in your opinion, Mary or Susan?"

APPENDIX D

An Outline Derived from Norris M. Sanders (1966) book entitled:

CLASSROOM QUESTIONS -- what kinds?

(author unknown)

CLASSROOM QUESTIONS

Three factors enter into the determination of the kind of thinking that is brought about in the minds of students by any question.

1. The nature of the question itself must be considered in terms of its classification in the taxonomy.

2. One must be aware of the knowledge of the subject that each student brings to the classroom.

3. The third factor that enters into the classification of a question concerning the instruction that precedes the asking of a question.

Evaluation
Synthesis
Analysis
Application
Interpretation
Translation
Memory

Facts stress knowledge that comes from direct observation.

These questions serve three roles:

1. Some facts are important in themselves.

2. Some facts are worth remembering because a cultured person is supposed to possess them.

3. They provide a building of blocks for generalizations, laws, and principles

A generalization is a statement that declares the common characteristics of a group of ideas or things.

A value differs from a generalization in that it is a judgment of quality.

Attention to definitions, generalizations and values is vitally important in framing good questions for four reasons:

1. This form of knowledge is most important - most worthy of learning.

2. Teachers will find it much easier to compose questions if they concentrate on generalizations and values.

3. Educational research indicates that widely applied generalizations and values are less likely to be forgotten than most other forms of knowledge.

4. Educational psychologists who have studieD "transfer of training" conclude that the best way to prepare students for an unknown future is to instruct them in the use of generalizations and values that are likely to be fruitful with application.

Skills

1. A skill is a physical, emotional and/or intellectual process.

2. A skill requires knowledge, but knowledge alone does not insure proficiency.

3. A skill can be used in a variety of situations.

4. A skill can be improved through practice.

5. A skill is often made up of a number of subskills that can be identified and practiced separately.

Memory Category - THREE WEAKNESSES

1. The inevitably rapid rate of forgetting

2. Memorized knowledge does not represent a high level of understanding.

3. It neglects other intellectual processes learned only through practice.

The memory category is indispensable on all levels of thinking.

Translation

An idea may be expressed in several forms of communication, such as oral, written, pictorial, and graphic.

Questions are assigned to higher categories than translation if they stress the use of definitions, generalizations, values, or skills.

Examples:

1. Answer the question in your own words.
2. Change the form from words to pictures (or vice versa)
3. Compose a picture.
4. Match paraphrased sentences or paragraphs.
5. Translate ideas into a sociodrama.

Caution: The mechanics of translating an idea from one medium to another must not be permitted to be out of proportion to the importance of the idea.

INTERPRETATION

The student relates facts, generalizations, definitions, values, and skills.

Six forms of relationship:

1. Comparative relationship - Are ideas identical, similar, different, unrelated, or contradictory?
2. Drawing implications - an idea that follows inevitably from specified evidence
3. Drawing inductive conclusions - a generalization based upon an observation that many members of a class of things have a common characteristic, therefore all members of the class must have the same characteristic.
4. Relating a value, skill, or definition to an example of its use.

5. Quantitative relationship - drawing conclusions from statistical information

6. Cause and effect relationship - factors are responsible for every happening

Examples:

1. Students are asked whether two or more ideas are the same or different.

2. Another type of question asks for the degree of similarity-- Which city is most like_____?

3. Students can be asked to relate two or more sets of ideas on specific points.

4. The most challenging comparison questions leave it up to the students to determine the topics on which two or more general sets of ideas are comparable.

APPLICATION

Application questions present problems that approximate the form and context in which they will be encountered in life.

Applications are designed to give practice in transfer of training.

Characteristics of application questions:

1. They deal with problems that have explanatory or problem-solving power.

2. They deal with the whole of ideas and skills rather than with the parts.

3. Include a minimum of direction because questions are based on previous learning.

Application questions give practice of independent use of knowledge and skills. The questions can be built from a principle, definition, value, or skill.

A problem in the interpretation category requires the student to know an abstraction well enough that he can correctly demonstrate its use when specifically asked to do so. Application questions go a step beyond this. Given a problem new to the student, he will apply the appropriate abstraction without having to be shown how to use it in that situation. Examples: practice teaching, language arts, industrial arts, mathematics, physical education, music.

