

A STUDY OF THE EFFECT OF THE MODIFIED DIRECTED  
READING-THINKING ACTIVITY ON THE DEVELOP-  
MENT OF PUPIL-INITIATED INFERENTIAL  
QUESTIONING AND INTERACTION AT  
SECOND GRADE LEVEL

by

Edna Joan Gemmell

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submitted in partial fulfilment  
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A Study of the Effect of the Modified Directed Reading-Thinking Activity on the Development of Pupil-Initiated Inferential Questioning and Interaction at Second Grade Level.

ABSTRACT

This study designed a strategy to promote pupil inferential questioning and interaction during reading lessons. The modified directed reading-thinking activity (MDR-TA) was then compared with the traditional basal reader approach, the directed reading activity (DRA), to determine which strategy best fostered pupil-initiated questions and interaction and whether use of the MDR-TA would cause a change in the types of questions posed by teachers and the types of responses elicited from pupils.

Five main hypotheses were examined. Pupils receiving instruction by means of the MDR-TA will ask 1) more questions in total; more questions in the categories of inference, explanation, evaluation; 2) initiate more talk and 3) make different numbers of responses in the categories of recall, translation, inference, explanation and evaluation, than pupils receiving instruction by means of the DRA. Teachers instructing by means of the MDR-TA will pose 4) fewer total questions, fewer recall and translation questions and more inference, explanation and evaluation questions than teachers instructing by means of the DRA. 5) The interaction pattern employed by the MDR-TA

will differ from the interaction pattern employed by the DRA.

From three schools in one suburban school district, six intact second-grade classes were randomly placed into three treatment groups. Group C received instruction by means of the DRA, while groups T<sub>1</sub> and T<sub>2</sub> received instruction by means of the MDR-TA. Each of the six teachers taught five introductory reading lessons according to the group assignment. A comparison was made of the first or pre-treatment lesson and the last lesson in order to test the five major hypotheses.

The data were analyzed in three ways. Pupil questions were presented in descriptive form. Teacher and pupil questions, pupil responses, as well as pupil-initiated talk, were analyzed by applying the Cochran Q Test, while a one sample Runs Test was applied to the interaction patterns. The level of significance for all data was set at .05.

The findings of this study appear to justify the following conclusions:

1. The MDR-TA promoted pupil-initiated questions, most of which were in the inference category. By contrast, pupils instructed by means of the DRA did not ask any questions.
2. The MDR-TA allowed for a significant increase in pupil-initiated talk.



3. Teachers instructing by means of the MDR-TA asked significantly fewer questions than teachers instructing by means of the DRA, especially those teachers assigned to the smaller groups.

4. The interaction patterns employed by the MDR-TA and the DRA were significantly different. The MDR-TA employed a random interaction pattern between pupils and teacher, while the DRA employs a regular teacher-pupil pattern.

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## Chapter I

### THE PROBLEM AND DEFINITION OF TERMS

#### Statement of the Problem

The research was undertaken in order to study a teaching strategy which aims at promoting pupil initiated high level questions and pupil interaction during introductory reading lessons. The high level questions involve predicting, guessing or hypothesizing about story content while the interaction concerns discussion of the story by the pupils and teacher before and after reading.

Of secondary but direct importance was the effect such a teaching strategy would have upon the quantity and quality of teacher questions and pupil responses. Studies by Gallagher<sup>1</sup> and Davidson<sup>2</sup> are quite specific regarding student interaction and teacher role: types of teacher questions control student interaction. Therefore it seemed necessary to examine teacher questions as well as pupil questions and responses. Although the study

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<sup>1</sup>Gallagher, J. "Productive Thinking of Gifted Children," Cooperative Research Project 1965, Urbana, Ill: Institute for Research on Exceptional Children 1965. Ed 001 307.

<sup>2</sup>Davidson, Roscoe, L. "Teacher Influence and Children's Level of Thinking," The Reading Teacher, Vol. 22:8, May 1969, pp. 702 - 704.

concentrated on these components the ultimate aim which was to improve critical reading comprehension, was not examined in the study.

An examination of any book on the pedagogy of reading instruction reveals that teachers' questions and pupil interaction resulting from these questions promotes reading comprehension. Furthermore the degree to which pupils become involved with the reading material through such interaction will be reflected in subsequent reading comprehension according to reading experts such as, Spache and Spache<sup>1</sup>, Stauffer<sup>2</sup> and Ruddell<sup>3</sup>. Thus in investigating the quality and quantity of pupil interaction and teacher questions there was an underlying assumption that reading comprehension would be affected.

### Rationale

According to Smith, cognitive psychologists believe that all learning is the result of a decision-making

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<sup>1</sup>Spache, George D. and Evelyn B. Spache, Reading in the Elementary School 3rd edition, Boston, Allyn and Bacon, Inc., 1973, p. 568.

<sup>2</sup>Stauffer, Russell, Directing the Reading Thinking Process, New York, Harper and Row, 1975, p.6

<sup>3</sup>Ruddell, Robert, B. Reading-Language Instruction: Innovative Practices, Englewood Cliffs, N.J. Prentice-Hall, 1974, p.

process.<sup>1</sup> There are three interrelated aspects to this process: the establishment of new categories, the development of relations among categories, and the refinement of rules for the allocation of events to categories. Learning is accomplished by detecting distinctive differences between categories and assigning events accordingly. The only way to detect these differences is to ask, "What is the same or different between categories?" Thus, questioning appears to be the key to learning.

Bruner<sup>2</sup> stated that education should train students to be good guessers, so that they could go beyond the information given and construct their own learning.

Piaget explained learning in terms of assimilation and accommodation in which every experience the child has is taken into the mind and made to fit past experiences. All new experiences are tested by asking intuitive questions such as, "Is this the same or different than what I already know?" Depending on the feedback received, the new information is either placed into existing categories through the process of assimilation or the existing

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<sup>1</sup>Smith, Frank, "Understanding Reading," Toronto, Holt, Rinehart and Winston, Inc., 1971, pp. 69 - 74.

<sup>2</sup>Bruner, Jerome, S., "On Going Beyond the Information Given," in The Cognitive Process Readings, (eds) Robert J. C. Harper et al, Englewood Cliffs, N.J., Prentice Hall, Inc., 1964, p. 309.

categories must be changed to fit new knowledge through the process of accommodation. In addition, intellectual development is enhanced when these processes occur in a group setting. Thus, questioning is a basic tenet of Piaget's theory but he also emphasizes discussion among youngsters; interaction with peers helps one to understand other points of view and to symbolize internally. The interaction of the group demonstrates to each child that there are many points of view and that individual ideas may need modification to iron out contradictions.<sup>1</sup>

According to the psycholinguistic theory, learning to read is the same as learning in general. It is accomplished by categorizing incoming information through the process of hypothesis testing or by asking real or implicit questions and upon a kind of discussion with the author. The reader proceeds by examining and asking questions about print. The answers or feedback he receives commensurate with his knowledge of the syntax and semantics of the language, enables him to read meaningfully. Thus learning to read like other learning involves questioning, receiving feedback and interacting with the reading material

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<sup>1</sup>Richmond, P.G. "An Introduction to Piaget," London Routledge and Kegan Paul, 1970, p. 96.

as one attempts to reconstruct the author's intended message.<sup>1</sup>

Focusing upon instruction, Stauffer<sup>2</sup> has noted the importance of pupil questioning and interaction. Reading for meaning implies that the reader must begin with a question in mind upon which he actively searches to find the author's message. When reading takes place in a group setting in which children are allowed to interact with each other the search for the author's message is facilitated; the interaction reveals various points of view and generally leads to better understanding of the author's intended meaning.

Thus there appears to be a general consensus that pupil questions and discussion during a learning situation is conducive to the acquisition of knowledge. In direct reference to reading instruction there is also general agreement that pupil questions and discussion during a reading lesson facilitates the comprehension of the material.

On the other hand, there appears to be a discrepancy between what is known about how children learn and what is

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<sup>1</sup>Smith, Frank, op. cit. p. 224.

<sup>2</sup>Stauffer, Russell, op. cit. pp. 32 - 33.

generally practiced in the primary classroom: children in school are not given many opportunities to ask questions. According to Torrance<sup>1</sup>, pre-school children have an intuitive ability to ask thoughtful questions, but when children come to school, they seem to have serious difficulty in formulating good questions. Torrance felt that this discrepancy was due in part to the fact that teachers often model only simple verification questions and because children are not encouraged to ask about things that puzzle them. Floyd<sup>2</sup> confirmed this fact in a study concerning primary children and found that they had very limited opportunity to raise questions. Student questions in first grade amount to 3.75% of all questions asked during class sessions. In second grade, only 5.14% of the questions were asked by students, while in third grade, students posed 3.64% of the questions. Similarly, Dodl<sup>3</sup> found that

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<sup>1</sup>Torrance, E. Paul, "Group Size and Question Performance of Pre-primary Children, Journal of Psychology 1970, Vol. 74: pp. 71 - 75.

<sup>2</sup>Floyd, W. P., "Analysis of the Oral Questioning Activities in Selected Colorado Primary Classrooms," unpublished Ph.D. dissertation, Colorado State College, 1969.

<sup>3</sup>Dodl, N. R., "Pupil Questioning Behavior in the Context of Classroom Interaction," unpublished Ph.D. dissertation, Stanford University, 1965.

during elementary social studies classes pupils were not asking questions. He suggested that pupil questioning was inversely related to teacher domination of classroom and the number of teacher-initiated questions and directly related to role reversal situations and the extent to which students were invited to ask questions during class.

This lack of pupil-initiated questions may be rooted in the fact that there is little research concerning the strategies which would promote such questions. In one study, Torrance et al<sup>1</sup> designed a creative-aesthetic approach to develop intellectual curiosity among kindergarten children by fostering visual and auditory awareness skills, seeing new possibilities, making and testing multiple hypotheses, making predictions from limited data, measuring growth and change, checking clues like detectives, elaborating and creative problem solving. The study compared this creative-aesthetic approach with the traditional approach. Torrance found that the creative-aesthetic approach accelerated the development of mature pupil questions which usually reflected a concern about

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<sup>1</sup>Torrance, E. Paul, et al, "Creative-Aesthetic Ways of Developing Intellectual Skills Among Five Year Olds," Journal of Research and Development in Education, Vol. 1, Spring 1968, pp. 58 - 69.



discrepant events and thus seemed to promote learning.

Helfeldt and Lalik<sup>1</sup> conducted a study at fifth grade level focusing on pupil questions and reading performance upon an interpretive reading test. They compared two questioning strategies: one in which the teacher and student took part in questioning, and one in which only the teacher asked questions. Higher reading test scores were obtained by the students in the group where both the teacher and students questioned. The greater success achieved by this group was attributed to the student-initiated questions.

In a recent exploratory study, Singer<sup>2</sup> also investigated the effects of student-initiated questions on reading comprehension. Nine third-graders formulated their own questions and then read to find answers to their questions. These students were matched with a control group and tested on the Stanford Reading Test. Results showed that the experimental group achieved higher reading scores than the control group.

The study of pupil initiated questions and interaction during reading instruction is a very recent concern. There

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<sup>1</sup> Helfeldt, John, and Rosary Lalik, "Reciprocal Student-Teacher Questioning," Reading Teacher, Dec. 1976, pp. 283 - 286.

<sup>2</sup> Singer, Harry, "Active Comprehension: From Answering to Asking Questions," The Reading Teacher, Vol. 31, #8, May 1978, p. 907.

appears to be no research which links pupil interaction or discussion with critical reading, although this relationship has been considered in the literature. For example, Stauffer<sup>1</sup> has noted that it is through pupils' actions upon print and their interactions with each other that sound intellectual reading skills are acquired. Spache<sup>2</sup> has suggested that students' ability to read critically depended in large measure on the teacher's role. He stated that pupils should be given the opportunity to discuss before the actual reading in order to set purposes, and then to discuss their reflections after reading.

The paucity of research in the area of student questioning and discussion during reading lessons may be due in part to the practice of using basal reading series in the majority of primary classrooms. A study by Barton and Wilder<sup>3</sup> indicated that basal readers were used

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<sup>1</sup>Stauffer, Russell, loc. cit. p. 33.

<sup>2</sup>Spache, George, Evelyn B. Spache, op. cit. pp. 563 - 564.

<sup>3</sup>Barton, Allen, and David E. Wilder, "Research and Practice in the Teaching of Reading: A Progress Report," in M. B. Miles (ed) Innovations in Education, Bureau of Publications, Teachers College, Columbia University, New York, 1964, pp. 378 - 379.

by almost all primary teachers. Two recent studies<sup>1,2</sup> showed that there were variations in the use of reading materials, although the single basal reader continued to be used by the majority of primary teachers, while in a recent survey conducted in the school district where the research study took place, three-quarters of the primary teachers were using basal readers.<sup>3</sup>

Thus the use of basal readers appears to be a common practice throughout most of the primary classrooms. According to Chall,<sup>4</sup> the reading strategy employed in the basal readers consists of the following points:

1. Preparation for the story - The teacher establishes background and arouses interest. The guide book usually suggests phrases for the teacher to use.
2. Presentation of new words - The guide book suggests which words to teach and how they could be presented.
3. Guided reading and interpretation of the story - Specific questions and points to emphasize are suggested for the teacher while the children are reading. Another set of questions are usually provided for re-reading.

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<sup>1</sup> A Survey of Reading Instruction: Right to Read ICG (Individually Guided Education) and Traditionally Organized Schools, May 1975 Ed. 102540, p. 4.

<sup>2</sup> Narang, H.L., A Survey of Reading Programs and Practices in Saskatchewan Elementary Schools, 1974, Ed. 102522.

<sup>3</sup> River East School Division, Math. and L.A. Questionnaire, September, 1977.

<sup>4</sup> Chall, J., Learning to Read: The Great Debate, New York, McGraw Hill Co., 1967, p. 202.

In addition to the three steps, a "closed wheel" interaction pattern is employed. The teacher occupies a central position and controls the interaction. Students are encouraged to speak directly to the teacher, thus the resulting pattern of interaction is usually teacher-pupil, teacher-pupil. This method which is essentially teacher-centered, has often been called the directed reading activity (DRA)<sup>1</sup>.