The mastery of skills is not complete until the student uses them successfully in the application category.

The research paper or oral report fulfills all the characteristics of the application category.

ANALYSIS

Analysis is different in that the thinking is relatively unfamiliar to many teachers and cannot be used until it is mastered.

In analysis there continues to be concern for subject matter, but in addition the student must be conscious of the intellectual process he is performing and know the rules for reaching a valid and true conclusion.

Four sources:

1. Knowledge in the subject is discovered
2. The discipline of logic and semantics
3. Description of propaganda techniques
4. A study of the rules of evidence used in court to establish guilt, innocence, and equity.

The most common form of analysis questions offers an example of reasoning and instructs the student to analyze it.

1. Instructive-reasoning from the specific to the general
2. Deductive-reasoning from the general to the specific

Long range plan for the study of deductive logic:

1. Present illustrations of deduction in their natural forms -- editorial and parts of speeches

2. Use deduction problems in all succeeding units.

Fallacies are mistakes in reasoning.

Students should not be asked analysis questions until they have had special instruction in some phase of the parts and processes of reasoning.

SYNTHESIS

Synthesis questions encourage students to engage in imaginative, original thinking.

Creativity in any field requires certain skills, but more than that, it requires a certain temperament and personality.

Synthesis thinking is not so closely tied to the form of the question as is true in other categories but, instead, is fostered by a classroom atmosphere that seeks and rewards originality.

Characteristics of synthesis questions:

1. They allow students great freedom in seeking solutions

2. The questions are of the type that have many possible approaches

3. Synthesis calls for divergent thinking which starts from a problem that offers a variety of possible and satisfactory answers

The teacher and the class should respect unusual answers and questions.

EVALUATION

Any idea or object can be evaluated in two main steps:

1. Set up appropriate standards or values
2. Determine how closely the idea or object meets these standards or values

To qualify in this category the student is required to perform both steps in evaluation.

Evaluation is always subjective in one of two ways:

1. Either the student cannot be proven to be correct
2. Or the idea to be judged cannot be proven to violate or illustrate the standard.

The process of evaluation requires preparatory instruction which falls mainly in the memory and interpretation categories.

Skill in evaluation requires knowledge of the nature of value.

By values we refer to objects, situations, or activities which are liked, desired, or approved by human beings. Facts can be determined to be true or false, but values cannot.

Theories concerning values:

1. Standards for right and wrong are related to the laws of nature
2. Values relate to particular cultures
3. Right and wrong are related to individual taste

To assess the quality of something requires a knowledge of purpose.

Evaluation is among the most difficult of mental activities, because there can be no absolute assurance that the product represents truth.

APPENDIX E

TESTS USED FOLLOWING PREDICTIVE READING SESSIONS

FROM BEACONS COMPREHENSION AND VOCABULARY ACTIVITIES

Comprehension Questions BEACONS

Chuckwalla Camp
(pages 320-331)

Answer these questions.

1. What was Pip looking for on his overnight camping trip in the desert?
2. After Pip got his supplies together for the overnight trip, he said that "if advice can be counted a supply, I was stocked up for a month." What did he mean?
3. Think about the amount of water you drink in a day. Do you think Pip needed to take a ten-gallon tank of water for his overnight trip?
4. How does a person's need for water in the desert differ from that of desert animals?
5. Pip forgot a very important rule that campers should follow, especially in the desert. What was that rule and what was it meant to guard against?
6. Why did Pip panic when he realized that he had been bitten by a scorpion?
7. What did Pip mean when he said that he had been looking for trouble in the "wrong direction"?
8. The author included in this fictional story many facts about lizards and other desert animals. Do you prefer to read factual information in a reference book, or do you enjoy learning facts while you are reading for pleasure? Give reasons for your answer.
9. After Pip was bitten, many things went through his mind as he waited seven hours for Jan to arrive. What are some of the things you might have thought about if you had been in Pip's place? How do you think you would have behaved?

Comprehension Questions BEACONS

The Night of the Leonids
(pages 350-358)

Answer these questions.