By contrast, Stauffer has developed the directed reading-thinking activity (DR-TA) which is more pupil-centered and is also used with basal reading materials. This strategy includes an "open channels" interaction pattern in which the teacher is a member of the group. Thus there is opportunity for more discussion among the pupils and less intervention or direction from the teacher. In such situations the pupils are encouraged to predict and to set purposes for their reading. They are motivated to read by stating what they think the story will be about, expressing their opinions and listening to ideas voiced by

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<sup>1</sup> Betts, Emmett. A, Foundations of Reading Instruction, New York, American Book Co., 1946, p. 492.

other group members.<sup>1</sup> The DR-TA consists of the following points:

1. Setting individual and group purposes for reading - the teacher invites the learners to articulate their hypotheses about the story.
2. Adjusting rate of reading according to the difficulty of the material.
3. Reading silently at which time the teacher helps students apply word recognition and comprehension skills.
4. Developing comprehension by checking group purposes and encouraging the group to reject or redefine purposes by:
  - a. oral re-reading to support or refute,
  - b. developing and refining concepts,
  - c. recognizing the need for other source material.

In a research study using the DR-TA as the means of instruction, Petre<sup>2</sup> found that students talked more and made responses which required hypothesizing, and evaluating more than students who received instruction by means of traditional basal approach (DRA). In a similar study,

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<sup>1</sup>Stauffer, Russell G., Teaching Reading as a Thinking Process, New York, Harper and Row, 1969, p. 26.

<sup>2</sup>Petre, Richard M., "Quantity, Quality and Variety of Pupil Responses During an Open Communication Structured Group Directed Reading-Thinking Activity and a Closed Communication Structured Group Directed Reading Activity, unpublished, Ph.D. dissertation, University of Delaware, 1970, p. 45.

Davidson<sup>1</sup> confirmed the Petre findings concerning student responses and in addition found that when teachers employed the DR-TA they asked more interpreting, inferring and evaluating questions than when they used the DRA. However, a basic problem remained: since emphasis is still on student responses, how does the teacher promote pupil-initiated questions?

In an attempt to answer the question, the investigator modified the DR-TA for use in a pilot study by having pupil predictions phrased in question form. The teacher begins by printing the story title on the chalk board and inviting pupils to predict story content from the title alone. Predictions are refined and discussed further when the pictures on the title page are introduced. The group then decides which questions are to be recorded and how each should be worded. Pupils are then invited to read the story silently at a comfortable rate. During the silent reading the teacher provides assistance with word attack skills on an individual basis. Post reading discussion follows at which time the group discusses the answers to the recorded questions. Comprehension is developed by oral

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<sup>1</sup>Davidson, Jane, "The Relationship Between Teachers' Questions and Pupils' Responses During a Directed Reading Activity and a Directed Reading-Thinking Activity," unpublished Ph.D. dissertation, University of Michigan, 1970, p. 45.

re-reading of selected parts of the story to support or refute answers, to develop and refine concepts and by going to other sources in order to answer questions more completely.

Results of the pilot study indicated that first and second graders were able to pose a number of inference and explanation questions.<sup>1</sup> Thus the modified DR-TA (MDR-TA) was chosen for the research study because it promotes pupil questioning and discussion during reading lessons.

The research study compared the DRA and the MDR-TA to determine whether the DRA would differ from the MDR-TA in the promotion of a) pupil-initiated questions and discussion, and b) in the types of teacher questions and pupil responses.

#### Specific Questions for Research

The problem has been translated into a series of questions for purposes of investigation:

1. Will pupils instructed by means of the MDR-TA pose more questions than pupils instructed by means of the DRA?
2. Will pupils instructed by means of the MDR-TA pose more inference questions than pupils instructed by means of the DRA?
3. Will pupils instructed by means of the MDR-TA pose more explanation questions than pupils instructed by means of the DRA?
4. Will pupils instructed by means of the MDR-TA pose more evaluation questions than pupils instructed by means of the DRA?

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<sup>1</sup>Complete results of the pilot study appear in Appendix A.

5. Will there be a difference in the instances of pupil-initiated talk between pupils instructed by means of the MDR-TA and pupils instructed by means of the DRA?
6. Will pupils instructed by means of the MDR-TA make responses which indicate different types of thinking than the thinking displayed by pupils instructed by means of the DRA?
7. Will teachers instructing by means of the MDR-TA ask less questions than teachers instructing by means of the DRA?
8. Will teachers instructing by means of the MDR-TA ask different types of questions than teachers instructing by means of the DRA?
9. Will teachers instructing by means of the MDR-TA invite pupil participation by extending redirect questions back to the group more frequently than teachers instructing by means of the DRA?
10. Will the interaction pattern employed with the MDR-TA differ from the interaction pattern employed with the DRA?

#### Significance of the Study

The study focuses on a basic tenet of the psycholinguistic theory of reading, the reader must ask intuitive questions and interact with the author in order to reconstruct the author's message.<sup>1</sup> According to this theory, it is very important to provide primary children with opportunities to question and to discuss during reading lessons.

Research has revealed that primary children are seldom given the opportunity to question during class time, although they can ask quality questions when given the opportunity. Several strategies have been designed to encourage student

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<sup>1</sup>Smith, op. cit., p. 187.



questioning; however, there have been none designed to promote questioning and discussion among primary children during reading lessons.

The present study was designed to investigate pupil questioning and discussion during reading lessons, in order to extend what is known about pupil questioning and discussion, and to find out how these factors affect types of teacher questions and pupil responses.

### Definition of Terms

For the purpose of this study, certain terms are defined as follows:

Redirect- A question which could be repeated or extended or merely directed repeatedly to various members. This category was used to indicate the extent to which the teacher invites pupil participation.

Recall - A question or response in which the information can be clearly found in the text.

Translation - A question or response which involves assigning literal meaning to a word or idea. It could also be a re-statement of the text in one's own words.

Inference - A question or response which requires going beyond what is given, seeing relationships between facts, events and ideas, hypothesis testing, making predictions, or looking for implications.

Explanation - A question or response in which a rationale for the "why" of a situation must be offered. The explanation must be based on information inferred from the text.

Evaluation - A question or response in which a judgment is made based on an established criteria. It includes personal interpretation or judgments about the quality or accuracy of printed material. One's own set of personal values or values established by the group may be used as the criteria.

Literal or low level questions are identified with categories of recall and translation.

High or critical thinking questions are identified with categories of inference, explanation and evaluation.

## Research Design

### Sample

From three schools in one suburban school district, six intact second-grade classes were randomly placed into three treatment groups. Group C, consisting of forty-nine pupils, received instruction by means of the DRA, while group  $T_1$ , consisting of fifty pupils, and group  $T_2$ , consisting of twenty-four pupils received instruction by means of the MDR-TA.

### Procedure

Prior to the actual research study, an introductory

reading lesson was recorded on tape by each class. These lessons were taught according to the regular procedure followed by each of the teachers. Two half-hour inservices were then held for the teachers in groups T<sub>1</sub> and T<sub>2</sub>; the first dealt with the development of interaction skills and the second dealt with the MDR-TA outline. One inservice was held for the teachers assigned to group C in order to ensure that the DRA outline was followed. Each teacher then taught four introductory reading lessons on four consecutive Thursdays according to the group assignment. The fourth lessons were taped and comparisons were made among the three treatment groups for the pre and last treatment lessons. The entire experiment took place over a period of five weeks.

### Reading Selections

The same reading selections were used for all groups. Selections were chosen from level seven of the basal series "Reading 360"<sup>1</sup>. This series was chosen since it was unfamiliar to teachers and pupils alike. Since regular instruction was with heterogeneous groups of pupils, the same organizational structure was used for the study and there was no need to select stories which differed in level of difficulty.

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<sup>1</sup>Clymer, Theodore, Reading 360, Ginn and Co., Lexington, 1969.

### Instrument of Measure

The Ohio Scales developed for use in 1967 Ohio State University study conducted by Wolf <sup>1</sup> et al were used for classifying teachers' questions and students' responses. Teacher verbal behavior was classified in seven categories and student responses into five categories according to the reasoning involved in the response. Based on the pilot study, the scale required modifications for the research study.

### Modified Ohio Scales

The Ohio Scales were simplified so that the major classifications could be applied to either teacher or pupil questions and responses. The simplified scale consists of the following categories: (1) redirect, (2) recall, (3) translation, (4) inference, (5) explanation and (6) evaluation. Levels 4, 5 and 6 were to be regarded as critical or high level thinking.

### Assumptions

This study was based on the assumption that there is a connection between the types of questions asked by teachers and critical reading comprehension performance of pupils.

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<sup>1</sup>Wolf, Willavena et al, Critical Reading Ability of Elementary School Children, U.S. Office of Education Cooperative Research Project, No. 5 - 1040. Ohio State University, June 1967, pp. 167 - 173.

It was also assumed that there is a connection between pupil-initiated questions and discussion and critical reading performance.

There was also an assumption that the inservice training provided during the research study was sufficient to convey an understanding of the reading process, the basic underlying principles of the DRA and MDR-TA, the relationship between types of teacher questions and pupils reading comprehension performance and the relationship between pupil initiated questions and discussion and pupils' critical reading performance.

Finally there was an assumption that the Ohio Scales were adequate in measuring the various levels of thinking.

### Limitations

The actual study was only five weeks in duration. Therefore, time must be considered as a limiting factor in affecting change in the pupils.

The sample in the study consisted of second grade pupils randomly chosen from one suburban school district. Caution should be exercised in generalizing these findings to other second grade pupils who may vary in socio-economic background.

The reading material used in the study was taken from only one reader in a particular series. Any effects

attributed to method must be limited to the specific type of material used in the study.

Two group sizes were used in the study, whole classes and half classes. While the MDR-TA appears to be useful with any group size, the findings must be viewed in the light of the group sizes employed in this study.

The most important limitation of the study was that the pupils were not administered a reading test to determine what effects each of the two approaches had upon the pupils' performance in reading comprehension.

#### Topics of the Subsequent Chapters

Chapter II examines the literature and research on questioning, discussion, critical thinking and critical reading. The design and procedures utilized to gather the data for the study are outlined in Chapter III, while Chapter IV is devoted to the analysis of the data. The final chapter contains the summary, discussion, limitations and implications of the study.

## Chapter II

### REVIEW OF RELATED RESEARCH

#### Introduction

This chapter examines the literature and research on questioning, discussion, critical thinking and critical reading. The following areas will be discussed: (1) questioning and discussion and their relationship to learning and reading, (2) the nature of critical thinking and reading, (3) isolating critical reading from other comprehension skills, (4) some factors which influence critical reading, (5) methods employed to improve teacher questioning, (6) methods employed to encourage student questioning, and (7) initiating instruction in critical reading.

#### Questioning and Discussion and Their Relationship to Learning and Reading

Questioning is central to learning. In the times of Socrates, it was believed that the question was the means of inducing thinking, thereby leading the student to discover his own wisdom<sup>1</sup>. This theory continues to

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<sup>1</sup>Carin, Arthur, A. and Robert B. Sund. Developing Questioning Techniques A Self-Concept Approach. Columbus: Charles E. Merrill Publishing Co. 1971. p. 28.

be used today. According to Piaget, as the child matures intellectually he organizes his world by developing concepts, categories, or memories of his experiences. For example, a child with a pet poodle first learns to say 'dog', and in time will identify several different breeds as being 'dogs'. The concept dog expands as the child applies his past experience to new situations through the process of assimilation. When the child sees a cat for the first time and assigns the label 'dog' he is asking an intuitive question, "Is it a dog"? The child requires immediate feedback so that he can establish the differences between cats and dogs and create a new category for himself. When new experiences cannot be placed into existing categories, new ones are established through the process of accommodation. Piaget emphasizes active involvement; the child must ask intuitive questions and receive feedback in order to develop concepts and organize his world in a meaningful way:

"The child must be active, must transform things and find the structure of his own actions on the objects for meaningful learning to take place."<sup>1</sup>

In addition intellectual development is enhanced

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<sup>1</sup>Piaget, J. "Three Lectures". In Piaget Rediscovered, edited by R. E. Ripple and U.N. Rockcastle, Ithaca, New York, Cornell University Press, 1964, p. 4.



when the processes of assimilation and accommodation occur in a group setting. Discussion with peers helps children develop language and the ability to symbolize internally. Such interaction of the group demonstrates to each child that there are many points of view and that individual ideas may need modification to iron out contradictions so that he can adjust his world view to that of others around him.<sup>1</sup>

In applying the theory to reading, the psycholinguists adopt the view that reading is "a psycholinguistic guessing game"<sup>2</sup>. In order to read, one must rely on what he already knows about written language, using strategies of sampling, predicting, testing and confirming. In other words the reader approaches the printed page with prior knowledge: he knows that print should be meaningful, he knows intuitively the syntactical patterns of the language, or word order in sentences. With this information a reader can predict words before actually reading them, thus the reader is guessing or asking himself questions about the content being read. He then tests his predictions by sampling more print and finally confirms his predictions as the author's message is understood. The process also involves the reader

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<sup>1</sup>Richmond, P.G. An Introduction to Piaget, London: Routledge and Kegan Paul, 1970, p. 96.

<sup>2</sup>Goodman, K.S. "Psycholinguistic Universals in the Reading Process", in Psycholinguistics and Reading, edited by Frank Smith, Toronto: Holt, Rinehart, and Winston, Inc. 1973, pp. 21 - 27.

in an active dialogue with the author as he reconstructs the intended message.

The process is somewhat difficult for the beginning reader. Smith<sup>1</sup> states that a child learning to read must discover for himself significant differences between letters, words, and meanings. Just as Piaget suggests that children need to discover the distinctive differences between the categories 'dog' and 'cat', Smith contends children need to discover the distinctive differences in words. For example, the child cannot learn to read his own name "John" until he has been shown other words such as "Jane", "Janet", or "Jack", so that he can establish important differences between words. With experience he begins to recognize equivalent forms such as "John" and "JOHN" and also learns the sequential order of letters in words. Given these two sources of information significant differences and sequential order, the child can trade off overlapping information or eliminate many alternatives in order to predict what a word will be. Thus according to psycholinguists, learning to read is a matter of establishing what is the same and what is different in written language.<sup>2</sup>

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<sup>1</sup>Smith, Frank, Understanding Reading, Toronto: Holt, Rinehart, and Winston, Inc. 1971. p. 144.

<sup>2</sup>ibid. p. 145.

These theorists offer several suggestions for the teaching of reading. New learning should be meaningfully associated with what one already knows. The learner must actively question in order to get the feedback necessary for learning to take place. Social interaction provided by peers involved in a common activity provides the necessary feedback and assists in the expansion and refinement of conception. By sharing various points of view, exchanging thoughts, verifying individual ideas, and resolving contradictions, group members adjust their personal views of the world in accordance with the consensus of the group. They should discuss situations before acting on them and discuss results before drawing conclusions if meaningful learning is to take place<sup>1</sup>. Prereading questions and discussion can facilitate the expansion and clarification of concepts, provide motivation for reading, and promote the ability to predict story content. While post reading questioning and discussion fosters the ability to verify answers, clarify meaning and evaluate what has been read.

With the emphasis upon pupil input, the teacher's role is to supply feedback to the child. The significant factor is that the child cannot get feedback unless he asks for it, thus he must learn to question himself and provide a

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<sup>1</sup>Richmond, P.G. op. cit. p. 108.

response before receiving feedback from the teacher.

For example when a child wants to find the significant differences between two words he must learn to ask, "How do I distinguish one from the other?" The teacher provides immediate feedback regarding the significant differences. This specific information along with what the child already knows about the syntax and semantics of the language enables him, given enough practice, to predict regularity or to induce rules and to recognize irregularities in print. Thus learning to read involves questioning by the learner, receiving specific feedback from the teacher and finally the learner making sense from print for himself.<sup>1</sup>

There are others in the field of reading instruction who are in agreement with the psycholinguistic theory of reading. Stauffer<sup>2</sup> notes that to become a thinking reader requires command of the art of asking questions, the ability to process information, and the ability to validate answers. Singer<sup>3</sup> suggests that reading comprehension depends upon the students' ability to ask their own questions and guide their own thinking.

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<sup>1</sup>Smith, Frank, op. cit. pp. 228 - 229.

<sup>2</sup>Stauffer, Russell, G. Directing the Reading Thinking Process, New York: Harper and Row, Publishers, Inc. 1975, pp. 3 - 25.

<sup>3</sup>Singer, Harry, "Active Comprehension: From Answering to Asking Questions". The Reading Teacher, Vol. 31 #8, May 1978, P. 907

Although there are few references to pupil initiated questions as they relate to reading comprehension several references have been made regarding types of teacher initiated questions and their relationship to levels of student thinking during reading instruction.

According to the results of several research studies it appears that questioning triggers thinking and the type of question asked will usually determine the type of thinking that results.

Wolfe et al<sup>1</sup> conducted an extensive study concerning the teaching of critical reading in grades one through six. One purpose of the study was to determine the kinds of teacher verbal behavior that elicit critical responses from children. The authors found that teachers' questions concerning specific facts elicited guessing and literal responses, whereas analyzing and evaluating questions produced responses of hypothesizing and evaluating from pupils.

In a study at the fourth grade level Petre<sup>2</sup> used the Directed Reading-Thinking Activity, (DR-TA), to teach

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<sup>1</sup>Wolf, Wilavena, et al. Critical Reading Ability of Elementary School Children U.S. Office of Education Cooperative Research Project, No. 5 - 1040, Ohio State University, June 1967, p. 111.

<sup>2</sup>Petre, Richard M. "Quantity, Quality and Variety of Pupil Responses During An Open Communication Structured Group Directed Reading-Thinking Activity and a Closed Communication Structured Group Directed Reading Activity, unpublished Ph.D. dissertation, University of Delaware, 1970, p. 83.

critical reading and thinking. He found that the method allows a greater number, higher quality and a wider variety of pupil responses. Davidson<sup>1</sup> felt the difference in student responses found in the Petre study could be attributed to the differences in the questions asked by teachers using DR-TA. She compared the relationship between teachers' questions and student's responses, using Directed Reading Thinking (DRA) and the DR-TA. Davidson concluded that teachers providing instruction by means of the DR-TA asked mostly interpreting and inferring questions, and students tended to make responses which were critical representing thinking which went beyond the literal level. By contrast, teachers providing instruction by means of the DRA asked chiefly specific fact questions, and students tended to make responses which were non-critical reflecting literal thinking.

Hunkins<sup>2</sup> found that sixth grade students exposed to analysis and evaluation questions for one month obtained higher scores on a post test which contained high level

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<sup>1</sup>Davidson, Jane, "The Relationship Between Teachers' Questions and Pupils Responses During a Directed Reading Activity and a Directed Reading-Thinking Activity," unpublished Ph.D. dissertation, University of Michigan, 1970, pp. 85 - 86.

<sup>2</sup>Hunkins, F. P. "The Influence of Analysis and Evaluation Questions on Achievement in Sixth Grade Social Studies." Paper presented at the annual meeting of the American Education Research Association, New York, 1967, p. 326 - 335.

questions than a group exposed to knowledge level questions. In a similar study, Ryan<sup>1</sup> compared the performance of two groups of fifth and sixth grade students on two social studies tests, one test required recall level responses, the other required higher level responses. Ryan concluded that questions asked at interpretive and applicative levels not only included the lower level questions of recall but also promoted high level thinking and understanding.

In summary, self initiated questioning is a key to learning, and discussion is a useful vehicle by which learning is clarified, extended and modified. When applied to reading these two strategies play a vital role in fostering skills of reading comprehension particularly in the higher levels of cognition. There is some evidence that these strategies can be developed through direct training thus it seemed necessary to examine the processes underlying the higher levels of thinking and reading.

#### The Nature of Critical Thinking and Reading

Investigation into the area of higher levels of thinking and reading revealed not only a paucity of research

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<sup>1</sup>Ryan, Frank, "Differentiated Effects of Levels of Questioning on Student Achievement". Journal of Experimental Education, Vol. 41 (Spr. 1973) pp. 63 - 64.

evidence but considerable disagreement among the researchers regarding the abilities underlying these skills. Critical thinking according to Russell<sup>1</sup> is closely related to what Dewey<sup>2</sup> labelled "problem solving". Table 2:1 is a comparison of Russell's four conditions in critical thinking and Dewey's five steps in problem solving. Critical thinking applies to

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Table 2:1

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<u>Russell's Conditions for Critical Thinking</u>	<u>Dewey's Steps in Problem Solving</u>
1. A background of facts and prior experience on the topic.	1. Consciousness that a problem exists
2. A general attitude of questioning, a habit of examining before accepting.	2. Assembling the facts pertaining to the problem.
3. Use of scientific inquiry or problem solving methods.	3. Hypotheses are formulated.
4. Judgment involving evaluation in terms of some standard or norm.	4. Gathering additional information and hypotheses testing.
	5. Deciding on the best solution.

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<sup>1</sup>Russell, David, H. Children's Thinking, Toronto: Blaisdell Publishing Co., 1956. p. 283.

<sup>2</sup>Dewey, John, How We Think: Boston: Heath, 1933, p. 107.



problem solving particularly as the hypotheses are being tested. The elements which appear to characterize critical thinking are the ability to suspend judgment until all facts are gathered and the ability to establish relationships before a solution is reached so that past experience can be considered.

In Guilford's<sup>1</sup> structure of the intellect, evaluation is the fifth and uppermost class of cognition and is synonymous with critical thinking. He reasoned that during the thinking process, a person must continually evaluate by way of conclusions what he knows, what he recalls and what he produces.

Critical thinking in the narrowest sense could be equated with evaluation. However both Russell and Guilford argue that it can encompass many modes of thought including recall, analysis and inference as well as evaluation.

Similarly, critical thinking is linked with creative thinking. The latter involves the production of new ideas or divergent thought. It is the process of bringing together isolated experiences into new combinations or patterns either by problem solving or by a trial and error method. While problem solving is usually directed toward some

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<sup>1</sup>Guilford, J.P. "Frontiers in Thinking That Teachers Should Know About", The Reading Teacher, XIII (Feb 1960) pp. 176 - 182.

external goal, creative thinking according to Russell<sup>1</sup> is problem solving plus since it also includes a personal or unique point of view. Critical thinking becomes an integral aspect of the other two modes of thought during the evaluation phase. Passmore<sup>2</sup> introduced the phrase "critico-creative" thinking to distinguish it from critical thinking that only has the capacity to think up objections. He felt that critical thinking joins imagination and criticism in a single form of thinking.

Literature related to the process of reading revealed that some authorities in the field of reading felt that reading is synonymous with thinking. Thorndike<sup>3</sup> pointed out that "to read is to think" Gates<sup>4</sup> defined reading as a complex organization of patterns of higher mental processes which can and should embrace all types of thinking, evaluating, judgment, imagining, reasoning, and problem solving;

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<sup>1</sup>Russell, op. cit p. 301.

<sup>2</sup>Passmore, J., "On Teaching To Be Critical", in Education and the Development of Reason, Dearden, R.F., P.H. Hirst, and R.S. Peters, London: Routledge and Kegan Paul, 1972, pp. 415 - 433.

<sup>3</sup>Thorndike, E.L. "Reading as Reasoning", Journal of Education Psychology, Vol. 8 (1917) pp. 323 - 332.

<sup>4</sup>Gates, Arthur, I. "Character and Purposes of The Yearbook", The Forty-Eighth Yearbook of the National Society for the Study of Education. Part II, Reading in the Elementary School, Chicago: The Society, 1949 p. 343.

"..... reading is one of the best media for cultivating many techniques of thinking and imagining". Stauffer<sup>1</sup> defined critical thinking and reading as a cognitive interaction between facts and values, hence critical thinking and critical reading are synonymous. The reader takes information from the printed page, extrapolates from it, makes educated guesses, and checks those guesses with the original. He evaluates and judges the authenticity of what he reads in the light of his own experiences.

Follman et al<sup>2</sup> presented empirical evidence to demonstrate that the two abilities share a very large verbal component as well as a number of reasoning and classifying activities.

Some authors, on the other hand are not as clear about the reading-thinking relationship and tend to confine their discussion to "critical reading". DeBoer<sup>3</sup> defined it as an active rather than a passive approach to the printed page; critical reading includes the ability to distinguish relevant and irrelevant data, an existence of skepticism

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<sup>1</sup>Stauffer, Russell, G. "Reading and Thinking", Grade Teacher, LXXXVII (March 1970) p. 27.

<sup>2</sup>Follman, John, A.J. Lowe, Russell, Wiley, "Correlation and Factor, Analysis of Critical Reading and Thinking Test Scores in 12th Grade, Reading the Right to Participate ed. Frank P. Greene, The National Reading Conference Inc. 20th yearbook, 1971. p. 135.

<sup>3</sup>DeBoer, John, "Teaching Critical Reading". Elementary English Review, XXIII, Oct. 1946, p. 251.

through which the reader evaluates the reliability of the evidence and the soundness of conclusions based on an appropriate standard or criteria. Gray<sup>1</sup> described critical reading as the evaluation of what is read in the light of sound criteria involving an inquiring attitude, wise selection of facts, relevant standards for making judgments, and rigorous checking on the validity of conclusions. DeBoer and Gray agreed that critical reading involved evaluation based on a criteria or standard using a problem solving process which is developed by the reader through his previous experiences with similar ideas. It is defined as an analytical, evaluative type of reading in which the reader analyzes and judges both the content of what is stated and the effectiveness of the manner in which the material is presented. Reading critically involves searching for the purposes underlying the author's message and making rational judgments about what is read based upon valid criteria, and can be applied to argumentative, informational or literary material.

In summary most investigators and theorists agree that critical reading is a subskill of critical thinking and that reading offers many opportunities to develop these skills,

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<sup>1</sup>Gray, Wm. S. "Basic Competencies in Efficient Reading," Reading in an Age of Mass Communication ed. W.S. Gray Ch. 4, New York: Appleton Century. Crofts, 1949. P. Ch. 4.

however they do not agree that the processes are synonymous. More recently Stauffer, wrote that both critical thinking and critical reading can be represented by the same complex process. For the purpose of this study critical reading and thinking were viewed as a single complex process as Stauffer has suggested and his definition of critical reading was used. Critical reading according to Stauffer included: the ability to predict, hypothesize and explain what is read in terms of past experience, and to evaluate what is read by measuring it against similar past experiences or some established criteria.<sup>1</sup>

#### Isolating Critical Reading Skills From Other Comprehension Skills

Though Stauffer appears to be quite definite in his definition of critical reading there is variability in the literature as to what actually constitutes critical reading. On the whole, researchers have been unable to clarify the nature, or levels of thinking which are exclusively critical reading with most studies resorting to logic rather than evidence for a definition of critical reading.

Three common factors seemed evident when two lists of critical reading skills were examined. The Williams<sup>2</sup>

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<sup>1</sup>Stauffer, Russell G., Op. Cit. P. 35.

<sup>2</sup>Williams, Gertrude, "Provision for Critical Reading in Basal Readers". Elementary English, 41, May 1959, pp. 323 - 330.

list was based on critical reading skills identified in ten basal reading programs while the Wolf et al<sup>1</sup> list was based on the opinion of ten reading experts. The following three common areas were isolated: a word factor reflecting comprehension of word meaning, a verbal factor which contributes to the ability to see relationships among ideas represented by the words in context, and an abstract reasoning factor. Sochor<sup>2</sup> confirmed that these three general factors were inherent in reading comprehension. However, she contended that for all practical purposes, literal and critical reading could not be differentiated except on the basis of the reader's purpose.

Other researchers have attempted to separate various comprehension skills in other ways. McCullough<sup>3</sup> analyzed reading comprehension test scores from students in grades one, two, and four to determine whether or not the same or different abilities were being measured in three different tests. She identified four types of ques-

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<sup>1</sup>Wolf, et al. Critical Reading Ability. p. 133.