1. Why didn't Lewis and his grandmother get to see the Leonids the night they went to Central Park?
2. Why had Grandmother missed seeing the earlier shower of Leonids?
3. Lewis said that sixty-three and thirty-three don't add up to another chance. What did he mean?
4. Lewis said he knew about "lost chances." What do you think he meant? If you wish, tell about any lost chances you have experienced.
5. Why, do you think, did Lewis and his grandmother hold hands on the way back from Central Park even though neither of them usually liked that sort of thing?
6. How did Grandmother explain the fact that "shooting stars" burn up before falling all the way to earth?
7. About how old was Lewis? How were you able to figure out his age?
8. Why did Lewis say that in case of fire, he would make the telephone call?
9. How do you feel about Grandmother's plan for sharing the TV set with Lewis? Can you think of a plan that might have worked out better? If so, what is your plan?
10. Lewis said several times that he and Grandmother "got along pretty well." Do you think Grandmother and Lewis had a good relationship? Why or why not?

Comprehension Questions BEACONS

Lady in Black of Boston Harbor (pages 392-400)

Answer these questions.

1. Why does the Lady in Black haunt Fort Warren?
2. What kind of person was Melanie Lanier?
3. How did Melanie travel from Crawfordville, Georgia, to Boston?
4. Melanie's plan was to help her husband escape. What items did she smuggle into prison with her? What bolder plan did the prisoners suggest?
5. In what way did the prisoners miscalculate in digging the tunnel?
6. If the prisoners had not miscalculated in digging the tunnel, do you think they might have captured the fort and changed the course of the war? Explain your answer.
7. After the prisoners had crawled from the tunnel and had been led to the parade ground, Melanie was their only hope. Can you think of a better plan than the prisoners did for having her rescue them?
8. Why do you think the author used the phrase "more quickly than a copperhead could strike" to describe how the colonel took the pistol away from Melanie?

Comprehension Questions BEACONS

The Phantom Tollbooth
(pages 526-544)

Answer these questions for pages 526-537.

1. Why did the Soundkeeper decide to banish all sound from the valley?
2. How did the people of the valley communicate with Milo?
3. What did the people ask Milo to do to help them bring back sound?
4. One of the favorite pastimes of the Soundkeeper was listening to fifteen minutes of silence on the radio. What other kinds of stillness did she mention besides those on the radio?
5. Which of the silences that the Soundkeeper named are most familiar to you? What are some other silences you enjoy?
6. What indications are there in the story that the Soundkeeper was not as fond of silence as she pretended?

Answer these questions for pages 537-544.

1. Why did the Soundkeeper think it was necessary to collect sounds?
2. What was the Soundkeeper's first step in making a sound? What visible sound did Milo try to put into his pocket?
3. How was Milo able to bring the word BUT out of the fortress?
4. What happened when Milo's word was shot at the fortress wall?
5. Explain what the Soundkeeper meant when she referred to sounds as "nourishment."
6. What are some sounds that most people do not seem to appreciate but would probably miss if the sounds disappeared?

APPENDIX F

TESTS USED FOLLOWING TRADITIONAL READING SESSIONS

Comprehension Questions BEACONS

The Cat-King's Daughter
(pages 333-346)

Answer these questions.

1. How did King Hugo come to be known as the Cat-King?
2. Was it because Raimond played the lute and wrote verse that the king found him an unacceptable suitor for his daughter? Why do you think as you do?
3. What different things did Elena suggest doing to change her father's mind and discourage suitors other than Raimond?
4. Margot convinced Elena to try a different plan. What was it?
5. What did Margot mean by saying that what happened while Elena lay hidden under the couch might break her heart?
6. The king expected that Raimond would react to the cat-princess in the same way the other suitors had reacted. How did Raimond react to her?
7. Why did the king think that Elena had turned herself into a cat?
8. Why was King Hugo ashamed when Raimond asked him if he loved himself more than anyone else?

Comprehension Questions BEACONS

Rescued by Dolphins
(pages 370-378)

Answer these questions.