<sup>2</sup>Sochor, E. Elona, "The Nature of Critical Reading" in Critical Reading Ability and Elementary School Children, ed. by W. Wolf, C. Huck and M. King, New York: J. B. Lippincott Co. 1967. p.

<sup>3</sup>McCullough, Constance, "Response of Elementary School Children to Common Types of Reading Comprehension Questions" Journal of Educational Research, vol. 51: 5 (Sept 1957) pp. 65 - 70.

tions: main idea, facts or details, sequence organization, and creative reading, including drawing conclusions passing judgments, and seeing relationships. Intercorrelations on the test scores show a positive relationship ranging from .26 to .63 among responses on the four types of comprehension questions. McCullough concluded that while there was evidence supporting the existence of four factors in reading comprehension these factors were not completely independent of each other.

Sochor questioned the use of a single reading test to measure reading ability in all situations. Using a sample of 513 fifth grade pupils she found that correlations between general reading ability and the ability to read critically in social studies to be only .23 which intelligence partialled out<sup>1</sup>. Using the same students Maney found that the correlations between general reading ability and the ability to read critically in science material to be only .11 when intelligence was held constant<sup>2</sup>. These studies suggest that critical reading ability in social studies and science are virtually independent of general

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<sup>1</sup>Sochor, E. Elona, "Literal and Critical Reading in Social Studies," Journal of Experimental Education, Vol: 27, Sept 1958. pp. 49 - 55.

<sup>2</sup>Maney, Ethel E., "Literal and Critical Reading in Science," Journal of Experimental Education, Vol: 27, Sept. 1958. pp. 57 - 64.

reading ability when the effects of intelligence are taken into account.

Although many researchers have shown that critical reading abilities cannot be inferred from a measure of literal reading, few are willing to separate the two entirely. In order to read critically, one must first be able to comprehend the literal message intended by the author. Betts<sup>1</sup> concluded that literal and critical reading are not an either-or process, rather critical reading ability is a complex of mental abilities which rely on literal reading. These abilities he believed could be improved given an appropriate educational experience. Gray<sup>2</sup> too, felt that the two processes were somewhat dependent upon one another. He stated that literal reading has a critical nature because getting the literal meaning necessitates the accurate preception of words, the fusion of separate meanings into ideas, grasping the organization and relationships of ideas and a reasonable fluency of preception. He adds, "... obviously an inquiring attitude and good thinking are required at every step in the apprehension of the literal

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<sup>1</sup>Betts, Emmett, Albert, "Research on Reading as a Thinking Process," Journal of Educational Research, Vol: 50 #1. Sept 1956. pp. 1 - 15.

<sup>2</sup>Gray loc. cit.



meaning of a passage".

Based on the research cited there is some evidence that skills labelled critical reading can be distinguished from other reading comprehension skills. There is also some evidence to support the premise that reading is a more general ability consisting of three or four basic components, rather than a complex set of multi-skills which can be learned individually. On the other hand, it is generally accepted that literal reading ability is basic to critical reading performance.

#### Some Factors Which Influence Critical Reading

A survey of the literature revealed that factors which affect critical reading performance include: intelligence, teacher questioning practices and teacher role, group communication pattern, classroom climate and goal directed behavior of the group. These factors will be discussed individually, followed by an examination of current teacher questioning practices.

There does not appear to be agreement concerning the relationship between critical reading and intelligence. For example, Durrell and Chambers in a review of the research on thinking abilities related to reading concluded that the ability to think and read critically appeared to rest upon specific training rather than on intelligence.

Chambers found correlations of .33 to .71 among several measures of intelligence but these were reduced to .03 and .33 when reading achievement was controlled statistically<sup>1</sup>. Similar findings were reported in studies by Covington,<sup>2</sup> Groff<sup>3</sup> and Davis<sup>4</sup>.

On the other hand some studies have shown a positive relationship between intelligence and critical reading ability. Glaser reported that the two factors most clearly related to scores of critical thinking were intelligence and reading ability which correlated .71<sup>4</sup>. Maney<sup>5</sup> found a correlation of .67 between critical reading in science and verbal intelligence. Sochor<sup>6</sup> reported a correlation of .69 between critical reading in social studies and verbal intelligence. Wolfe et al<sup>7</sup> investigated the re-

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<sup>1</sup>Durrell, Donald D., J. Richard Chambers, "Research in Thinking Abilities Related to Reading." The Reading Teacher, XII Dec. 1958. pp. 89 - 91.

<sup>2</sup>Covington, Martin, V. "Some Experimental Evidence in Teaching For Creative Understanding." The Reading Teacher XX, Feb. 1967. pp. 390 - 396.

<sup>3</sup>Groff, Patrick J. "Children's Attitudes Toward Reading and Their Critical Reading Abilities in Four Content-Type Areas." Journal of Educational Research. Vol. 55, April 1962. pp. 313 - 319.

<sup>4</sup>Davis, John, E. "The Ability of Intermediate Grade Pupils to Distinguish Between Fact and Opinion". The Reading Teacher, XII Feb. 1969. pp. 419 - 422.

<sup>5</sup>Maney, Ethel E. op. cit. p. 60

<sup>6</sup>Sochor, E. Elona, op. cit. p. 177.

<sup>7</sup>Wolf, et al. Critical Reading Ability. p. 109.

relationship between critical reading ability and intelligence and found that critical reading ability was related to intelligence with a correlation of .792, however all subjects benefited from instruction in critical reading regardless of intelligence.

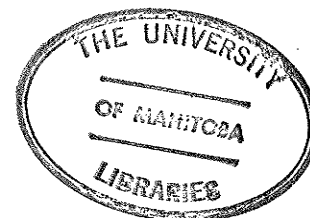
Teacher influence appears to be a critical issue in the teaching of thinking. Teacher influence has been defined by Davidson<sup>1</sup> and Taba<sup>2</sup> as being synonymous with questioning practices, yet few researchers have explored the relationship between teacher questions and student outcomes. In one study Gallagher<sup>3</sup> examined the productive thinking of gifted junior high school students. He found that teachers have control over the types of expressive thought in the classroom. Control was most closely associated with the types of questions asked by teachers such as when a teacher asks for the date of a particular event, a student is not likely to respond with divergent thinking.

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<sup>1</sup>Davidson, Roscoe, L. "Teacher Influence and Children's Level of Thinking". *The Reading Teacher*, Vol. 22:8, May 1969, pp. 702 - 704.

<sup>2</sup>Taba, Hilda, Thinking in Elementary School Children Cooperative Research Project #1574, San Francisco: San Francisco State College 1964, p. 177. Ed 003 285.

<sup>3</sup>Gallagher, J. "Productive Thinking of Gifted Children" Cooperative Research Project" 965, Urbana, Ill: Institute for Research on Exceptional Children 1965. p. 102.



Taba<sup>1</sup> also found that while teacher influence was exercised in a variety of ways, teacher questioning was the central factor in developing student thinking. Specifically, it is the series of questions asked and the resultant pattern of student - teacher interaction that was found to be most important.

However the studies concerning teacher questioning practices revealed that knowledge of productive questioning practices is not widespread among teachers. Guzak<sup>2</sup> examined the types of questions teachers ask about assigned reading, the frequency with which students were able to respond correctly, and the strategies for questioning used by the teachers. Guzak was concerned by the fact that teachers equated reading - thinking skills with literal comprehension skills. His subjects were four randomly selected second, fourth and sixth grade classrooms. Findings indicated that literal questions, asking for recall and recognition were most frequently asked by teachers. Results of the study also indicated that the most dominant pattern of interaction at all grade levels was a teacher's question followed by a single response from a pupil. The author concluded

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<sup>1</sup>Taba, Hilda, op. cit. p. 177.

<sup>2</sup>Guzak, Frank, J. "Teacher Questioning and Reading", The Reading Teacher, XXI, December, 1967, pp. 227 - 234.

that students are being conditioned to respond with details and unsupported value statements and pointed out the need for teachers to pattern questions which demand that students support their statements with evidence.

Dodl<sup>1</sup> analyzed student - teacher interaction during elementary social studies classes. He found that sixty percent of the teacher questions dealt with the recall of factual material and pupils were seldom given the opportunity to ask questions. Pupil questioning behavior related inversely to the extent of teacher domination of classroom interaction and teacher questioning behavior.

Studies by Schreibner,<sup>2</sup> and Galloway and Mickelson<sup>3</sup> examined the questioning practices of elementary teachers. Findings show that up to eighty percent of teacher questions required only the recall of facts of literal thinking from students.

These studies suggest that teachers need more instruction in the art of questioning. Evidence is provided by

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<sup>1</sup>Dodl, Norman, Richard, "Pupil Questioning Behavior in the Context of Classroom Interaction," unpublished Ph.D. dissertation, Stanford University, 1965.

<sup>2</sup>Schreibner, J. E. "Teachers' Question - Asking Techniques in Social Studies", unpublished Ph.D. dissertation, Iowa City: University of Iowa 1967.

<sup>3</sup>Galloway, Charles, G. and Norma I. Mickelson, "Improving Teachers' Questions." The Elementary School Journal, December 1973, pp. 145 - 148.

the following study which suggested that teachers need to practice teaching to the objectives they have set.

Bartolome<sup>1</sup> studied the congruency between the objectives teachers wrote and the questions they asked during reading lessons. Objectives asked for 8.46% memory type thinking; questions on memory accounted for 47.5% of the questions asked. Objectives asked for 22.17% application type thinking; teacher questions requiring application type thinking amounted to 2.29% of the questions asked. Teacher objectives asked for 54.43% analysis type thinking; actual teacher questions amounted to 25.44% of the questions asked. Bartolome suggested that teachers must learn to state their objectives more clearly. He also implied that teachers need more training in the art and understanding of questioning in order to meet the objectives required for the development of critical reading.

Further, teachers need to learn about questioning from sources other than text-books. Davis and Hunkins<sup>2</sup> examined the question in three fifth grade social studies text books. The texts emphasized a historical, a geographical and a

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<sup>1</sup> Bartolome, Paz I. "Teachers' Objectives and Questions in Primary Reading." The Reading Teacher XIII Oct. 1969. pp. 27 - 33.

<sup>2</sup> Davis, O. L. and F.P. Hunkins, "Textbook Questions, What Thinking Processes Do They Foster?" Peabody Journal of Education Vol: 43, 1966, pp. 285 - 292.

fused approach. All questions were analyzed using Bloom's taxonomy<sup>1</sup>. Seventy-eight percent of the total number of questions dealt with knowledge of specifics. Thirteen percent of the questions were described as comprehension, four percent dealt with application, there were no questions that required synthesis and only two questions necessitated evaluative thinking. The authors suggested that publishers and authors of text books need to become aware of the importance of developing high level thinking in students. Texts should contain the necessary information about writing higher cognitive objectives and about questioning strategies which meet these objectives for teachers using text books.

Mueller<sup>2</sup> analyzed the levels of thinking fostered by the teachers' guide of basal readers. The analysis indicated that only a small percentage of the questions suggested by the guide book involved higher level thought processes. Nearly two-thirds of the questions required cognitive memory or reading verbatim from the text.

There are other factors besides teacher questioning practices which affect student thinking and participation.

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<sup>1</sup> Bloom, Benjamin, Taxonomy of Educational Objectives, Handbook 1 Cognitive Domain, New York: The David McKay Co., Inc. 1956.

<sup>2</sup> Mueller, Doris, E. "Teacher Questioning Practices in Reading", Reading World, Dec. 1972, Vol 12, pp. 136 - 145.

Lorge<sup>1</sup> concurred that teacher questioning was important but in addition the teacher must be a guide who leads the learner through the phases of understanding the problem, forming hypotheses for solution, questioning and evaluating before arriving at conclusions. The main emphasis is the learners active involvement in the thinking process.

Active involvement seems to be facilitated by an open channels interaction pattern. This system allows group members the opportunity to communicate equally. By contrast in the closed wheel pattern the person occupying the central position controls the interaction. Although there are few studies which deal with the open channels network and reading instruction there are a number of laboratory studies and educational studies which deal with communication networks at various grade levels and a variety of subjects.

Petre<sup>2</sup> compared the open channels interaction network with a closed wheel network during reading instruction at fourth grade level. The open channels network was used with the directed reading - thinking activity (DR-TA) while the closed wheel network was used with the directed reading activity (DRA). He found that students in the DR-TA group had the opportunity to communicate equally and thus appeared

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<sup>1</sup>Lorge, Irving "The Teacher's Task in the Development of Thinking, The Reading Teacher, XIII Feb. 1960, pp. 170 - 175.

<sup>2</sup>Petre, R. op. cit. p. 28.



to experience more satisfaction. Students in the DRA group communicated through the teacher and appeared to have less opportunity for satisfaction.

Spache<sup>1</sup> provides support for open communication within groups. He indicates that while authoritarian, teacher - directed learning situations do facilitate learning in some children, this type of climate can also promote tensions, hostilities and aggression between pupils and teacher and among pupils. In contrast, classroom environments which permit more independence in terms of self-selection, self-direction, and self-pacing are more conducive to learning and to positive relationships among pupils and between pupils and teacher. The teacher assists students in this environment, rather than providing constant direction.

Lewin et al<sup>2</sup> studied open and closed communication networks in children's play groups. They found that the closed structure restricted the participants amount of speech. The open structure provided more communication among group members and the freer climate allowed more independence.

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<sup>1</sup>Spache, George, "Contributions of Allied Fields to the Teaching of Reading" Innovation and Change in Reading Instruction, Sixty-Seventh Yearbook of the National Society for the Study of Education, Pa 11. Chicago: University of Chicago Press, 1968. p. 248.

<sup>2</sup>Lewin, K. et al. "Patterns of Aggressive Behavior in Experimentally created Social Climates." Journal of Social Psychology, Vol. 10, 1939, pp. 271 - 299.

Heise<sup>1</sup> studied five member problem solving groups in a laboratory setting and found that when all members could talk and listen to all other group members the most efficient problem solving took place. Just the opposite was true in the closed wheel network. This system appeared to be slower and resulted in less economical performances.

Bavelas<sup>2</sup> found that the average level of satisfaction was higher among members of groups with an open network than among those with a closed network. In the closed pattern the central person in the network receives satisfaction.

Bales et al<sup>3</sup> examined the amount of feedback received by individual group members in both open and closed networks. They found that it was possible for individual members to receive more feedback in the open network than in the closed network. In the latter only the central person receives feedback.

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<sup>1</sup>Heise, G. A. and G. A. Miller, "Problem Solving by Small Groups Using Various Communication Nets" Journal of Abnormal Psychology, Vol. 46, 1951, pp. 327 - 336.

<sup>2</sup>Bavelas, A. "A Mathematical Model for Group Structures", Applied Anthropology Vol: 7, 1948, pp. 16 - 30.

<sup>3</sup>Bales, R. F. et al "Channels of Communication in Small Groups" American Sociological Review, Vol. 16, 1951, pp. 461 - 468.

Leavitt and Mueller<sup>1</sup> used a closed network where the receiver of information was given no opportunity for feedback, acknowledgements, questions, or negative reactions to the sender. The result was a reduction of accuracy and confidence for both the sender and the receiver. They concluded that feedback is significant in determining the amount of interaction which takes place.

Cartwright<sup>2</sup> suggested that if a group member highly identifies with a group goal he should gain satisfaction from the contributions of other group members. Further, as the group works together there is an increase in the degree of participation by its members. In other words, participation in goal setting heightens the motivation of members to work toward goal attainment. These findings have been supported by Taba<sup>3</sup>.

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<sup>1</sup>Leavitt, H. J. and R. A. Mueller, "Some Effects of Feedback on Communication," Human Relations, Vol. 4, 1951, pp. 401 - 410.

<sup>2</sup>Cartwright, Dorwin, "The Nature of Group Cohesiveness," Group Dynamics, ed. by Dorwin Cartwright and Alvin Zander, New York: Harper and Row, Publishers, 1960, pp. 91 - 109.

<sup>3</sup>Taba, Hilda, Curriculum Development-Theory and Practice, New York: Harcourt, Brace and World, Inc., 1962, pp. 170 - 171.

"....groups are more productive when they (a) share purposes, (b) are trained in productive procedures, and (c) are composed to produce a climate which provides a latitude of social space and supportiveness. If the psychological structure of the group supports communication and participation, the difficulties encountered in learning tasks are more easily overcome and the communication of learning from person to person and across the social division is facilitated."

These studies have demonstrated that the open channels network seemed to provide opportunities for productive problem solving, individual satisfaction, feedback for each member as well as increased participation by group members. The teacher in this network seems to be a guide rather than a director, students are assisted rather than dominated. The following studies concentrate on the role of the teacher in an open channels classroom.

Anderson<sup>1</sup> studied the behavior of teachers in pre-school, primary, and elementary classes. He found that the behavior of the teacher sets the classroom climate: domination incites further domination whereas integration stimulates further integration. The integrative pattern was defined as one which:

- a. accepts, clarifies and supports the ideas and feelings of students,
- b. praises and encourages students,
- c. asks questions to stimulate pupil participation in decision making.

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<sup>1</sup>Anderson, H. H., "The Measurement of Domination and Socially Integrative Behavior in Teachers' Contacts with Children" Child Development: Vol. 10:2, 1939, pp. 73 - 89.

- d. asks questions to orient pupils to the task at hand.

The dominative pattern was one in which the teacher:

- a. lectures or expresses his own ideas,
- b. gives direction and orders,
- c. criticizes student behavior with intent to change it,
- d. justifies his own position of authority.

When the teacher has a high proportion of integrative contact, Anderson stated that pupils show more spontaneity, initiative, voluntary social contributions and acts of problem solving. When the teacher displays a higher proportion of dominative contacts the pupils are more easily distracted from school work and show greater compliance to as well as rejection of teacher domination.

Similar findings were reported by Flanders<sup>1</sup> in a study employing eighth grade students during Geometry and Social Studies classes. He suggested that classroom climate, student attitude, and teacher role are linked; each is a factor in the classroom interaction pattern, each is dependent upon the other factors. A change in one factor causes a change in the other factors. For example, the teacher who exerts an indirect or integrative influence encourages student participation and stimulates student verbal

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<sup>1</sup>Flanders, Ned. "Teacher Influence, Pupil Attitudes and Achievement". U.S. Office of Education Co-Operative Research Study, Monograph #12, OE-25040, Washington, D.C. 1965. pp. 109 - 115. Ed. 002 865.

interaction. This teacher will not dominate by occupying the central position but sees that each student has an equal chance to participate so that each student will have the chance to achieve more. Since students found more satisfaction from active involvement they had better attitudes toward learning.

#### Methods Employed to Improve Teachers' Questioning

Several methods have been used to improve teachers' questioning practices. Zoch<sup>1</sup> investigated the extent to which kindergarten and first grade teachers employed high level cognitive questions. The participating teachers used selected materials and learning activities during inservice trainings, then they received individual suggestions to improve their questioning techniques. Results showed that when comparisons were made with previous lessons, teachers asked a greater number of high level questions after treatment. Pupils also increased their verbal participation significantly. This study suggests that materials can be developed to modify teachers' questioning behavior and that teachers require feedback about their questioning before changes can be expected.

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<sup>1</sup>Zoch, Rudy, "The Effect of an Individualized Inservice Program on Teacher Questioning and Student Verbal Participation". Unpublished Ph.D. dissertation, University of Houston, 1970.

Trosky<sup>1</sup> was interested in improving reading comprehension by improving teachers' questions. She investigated the relationship between teacher's questioning behavior and a series of three individual supervisory conferences. The results showed no significant changes in the types of teacher questions during the first and second conferences. After the third conference which focused on the analysis of a recent reading comprehension lesson taught by each teacher, three of the five teachers asked significantly fewer recognition questions. Studies by Ebert<sup>2</sup>, Smith,<sup>3</sup> and Davidson<sup>4</sup> also found that teachers' questioning practices could be modified after intensive training and individualized feedback.

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<sup>1</sup>Trosky, O.S. "Modification in Teachers' Questioning Behavior in the Development of Reading Comprehension and a Series of Supervisory Conferences," Unpublished Ph.D. dissertation, University of Toronto, 1971.

<sup>2</sup>Ebert, Marilyn Jane, "The Effect of Modelling and Feedback on the Learning of Questioning Behavior by Teacher Candidates in Nursing Utilizing a Microteaching Practice Setting. Unpublished Ph.D. dissertation, University of California Berkley, 1970.

<sup>3</sup>Smith, Marilyn Marie, "Dialectical and Didactic Instruction Methods: Their Relationship to Changes in Kindergarten Teachers Questioning Behavior," Unpublished Ph.D. dissertation, George Peabody College for Teachers 1970.

<sup>4</sup>Davidson, Roscoe, L. "Teacher Influence and Children's Levels of Thinking." The Reading Teacher XXII. May 1969, pp. 702 - 704.

Strategies which appear to improve teachers questions have been developed for use during reading instruction. Davidson<sup>1</sup> compared the DR-TA and the DRA in order to determine which method promoted higher levels of teacher questions. She found that teachers using the DRA asked most of their questions about specific facts and student responses involved literal level thinking. On the other hand teachers using the DR-TA asked more interpreting and inferring questions and students responded at levels which indicated inferential, applicative and evaluative type thinking.

Wolf et al<sup>2</sup> wished to determine whether critical reading skills could be taught to elementary students. Part of this procedure involved improving teachers' questioning practices. They found that teachers given instruction and provided with specific materials asked more analyzing and evaluating types of questions than teachers in a control group. Students responded by hypothesizing and making evaluations.

Thus it would seem that teachers can be trained to ask higher level questions when they are provided with specific materials, given specialized training and individual feedback.

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<sup>1</sup>Davidson, Jane. op. cit. p. 83.

<sup>2</sup>Wolf et al op. cit. p. 108.



### Methods Employed to Encourage Student Questioning

Psycholinguistic theory has stressed the importance of questions initiated by the learner, however a survey of the research on classroom practices revealed that there were few opportunities for student questioning.

A research study conducted by Torrance<sup>1</sup> found that while preschool children have an intuitive ability to ask high level questions they seem to lose this ability when they enter school. He found that primary students had serious difficulty in formulating good questions. Torrance attributed this apparent loss in questioning ability to specific school pressures. He found that children were seldom given the opportunity to question in class and that teachers were not good models, for they often asked questions which required the recall of specific facts.

Floyd<sup>2</sup> found that primary children had very limited opportunity to raise questions. Student questions in first grade amounted to 3.75% of all questions asked during class sessions. In second grade, only 5.14% of the questions were asked by students, while in third grade,

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<sup>1</sup>Torrance, E. Paul, "Group Size and Question Performance of Preprimary Children". Journal of Psychology, Vol. 74, 1970. pp. 71 - 75.

<sup>2</sup>Floyd, W. P., "Analysis of the Oral Questioning Activities in Selected Colorado Primary Classrooms," Unpublished Ph.D. dissertation, Colorado State College, 1969.

students posed 3.64% of the questions. Similarly, Dohl<sup>1</sup> found that during elementary social studies classes, pupils were not asking questions. He suggested that pupil questioning was inversely related to teacher domination of the classroom and the number of teacher-initiated questions; and directly related to role reversal situations and the extent to which students were invited to ask questions during class. Davis<sup>2</sup> examined student and teacher questioning during elementary social studies classes. She found that in a typical classroom the teacher asked 88% of the questions while one-third of the students posed 12% of the questions. In concurrence with Dohl's findings Davis found that when a student or an adult other than the teacher was left in charge of the class student questions increased.

The lack of pupil-initiated questions may be rooted in the fact that there are few strategies designed to promote such questions. Most of the strategies which promote student questioning have been used in subjects other than reading. Torrance et al<sup>3</sup> found that kindergarten children

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<sup>1</sup>Dohl, N.R., "Pupil Questioning Behavior in the Context of Classroom Interaction," unpublished Ph.D. dissertation, Stanford University, 1965.

<sup>2</sup>Davis, Rose Marie Stevens, "A Study of the Relationship Between Pupil Questions and Selected Variables," unpublished Ph.D. dissertation, University of Oregon 1970.

<sup>3</sup>Torrance, E. Paul, et al, "Creative-Aesthetic Ways of Developing Intellectual Skills Among Five Year Olds," Journal of Research and Development in Education, Vol. 1, Spring 1968, pp. 58 - 69.

could generate significantly more questions concerning puzzling or discrepant events after exposure to a creative-aesthetic approach to learning which included making and testing multiple hypotheses, making predictions from limited data, checking clues like detectives, elaborating, and creative problem solving.

Dalis and Strasser<sup>1</sup> developed an open-ended teaching strategy to encourage student questioning during social studies. Students learned to judge the worth or validity of their own investigations without relying on input from the teacher. The role of the teacher was to assist rather than dominate students' thinking.

Hunkins<sup>2</sup> developed a strategy for use with social studies materials. Provision was made for both teachers and students to engage in the questioning process. This strategy gradually raised the cognitive level of questioning and discussion while allowing students to function at lower cognitive levels when additional information or re-thinking was required.

Several studies have also dealt with the development

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<sup>1</sup>Dalis, Gus T. Ben B. Strasser, "The Open-Ended Discussion Teaching Strategy," The Journal of School Health, Vol 18 Dec. 1973 pp. 664 - 665.

<sup>2</sup>Hunkins, Francis, Questioning Strategies and Techniques, Boston: Allyn and Bacon, Inc. 1972 pp. 79 - 83.

of student questioning strategies. Sadker and Cooper<sup>1</sup> increased student high order questions during fifth grade social studies classes using a behavior modification technique. Four students were trained to ask evaluation, comparison, problem solving, cause and effect and divergent questions. The students asked 109 cause and effect questions and 49 problem solving questions. The other categories were used infrequently: 16 evaluation, 3 divergent and 9 comparison questions.

A study by Cheves<sup>2</sup> demonstrated that sixth grade students could be trained to write inference questions. The results indicated that students of varying ability could write inference questions with specifically designed material.

The following studies deal with student initiated questions during reading instruction. Helfeldt and Lalik<sup>3</sup> conducted a study of fifth grade level to determine whether student initiated questions would affect scores on an interpretive reading test. They compared two questioning

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<sup>1</sup>Sadker, Myra, James Cooper, "Increasing Student Higher-Order Questions," Elementary English, Vol. 51:4 April 1974, pp. 502 - 507.

<sup>2</sup>Cheves, Deborah, "An Experiment in Developing the Ability to Make Inferences and to Ask Questions Which Require Inference in Sixth Grade Students" unpublished Ph.D. dissertation, Kansas City, University of Missouri, 1973.

<sup>3</sup>Helfeldt, John, and Rosary Lalik, "Reciprocal Student-Teacher Questioning" Reading Teacher, Dec. 1976 pp. 283-286.

strategies: one in which the teacher and student took part in questioning; and one in which only the teacher asked questions. Higher reading test scores were obtained by the student in the group where both the teacher and students questioned. The greater success achieved by this group was attributed to the student initiated questions.

In an exploratory study Singer<sup>1</sup> investigated the effects of student initiated questions on reading comprehension. Nine third graders formulated their own questions and then read to find answers to their questions. These students were matched with a control group and tested on the Stanford Reading Test. The experimental group achieved somewhat higher reading scores than the control group.

In a preliminary pilot study<sup>2</sup> the MDR-TA was used to promote inferential questioning among first and second graders during reading lessons. Results of the study showed that pupils asked questions in the categories of inference, explanation and evaluation.

Thus research in the area of student questioning revealed that a variety of methods have been designed to develop student questioning at the elementary level in subjects other than reading.

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<sup>1</sup>Singer, loc. cit.

<sup>2</sup>For complete results of the pilot study see Appendix A.

Little has been done with young pupils during reading instruction except for one strategy at third grade level and one strategy at fifth grade level.