1. Do you think dolphins are capable of rescuing someone in the way described in this science fiction story? Why or why not?
2. How were the dolphins able to keep pushing the raft steadily for so long?
3. How did Johnny know the animals were dolphins rather than sharks?
4. The author described the dolphins as moving through the water in a "roller-coaster motion." What did you think he meant by those words?
5. What did Johnny do to try to protect himself from the tropical sun?
6. How do you know that the dolphins must have pushed the raft very gently?
7. How did Johnny discover in which direction he was traveling?
8. Why did the dolphins detour around the island?
9. You have probably never gone as long as Johnny did with nothing to eat or drink, but when you have been without food or drink for a long time, what did you crave the most? Why did you crave that particular thing?

Comprehension Questions BEACONS

Harriet Tubman: Conductor on the Underground Railroad (pages 401-416)

Answer these questions.

1. When Harriet Tubman was arranging for an escape at a plantation, how did she announce her arrival in the slave quarters?
2. Why did Harriet have to take the fugitive slaves all the way to Canada?
3. The Fugitive Slave Law made it a crime to assist runaway slaves. Why do you think Harriet Tubman and others disobeyed that law and helped the fugitives?
4. When Harriet's group arrived at the farmhouse that was to be their first stop, after three nights of walking, the farmer refused to shelter them. Why?
5. What would have happened to the slaves if they had been caught? What would probably have happened to Harriet if she had been caught while helping the slaves escape?
6. Why did Harriet's group travel at night instead of during the day?
7. Why was it difficult for the members of the group to sleep during the day?
8. Why did Harriet continually talk to the slaves as they traveled?
9. Why did Harriet threaten to shoot the slave who wanted to give up and go back to his master?
10. Why do you think the runaways stayed with Harriet when she fell into one of her fits of sleep rather than going on without her or turning back to the plantation?
11. What kind of person, do you think, was Harriet Tubman? Give reasons for your answer.

Comprehension Questions BEACONS

The Last Take
(pages 456-469)

Answer these questions.

1. Emmeline and her friends liked visiting Aunt Beth for several reasons. What was the greatest attraction? Why did the girls like it so much?
2. After Alison viewed her sister Jeannie's ballet performance on the TV monitor, she said that the dancing made up in vigor what it lacked in grace. What did she mean?
3. What did Alison hope would happen someday while she was performing on the TV monitor?
4. Why had a section of the West Side Highway been closed to cars?
5. Do you think it was a good idea for people to be allowed to use the highway as they did? Why or why not?
6. At first the girls thought that the action taking place on the highway was a real police chase. What was the first clue that it was not?
7. As the girls hurried through the lobby to join the spectators outside, why were they "scornful of the security guard and his mere ordinary, foggy little security TV screens"?
8. When the girls rushed out to get a close look at the Great TV Detective, why were they disappointed?
9. What did the girls do to appear in the last take?
10. Why, do you think, did the author refer to the girls as human grass snakes?
11. When Alison thanked Emmeline for being the cause of her first big chance, was she being sincerely modest. Why or why not?
12. How do you think the film crew might have reacted when they printed the last take and noticed the girls in the background?

APPENDIX G

DATA INFORMATION TABLES

TABLE 4-3

RAW TEST SCORES

	TESTING SESSIONS							
	*1	2	3	*4	5	*6	7	*8
STUDENTS								
A	9	7	7	9	10	8	10	10
B	9	8	8	9	8	6	6	10
C	9	6	5	8	9	7	9	6
D	9	6	9	7	7	8	9	10
E	8	8	9	9	9	7	10	8
F	8	4	5	7	6	7	4	6
G	7	4	4	5	3	2	5	10
H	8	6	5	4	8	7	8	7
I	8	5	5	6	7	5	6	7
TOTAL POSSIBLE	9	8	9	10	11	8	12	13

* PREDICTIVE TESTS

TABLE 4-4

INDIVIDUAL STUDENTS' TEST PERCENTAGE SCORES

Number of Students = 9

Predictive percentage is based on 4 test scores
Traditional percentage is based on 4 test scores

Comprehension Tests Percentages

	Predictive	Traditional
A	95	85
B	88	67
C	83	68
D	89	79
E	84	91
F	79	50
G	63	40
H	74	63
I	73	56

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