### Initiating Instruction in Critical Reading

The final consideration of this chapter concerns the appropriate time for initiating instruction in critical reading. Stauffer<sup>1</sup> noted that some authorities feel that critical reading skills should be left until after many other skills have been mastered. Others such as Robinson<sup>2</sup>, Jenkinson<sup>3</sup> and Stauffer<sup>4</sup> suggest that young children are capable of critical reading.

Experimental evidence on childrens' thinking revealed that very young children are capable of problem solving

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<sup>1</sup>Stauffer, Russell, "Productive Reading Thinking at the First Grade Level", The Reading Teacher Vol: 13 Feb. 1960, pp. 183 - 187.

<sup>2</sup>Robinson, Helen, M. "Developing Critical Reading" in The First International Reading Symposium, Oxford 1964 edited by John Downing, Toronto Cassell and Co. Ltd. 1966, pp. 252 - 258.

<sup>3</sup>Jenkinson, Marion, D. "Information Gaps in Re-search in Reading Comprehension", in Reading: Process and Pedagogy, 19th Yearbook of the National Reading Conference, 1971, pp. 179 - 192.

<sup>4</sup>Stauffer, Russell, Teaching Reading As a Thinking Process, New York, Harper and Row, Publishers, 1969, p. 3.

when the situation is concrete and familiar. Hazlitt studied these abilities in children aged three to seven. In the test for making exceptions the children were asked to put all the small eggs except the green ones back into a large Russian egg and to pick out from twelve cards all the cards except those with a moon and star. In testing generalizations she asked children to select from five objects so as to put a dog and one object in each tray and a matchbox and an object on each tray and then asked, "What is there on all trays?" Hazlitt found that the ability to generalize and the ability to make exceptions can occur at all age levels under study.<sup>1</sup>

McAndrew<sup>2</sup> interviewed 151 children aged three years to about seven years and asked "What makes the train go?" and "Why are cookies different from cake?" She concluded that reasoning was possible in the youngest child and that with age there is a persistent increase in answers which fall into 'logical' and 'statement of fact categories'. In a summary of research concerning reasoning ability in

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<sup>1</sup>Hazlitt, V. "Children's Thinking" British Journal of Psychology vol 20, 1930 pp. 354 - 361.

<sup>2</sup>McAndrew, M.B. "An Experimental Investigation of Young Children's Ideas of Causality," Stud. Psychol. Psychiat. Cathol. Univ. Amer., vol. 6, 1943, no. 2, p. 66.

young children. Anderson<sup>1</sup> found that there was a complete range of behavior from random activity through to the immediate solution with ability to state the principle. Finally Wolf et al<sup>2</sup> concluded that children in grades one through six who had been taught to apply logical reasoning while reading were better able to read critically. It would appear that primary children are capable of high level thinking and can be trained to ask high level questions.

#### Summary

Questioning has been found to be a central factor in the development of reading. Research has revealed a variety of ways in which critical thinking and reading can be improved including the use of higher level teacher questions and specifically designed communication patterns. Several studies suggest that critical reading could be improved by focusing upon student questioning and student interaction, however very few studies have investigated this area especially as it applies to primary pupils.

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<sup>1</sup> Anderson, John E. Psychology of Development and Personal Adjustment, New York: Henry Holt and Company, 1949. pp. 177 - 194.

<sup>2</sup> Wolf et al, op. cit. 108 - 109.



## Chapter III

### DESIGN AND PROCEDURE

Since the focus of the study was on the comparison of two approaches used in the presentation of introductory reading lessons at the primary level this chapter discusses the Directed Reading-Thinking Activity (DR-TA) and the Directed Reading Activity (DRA). A discussion of the pilot study and the modified Directed Reading-Thinking Activity (MDR-TA) follow. The chapter concludes with a detailed description of the research study.

#### Discussion of DR-TA and the DRA

The DR-TA as designed by Stauffer<sup>1</sup> is an alternate way of developing reading and thinking skills while using basal readers. It is aimed at promoting pupil involvement, thus it consists of the following steps:

1. Setting individual and group purposes for reading - the teacher invites the learners to articulate their hypotheses about the story.
2. Adjusting rate of reading according to the difficulty of the material.
3. Reading silently at which time the teacher helps students apply word recognition and comprehension skills.
4. Developing comprehension by checking group

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<sup>1</sup>Stauffer, R. G. Teaching Reading as a Thinking Process New York: Harper and Row, Publishers, 1969, p. 26.

purposes and encouraging the group to reject or redefine purposes by:

- a. oral rereading to support or refute,
- b. developing and refining concepts,
- c. recognizing the need for other source material,

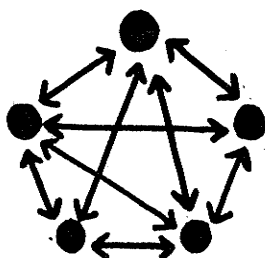
The Stauffer strategy varies from the traditional basal approach, the directed reading activity (DRA) in three ways: in the structure of the teaching-learning activity; in the role of the teacher, and in the interacting role of the student.

In the DR-TA strategy, students take an active role in predicting what the story will be about and discussing these predictions with their peers. Thus the emphasis is on student learning rather than on teaching and the teacher becomes an intellectual agitator and moderator rather than the director of the group. The open channels communication network is fostered in this approach.

The open channels communication system was designed to produce modifications in the roles of teachers and students. The teacher gives up the centralized leadership position and becomes an equal group member, so that each person may communicate freely with any other group member. Consequently, students have much more freedom to interact with peers but they also assume the responsibility for the

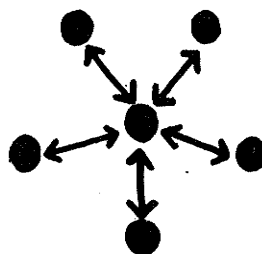
Table 3:1

## Two Group Communication Structures



All channels open structure

1. There is no one dominant leader, all participants are equal.
2. This system allows full feedback for each member.
3. This system is used in the DR-TA.



Closed wheel structure

1. There is a definite leader and all interaction flows through the leader in the central position.
2. This system allows full feedback for the leader only.
3. This method is used in the DRA.

evaluation and accuracy of what has been read. Table 3:1 summarizes the open and closed channels communication system.

In contrast, the DRA is a teacher-centred strategy, with emphasis on what the teacher should do rather than on what the children should learn. The DRA procedure summariz-

ed by Chall<sup>1</sup> in 1967 was quite rigid, making very specific demands on the teacher. In several of the more recent basal series the teachers' guides contain lesson outlines which have a very similar appearance to the Chall model, however the emphasis has shifted from clearly telling the teacher what to do, to suggesting ways in which the reading lessons might be presented including suggestions for developing student thinking skills.<sup>2,3</sup>

The DRA outline for presenting introductory reading lessons consists of the following points:

1. Preparation for the story - The teacher establishes background and arouses interest. The guide book usually suggests phrases for the teacher to use.
2. Presentation of new words - The guide book suggests which words to teach and how they could be presented.

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<sup>1</sup>Chall, J. Learning to Read: The Great Debate, New York: McGraw Hill Co. 1967, p. 202.

<sup>2</sup>Thorne, Elizabeth, A. et al, Language Experience Reading Program, Teacher's Source Book, Toronto, W.J. Gage Limited, 1970, p. 8.

<sup>3</sup>Clymer, Theodore, Reading 360, Ginn and Co. Lexington, 1969.

3. Guided reading and interpretation of the story - Specific questions and points to emphasize are suggested for the teacher, while the children are reading. Another set of questions are usually provided for re-reading.

As seen in Table 3:1, in the DRA the teacher is the central person acting in role of questioner, moderator, and judge of answers in the teacher-pupil dialogue. The communication is almost totally unilateral since interaction takes place only as directed by the teacher. The group members have no control over what will be discussed or how it will be discussed. They are unable to discuss things which may puzzle or interest them concerning the story because of the closed wheel communication system used in connection with DRA.

These two approaches were the basis for comparing pupil initiated high level questions and discussion and the effect of each approach on the types of questions posed by teachers and the types of responses elicited from pupils.

## THE PILOT STUDY

### Purpose

A pilot study was conducted in preparation for the research study using the DR-TA in a modified form. One change was necessary to facilitate pupil initiated questions. While the DR-TA encourages pupils to make predictions about story content prior to reading, in the (MDR-TA) these predictions are phrased in question form. Therefore the main purpose of this study was to determine whether the MDR-TA could be used to encourage primary pupils to pose inferential questions during reading lessons. Another purpose was to examine the feasibility of comparing the type of questions posed by teachers during a DR-TA lesson with questions posed by teachers during a lesson using the DRA procedure.

### Subjects

Six teachers and six groups of ten students each were involved in the pilot study. These sixty pupils were divided into three groups at first grade level and three groups at second grade level. Pupils were chosen from four classes in a large suburban middleclass school and arrayed into three categories: above average, average and below average groups, on the basis of informal teacher evaluation.

## Procedure

Data was recorded on tape for each group during a reading lesson, in which a new story was introduced. The participating teachers followed the DRA outline as it was presented in the teachers' guide book. Then the teachers attended a half-hour workshop at which time the MDR-TA procedure was carefully outlined<sup>1</sup>. In addition the teachers took part in an actual demonstration of the procedure. A question period followed to ensure that each teacher understood what the procedure involved. Then each teacher taught four lessons over a period of two weeks using the MDR-TA procedure. For the purpose of analysis, pupil and teacher questions from the pre-treatment, and the final MDR-TA lesson were compared for each group.

## Materials

Reading selections were chosen at each of the instructional levels from a basal reading series entitled The Ginn Basic Readers.<sup>2</sup> This series was chosen since it was unfamiliar to the participating teachers and to the children.

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<sup>1</sup>See appendix E for the outline.

<sup>2</sup>Russell, David H., The Ginn Basic Readers, Revised Edition, Toronto, Ginn and Co.

### Analysis of Data

For purposes of analysis two basic questions were then examined during the pilot study: will pupils instructed by means of the MDR-TA pose inference questions, and will teachers using the MDR-TA ask different types of questions than they do following the DRA procedure for introductory reading lessons?

A descriptive method was used to analyze the data<sup>1</sup>. When the pre and fourth treatment lessons were compared for the group labelled below average grade one, there were no questions posed by pupils on the pre treatment lesson. On the fourth treatment lesson there were thirteen inference questions, and no recall or explanation questions. The questions posed by the teacher in this group also changed from the pre to fourth treatment lesson. In the categories of recall and inference there was a decrease from ten to five and from twelve to two questions respectively, while in the explanation category there was an increase from four to eight questions.

In the average grade one group pupils did not pose questions during the pre treatment lesson. How-

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<sup>1</sup>See Appendix A for pilot study findings.



ever during the fourth treatment lesson pupils asked one recall, eleven inference and one explanation question. The teacher questions for this group varied very little from the pre to the fourth treatment lesson except in the inference category. The teacher posed two and three recall questions, nine and three inference questions and fourteen and thirteen explanation questions on the pre and fourth treatment lessons respectively.

Pupils in the above average grade one group did not pose questions during the pre treatment lesson while on the fourth lesson pupils posed thirteen inference and two explanation questions. The teacher questions for this group varied from the pre to the fourth lesson also. In the recall category there was a reduction from fifteen to three questions. In the categories of inference and explanation there were increases from the pre to fourth lesson: inference questions increased from five to seven, while explanation questions increased from eight to fifteen.

Results at the grade two level for pupil initiated questions were very similar to those at the grade one level. When the pre and fourth lessons were compared for the below average grade two group the findings were as follows: no questions posed by pupils on the pre treatment lesson, one recall, twelve inference and no explanation questions

posed during the fourth treatment lesson. Teacher questions for this group changed from the pre to the fourth lesson, with a reduction in recall questions from ten to five, no change in inference questions with three during both lessons and an increase in explanation questions from two to four.

In the average grade two group pupils did not pose questions during the pre treatment lesson. However during the fourth treatment lesson pupils asked one recall, twelve inference and one explanation question. The teacher questions for this group changed from the pre to the fourth lesson as well. In the recall category there was a reduction of questions from ten to three, an increase in inference and explanation questions from zero to two and from one to six respectively.

Pupils in the above average grade two group did not pose questions during the pre treatment lesson while during the fourth treatment lesson there were fourteen inference questions and three explanation questions posed by pupils. The teacher's questions in this group also changed from the pre to the fourth lesson with a decrease in the recall category from thirteen to three and an increase in the inference category from one to five and in the explanation category from five to nine.

### Summary of the Findings

There were no questions initiated by pupils during the pre treatment lessons. After treatment with the MDR-TA pupils in grades one and two at each of the instructional levels posed questions most of which were in the inference category. There were also some pupil questions in the categories of recall and explanation.

Changes also occurred in teacher questioning practices. Teachers in each of the groups posed fewer recall questions after treatment with the MDR-TA. In the other categories results were not very clear particularly at the grade one level where teachers in the average grade one group and in the below average group asked fewer inference questions after treatment. The teacher in the above average group asked more inference questions. Results in the explanation category also varied with the below average group and the above average group asking more questions, while the teacher in the average group asked fewer explanation questions on the fourth treatment lesson. Results in the categories of inference and explanation were more definitive at the grade two level where teachers at each instructional level posed an increased number, or retained the same number of explanation and inference questions.

Thus when the MDR-TA was employed as the method of instruction, pupils in each of the instructional levels posed questions. Most of these questions were in the inference category. There were no pupil initiated questions when the DRA method was used as the means of instruction. It was also found that teacher's questions changed when the MDR-TA was used for instruction. Teachers at each instructional level posed fewer recall questions and teachers in the three instructional groups at the grade two level asked slightly more inference and explanation questions.

#### Evaluation and Modifications

While the MDR-TA did promote a number of pupil questions and an increase in participation among pupils was apparent, the open channels interaction pattern was not fully achieved. Pupils tended to direct their questions and responses to the teacher rather than other group members. Teachers tended to retain their position of centrality rather than assume the role of observer. These trends were reflected in the pattern of interaction which remained teacher-pupil, teacher-pupil. Therefore the MDR-TA was modified by providing information and practise sessions concerning group interaction procedures during the inservice training for teachers involved in the research study.

A further modification was made to the MDR-TA based on the findings of the Petre<sup>1</sup> and Davidson studies.<sup>2</sup> These studies employed homogeneous groups of children according to reading ability. Findings indicated that all reading groups, above average, average and below average, responded with a greater number of and higher level responses. Thus the research study employed heterogeneous groups to see if this type of grouping would affect the two procedures. A final modification concerned rate of reading, step two of the DR-TA. Reading rate did not seem to have any meaning in the pilot study therefore it was omitted in the MDR-TA outline used in the research study. The outline consists of the following points:

MDR-TA

- Step 1. Setting the Purpose - the teacher begins the discussion and reading by:
- a. printing the title of the story on the blackboard,
  - b. posing an open-ended question, eg.  
"What are you wondering as you read the title?"

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<sup>1</sup>Petre, Richard M. "Quantity, Quality and Variety of Pupil Responses During an Open Communication Structured Group Directed Reading-Thinking Activity and a Closed Communication Structured Group Directed Reading Activity, unpublished Ph.D. dissertation, University of Delaware, 1970, p. 45.

<sup>2</sup>Davidson, Jane, "The Relationship Between Teachers' Questions and Pupils' Responses During a Directed Reading Activity and a Directed Reading-Thinking Activity," unpublished Ph.D. dissertation, University of Michigan, 1970, p. 45.

Step 2. Pre-reading:

- a. children read the title and look at the pictures on the title page,
- b. group members predict what the story might be about, interact and question each other,
- c. the group decides on the wording of questions and which questions they wish recorded, and the teacher records them on the board,
- d. the teacher acts as a catalyst asking for explanations, proof, and redirecting questions back to the group.

Step 3. Silent Reading -

- a. pupils read story silently,
- b. teacher helps pupils apply word recognition and comprehension skills by providing individual instruction as it is required.

Step 4. Post reading discussion - comprehension is developed by:

- a. discussing the recorded questions,
- b. oral rereading to support or refute,
- c. developing and refining concepts through discussion,
- d. the teacher asking for explanations, proof and evaluation of what has been read,

Table 3:2 summarizes the differences in the DRA, the DR-TA and the MDR-TA.

Comparisons Among the Directed Reading Activity, The Directed Reading-Thinking Activity and Modified Directed Reading-Thinking Activity

ELEMENTS

DRA

DR-TA

MODIFIED DR-TA

Group Make-up

Homogeneous or Heterogeneous

Homeogeneous

Heterogeneous

Purposes

Set by teacher to motivate the reading activity

Set by group or individuals to motivate critical reading and thinking and to foster student interaction

Set by individuals to promote inference questions and critical reading and thinking, and as well as student interaction.

Interaction

Established with a teacher-pupil dialogue

Encouraged for all members by the teacher

Discussion of questions encouraged for all members by teacher or pupils

Word recognition skills

Usually taught prior to the reading step from the author's prepared list

Taught during or after the reading step and selected by each pupil because of established need

Taught incidently as questions are recorded on the chalkboard, and during the silent reading on an individual basis.

Comprehension Skills

Developed during the lesson by the teacher

Developed by pupils' re-reading parts to accept, reject, or re-define their individually formulated purposes

Developed by pupils' rereading part of story to check answers to their own questions and through their discussion.

Source of Authority

Teacher and material being read

The group and material being read

The group and material being read

Rereading orally

Could be left for another lesson or specific parts could be read to find answers to teacher's questions.

Used for reading specific parts to prove purposes

Used to find answers to questions posed by students

Teacher's Role

Serves as moderator, questioner, and judge of the pupil's answers

Serves as a moderator and intellectual agitator

Serves as a moderator, recorder of questions, a catalyst to keep discussion going, a monitor by re-directing questions back to the group

In addition modifications were made to the measuring instrument. The Ohio Scales were chosen for classifying data because both Petre<sup>1</sup> and Davidson<sup>2</sup> had used these scales. Since the present study was in part an extension of these studies it was decided to use the scale again. These scales were developed for the 1967 Ohio State University study conducted by Wolfe et al<sup>3</sup> for the purpose of classifying teacher questions and student responses. Modifications were made based on the findings of the pilot study including changes to accommodate student questions and group interaction patterns.

The Ohio Scales has seven categories for teacher verbal behavior and five categories for student responses based on the reasoning involved. The modified scale has six categories to identify the teacher and student verbal behavior. The analyzing, applying and summarizing categories have been omitted in the modified scales and were replaced with an explanation category, one additional category, redirect, was added. Provision was also made for recording interaction patterns.

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<sup>1</sup> Petre, op. cit. p. 105.

<sup>2</sup> Davidson, op. cit. p. 8

<sup>3</sup> Wolf, Wilavena, et al. Critical Reading Ability of Elementary School Children U.S. Office of Education Cooperative Research Project, No. 5 - 1040, Ohio State University, June 1967, pp. 167 - 173.



The final modification concerned teacher selection. The Davidson study<sup>1</sup> employed highly qualified reading specialists to teach all lessons in the study. In the Petre study<sup>2</sup> the investigator taught all lessons. For the research study under current investigation teachers in one school division were chosen at random to teach all the lessons.

### THE RESEARCH STUDY

#### Sample

The sample was chosen from three elementary schools within the River East School Division. These schools had been randomly picked from a list consisting of those schools with two or more grade two classes. Two intact grade two classes including the teachers at each of the three schools volunteered to take part in the research. Thus the sample consisted of six teachers and one hundred and twenty-three pupils.

#### Teachers

The academic background and teaching experience of the six teachers who participated in the study were summarized in Table 3:3. All of the teachers have four

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<sup>1</sup>Davidson, op. cit., pp. 43 - 44.

<sup>2</sup>Petre, op. cit. p. 48.

years of training including a Bachelor of Arts degree and a one year certification program which included one compulsory Language Arts Course of which reading is a major component. None had taken any special reading courses at the university level. Teaching experience among the teachers varied from one to six years.

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Table 3:3

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Participating Teachers' Years of Teaching Experience

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<u>Teacher</u>	<u>Total Teaching Experience</u>	<u>Experience Teaching Grade 2</u>
1	3	3
2	3	3
3	3	3
4	1	1
5	1	1
6	6	1

---

Pupils -

One hundred and twenty-three pupils took part in the experiment. Two classes consisting of forty-nine pupils and two teachers were randomly assigned to the con-

trol condition. Another two classes comprised of fifty pupils and two teachers were assigned to the experimental group. A third group consisting of two teachers with a group of twelve pupils each was also assigned to experimental condition. This smaller group was included since many teachers are currently teaching classes of more than one grade. Thus the research study provided an opportunity to investigate whether group size had an effect on the MDR-TA in the two major areas under study.

Classes were assigned to groups as shown in Table 3:4:

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Table 3:4

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Group Assignments

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Control Group (C)	Treatment Group (T <sub>1</sub> )	Treatment Group (T <sub>2</sub> )
DRA	MDR-TA	MDR-TA
49 pupils	50 pupils	24 pupils

---

The three groups were then compared in order to determine whether differences existed between them in terms of pupil initiated questions, types of pupil responses, types of teacher questions as well as type of group interaction pattern.

Prior to the experiment, all students were administered the comprehension sub-test of the Metropolitan Reading Test Primary II<sup>1</sup> form F to determine the range of reading ability within the classes and the similarity between the six classes within the study. The stanine range and the average stanine scores suggested similarities among the classes on this one measure of comprehension. These scores were summarized in Table 3:5:

Table 3:5

Student Reading Comprehension Scores

	<u>Class</u>	<u>Stanine Range</u>	<u>Average Stanine</u>
1)	control (C)	2-9	6.15
2)		4-9	6.56
3)	treatment 1 (T <sub>1</sub> )	2-9	6.08
4)		4-9	6.20
5)	treatment 2 (T <sub>2</sub> )	3-9	6.28
6)		3-9	6.41

<sup>1</sup>Durost, Walter, Harold Bixler, Wayne Wrightstone, George A. Prescott, Irving H. Balow, Metropolitan Achievement Tests Primary II Form F, Harcourt Brace Jovanovich, Inc. 1970.

## Materials

Each group participating in the study used the same reading selections. Stories were chosen from Seven is Magic, level 7 Reading 360<sup>1</sup> because this series was unfamiliar to the participating teachers.

The following stories were used:

- "Pat's School Picture", pp. 14 - 16,
- "Pork Chops and Applesauce", pp. 35 - 40,
- "Kay", pp. 48 - 54.
- "Snow" pp. 95 - 99.

Teachers using the DRA method followed the lesson plans as outlined in the teacher's guide.<sup>2</sup> Teachers using the MDR-TA followed the outline prepared by the investigator.<sup>3</sup>

## Modified Ohio Scales

The scale based on the Ohio Scales was changed so that student and teacher verbal output could be categorized in the same way. Several of the categories were also changed based on the finding of the pilot study. The categories have been defined as follows:

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<sup>1</sup> Clymer, Theodore, Reading 360, Ginn and Co. Lexington, 1969.

<sup>2</sup> See Appendix F for a copy of DRA outline.

<sup>3</sup> See Appendix E for a copy of MDR-TA outline.

1. Redirect: A question which could be repeated or extended or merely directed repeatedly to various members. This category was used to indicate the extent to which the teacher invites pupil participation.

Example: What do you think Bill? Do you agree or disagree with Bill, Janet? Why?

Does anyone else have anything to add?

2. Recall - A question or response in which the information can be clearly found in the text.

Example: What did the author say about John?

Can you find proof in the text, that John went skating?

3. Translation - A question or response which involves assigning literal meaning to a word or idea. It could also be a re-statement of the text in one's own words.

Example: What does "journey" mean? State in your own words what the author meant by .....

4. Inference - A question or response which requires going beyond what is given, seeing relationships between facts, events and ideas, hypothesis testing, making predictions, or looking for implications.

Example: Now that you have read the title what do you think the story will be about? After reading the first few pages how do you think the story might end?

5. Explanation - A question or response in which a rationale for the "why" of a situation must be offered. The explanation must be based on information inferred from the text.

Example: Explain how you know that Bill would be safe? The author said "it was the beginning of the end", Why do you think he said that?

6. Evaluation - A response or question in which a judgment is made is based on established criteria. It includes personal interpretation or judgments about the quality or accuracy of printed material. One's own set of personal or group established values may be used as the criteria.

Example: This story is a fairy tale because it contains all the elements of a fairy tale. Do you agree with that statement, Jane? Why?

What evidence do you have for saying that statement is true?

#### Validation of the Modified Measurement Instrument

Using the modified Ohio Scales, two graduate students in reading and the experimenter coded the verbal behavior of both teachers and pupils from transcriptions of the taped lessons. Prior training was carried out using tapes from the pilot study. As a group the raters clarified differences while they worked through these transcripts until a clear understanding of the six categories on the modified scale was established. Then the rating of the transcripts from the actual study was done independently by all three raters.

Raters reliability was determined by calculating the Pearson's product moment correlation from three random-

ly chosen marked transcriptions. Transcript one produced a correlation of .99, transcript two yielded a correlation of .97, while transcript three had a correlation of .98. These correlations indicated a high inter-judge reliability.

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Table 3:6

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Correlations Between Raters' Scores on  
Three Randomly Chosen Sample Lessons

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Investigator's Score	Rater X.	Rater Y.
Investigator 1.00	.99	.97
Rater X	1.00	.98
Rater Y		1.00

---

Procedures

Three schools chosen randomly for the research study were contacted and a meeting arranged to discuss the project with all the grade two teachers at each school. The teachers were asked if they would be interested in teaching and taping five reading lessons, one lesson taught accord-



ing to the method usually followed by each teacher and four lessons taught following either the DRA or the MDR-TA according to assignment. Two teachers at each of the three schools agreed to participate.

As noted previously, each student participating in the study was given the comprehension sub-test of the Metropolitan Reading Test, Primary 2 Form F<sup>1</sup> during the first week of the experiment.

On Thursday morning of this same week pre-treatment data was recorded on tape for each group. Only "introductory" reading lessons wherein a new story is being introduced, were used during the experiment. Teachers were instructed to teach this lesson according to the program or procedure they usually followed.<sup>2</sup>

After the pre-treatment data were collected, the four teachers assigned to the experimental groups took part in a half-hour inservice where they were given information about the open channels communication network to be used in the MDR-TA approach. This was explained in detail and

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<sup>1</sup> Durost, loc. cit.

<sup>2</sup> See Appendix C for the time line of the experiment.

teachers were encouraged to question so that they understood the concept and the purpose underlying it.<sup>1</sup>

During the following week a second half-hour inservice introduced the four teachers in the experimental conditions to the MDR-TA approach. The outline was discussed step by step, then teachers participated in a demonstration of the procedure using a story similar to those used in the study. Teachers were encouraged to question until the procedure and the rationale were clearly understood by each participant. All story materials were given out at this time.<sup>2</sup>

The two teachers assigned to the control group took part in a separate half-hour inservice. The purpose of which was to discuss the specific DRA they were to follow during the experiment. While both teachers normally followed a DRA procedure as part of their daily practice, it was considered important that the specified outline was followed as closely as possible during the experiment. This inservice also served to provide the control group with similar attention to that afforded the experimental groups as well as an opportunity to give out lesson outlines and story materials.

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<sup>1</sup>See Appendix F for the inservice material

<sup>2</sup>See Appendix D for MDR-TA inservice material

On Thursday morning during the second week, all six participating teachers taught the first lesson following the procedure they had been taught. All lessons in their entirety were recorded on tape. This procedure was followed for the duration of the experiment. During this time teachers worked independently and had no contact with the experimenter.

### Method of Analysis

The Cochran Q statistic was employed to test the hypotheses dealing with types of teacher questions and types of student responses.<sup>1</sup>

The hypotheses concerning student initiated questions were reported in graphic form while the hypothesis which dealt with the group interaction pattern was analyzed by applying a one sample Runs Test.<sup>2</sup>

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<sup>1</sup>See Appendix G for Cochran Q formula

<sup>2</sup>See Appendix G for Runs Test formula.

## Chapter IV

### ANALYSIS OF THE DATA

The major purpose of the study was to compare two teaching strategies used in the presentation of basal reading material: the modified directed reading-thinking activity (MDR-TA) and the directed reading activity (DRA) regarding pupil initiated questions and discussion and the types of teacher questions and pupil responses.

The present chapter contains the specific questions formulated for the study, the rationale for selecting particular statistical treatments, and the hypotheses emanating from the questions. These are followed by an analysis of the data as related to each of the hypotheses and a summary of the findings.

The specific questions to be answered were:

1. Will pupils instructed by means of the MDR-TA pose more questions than pupils instructed by means of the DRA?
2. Will pupils instructed by means of the MDR-TA pose more inference questions than pupils instructed by means of the DRA?
3. Will pupils instructed by means of the MDR-TA pose more explanation questions than pupils instructed by means of the DRA?
4. Will pupils instructed by means of the MDR-TA pose more evaluation questions than pupils instructed by means of the DRA?

5. Will there be a difference in the instances of pupil initiated talk between pupils instructed by means of the MDR-TA and pupils instructed by means of the DRA?
6. Will pupils instructed by means of the MDR-TA make responses which indicate different types of thinking, than the thinking displayed by pupils instructed by means of the DRA?
7. Will teachers instructing by means of the MDR-TA ask fewer questions than teachers instructing by means of the DRA?
8. Will teachers instructing by means of the MDR-TA ask different types of questions than teachers instructing by means of the DRA?
9. Will teachers instructing by means of the MDR-TA invite pupil participation by extending redirect questions back to the group more frequently than teachers instructing by means of the DRA?
10. Will the interaction pattern employed with the MDR-TA differ from the interaction pattern employed with the DRA?

#### Selection of Statistical Treatments

A non parametric statistic was called for in the research study since the data was dicotomous and consisted of frequency counts. Chi-square was the statistic chosen because it was felt that the data would satisfy the assumptions associated with this test.<sup>1</sup>

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<sup>1</sup> Chi-square is applied when the following conditions are met:

1. The data frequencies in each category represent the number of independent observations in each category.
2. The categories are mutually exclusive so that a single observation can appear in only one category.
3. The frequency according to most authorities must reach a minimum of ten in all categories. n. Main source of information: Lynch, Mervin, D., David V. Huntsberger, Elements of Statistical Inference for Education and Psychology. Toronto: Allyn and Bacon, Inc., 1976 p. 207.

However when the data concerning pupil questions was collected it violated a basic assumption regarding minimum frequencies: the pre treatment lessons showed no pupil questions and the post treatment lessons revealed questions in only two of the three treatment groups<sup>1</sup>. The problem with no frequencies was such that no statistical procedure could be found to deal with it, therefore the hypotheses concerning pupil questions were analyzed in descriptive form. Further, since there were a number of frequencies below the required minimum of ten the data concerning pupil responses, pupil initiated talk and teacher questions also violated the assumption associated with chi-square. Therefore another statistic was found in order to analyze this data: the Cochran Q test which is similar to the chi-square but which has no assumption regarding low frequencies was chosen for the analysis of hypotheses four through seven.

The Cochran Q test like chi-square is a non parametric test suitable for use with frequency data which can be divided into mutually exclusive categories. This test provides a method for determining whether the responses of three or more groups of subjects differ significantly among themselves. It allows for an item to be analyzed and the responses of the groups in the different conditions to be

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<sup>1</sup>The terms pre and post treatment lessons were used through out the chapter. Pre treatment lesson was the lesson taught according to the usual procedure followed by each teacher. Post treatment lesson was the fourth lesson taught according to the DRA or the MDR-TA.

compared. Specifically the test was used to determine whether the three treatment groups C,  $T_1$  and  $T_2$  differed in their frequency of responses to various categories of pupil responses and teacher questions.

The data concerning the pattern of interaction also required a different type of analysis for it was not the frequency of events but the order of events which was important. The closed wheel communication pattern associated with the DRA is represented by a teacher-pupil type interaction. The all channels open pattern associated with the modified DR-TA is usually characterized by a more irregular sequence of events. The Runs Test is a technique which can be applied to a frequency of events in order to determine whether or not the sample demonstrates a random sequence of events.

The order of teacher and pupil initiated talk was examined in order to determine whether or not the pattern was random. The sampling distribution of the values of Z which could be expected from repeated random samples was known. Using this sampling distribution a decision could be made as to whether a given observed sample had more or fewer runs than would probably occur in a random sample.

Having selected the statistical analysis appropriate to the data, it was applied to the hypotheses.

### Hypotheses for the Study

In examining the various hypotheses, it is necessary to recall that group C received instruction by means of the DRA while group  $T_1$  and  $T_2$  received instruction by means of the MDR-TA. The main reason for a distinction between groups  $T_1$  and  $T_2$  was group size. Group C consisted of two, whole class size groups, forty-nine pupils and two teachers. Group  $T_1$  also consisted of two entire class size groups, fifty pupils and two teachers, whereas group  $T_2$  consisted of two half classes twenty-four pupils and their teachers. Thus as the hypotheses are analyzed, the effects of group size will also be considered.

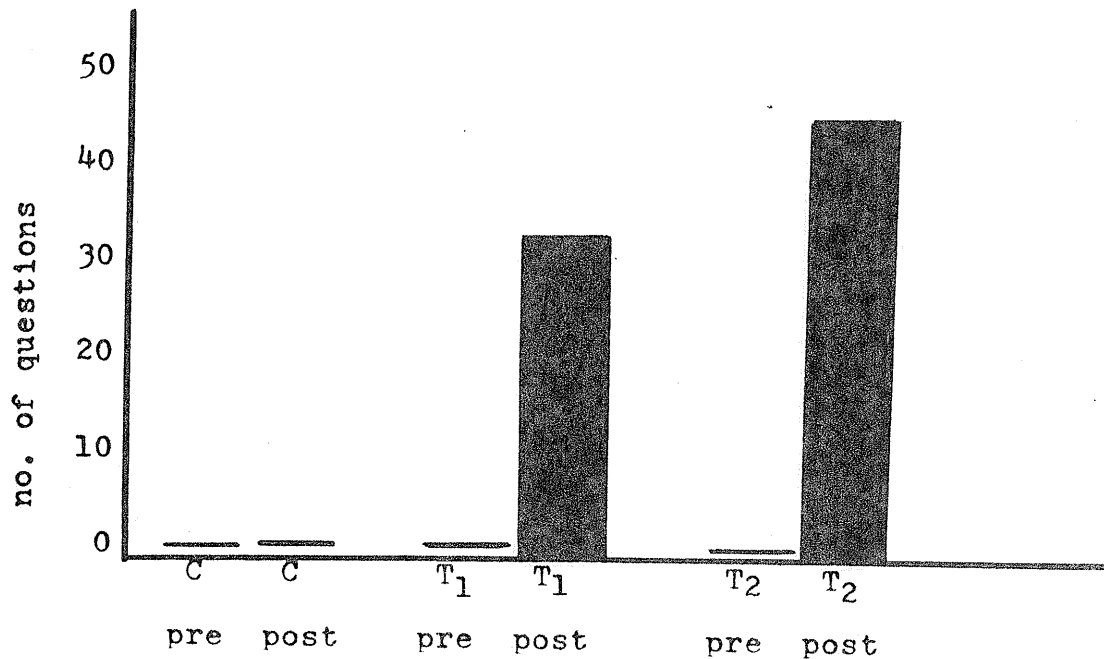
HOI: There will be no difference among the three treatment groups on the total number of questions posed by pupils.

There were no pupil questions recorded for the three treatment groups during the pre treatment lessons. Diagram 4:1 summarizes the total number of pupil initiated questions posed in groups  $T_1$  and  $T_2$  during the post treatment lessons.



Diagram 4:1

Total Number of Pupil Initiated Questions:  
Pre and Post Treatment Lessons



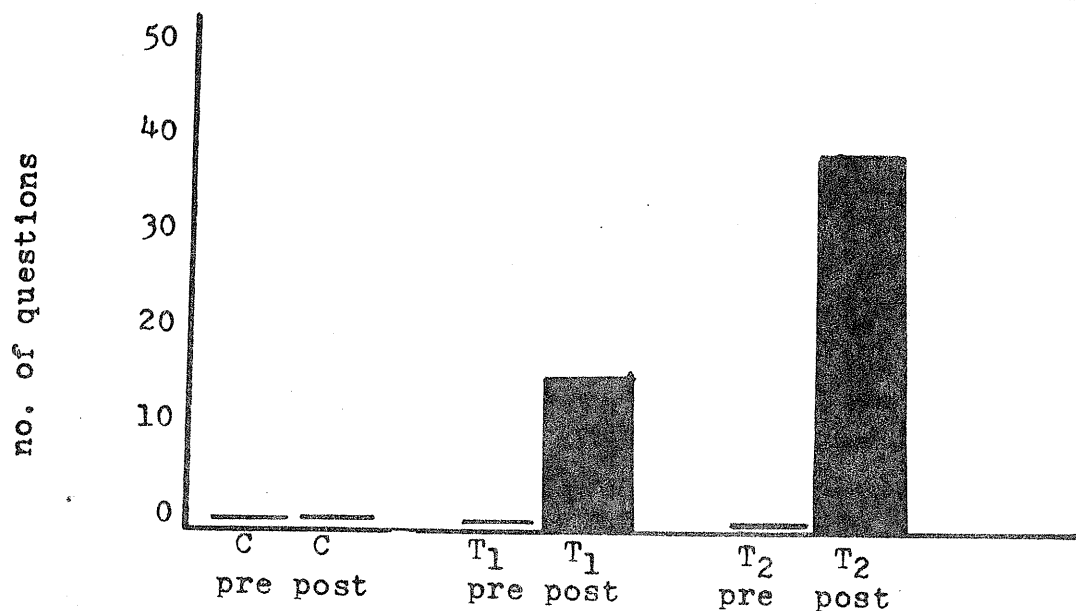
During the post treatment lessons pupils in group C instructed by means of the DRA asked no questions while pupils in groups T<sub>1</sub> and T<sub>2</sub> instructed by means of the MDR-TA asked totals of thirty-two questions and forty-six questions respectively. This represented an average of .64 questions per pupil in group T<sub>1</sub> and an average of 1.9 questions per pupil in group T<sub>2</sub>. Thus the null hypothesis was rejected.

H02: There will be no difference among the three treatment groups regarding the number of inference questions posed by pupils

There were no pupil inferential questions posed in any of the groups during the pre treatment lessons. When the post treatment lessons were examined, group C continued to pose no inferential questions. However the treatment groups  $T_1$  and  $T_2$  recorded thirteen and thirty-nine inference questions respectively. Therefore Diagram 4:2 illustrates the number of inference questions posed by pupils in groups  $T_1$  and  $T_2$ .

Diagram 4:2

Number of Pupil Initiated Inference Questions:  
Pre and Post Treatment Lessons



Groups  $T_1$  and  $T_2$  showed an increase in pupil initiated inference questions with thirteen and thirty-nine questions respectively. For group  $T_1$  this represented 42% of the questions asked while for group  $T_2$  it represented 85% of the questions asked. Further analysis revealed that in group  $T_2$  the average number of inference questions posed per child was 1.6 while in group  $T_1$  the average was .26. Thus the null hypothesis was rejected.

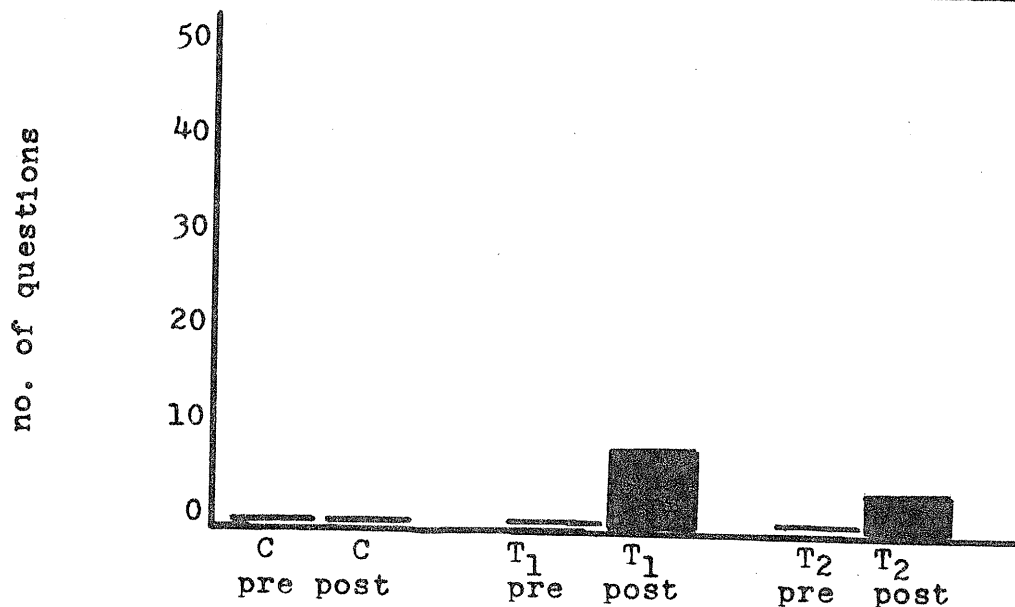
H03: There will be no difference among the three treatment groups regarding the number of explanation questions posed by pupils.

There were no explanation questions posed by any of the pupils in the three groups during the pre treatment lessons and none by pupils in group C during the post treatment lessons. The total number of explanation questions posed by pupils in groups  $T_1$  and  $T_2$  are shown in Diagram 4:3.

Groups  $T_1$  and  $T_2$  showed an increase in pupil initiated explanation questions with six and two questions respectively. For group  $T_1$  this represented nineteen percent of the questions asked while for group  $T_2$  it represented four percent of the total questions. Further analysis revealed that pupils in group  $T_1$  and  $T_2$  posed averages of .12 and .08 explanation questions respectively. Thus the null hypothesis was rejected.

Diagram 4:3

Number of Pupil Initiated Explanation Questions:  
Pre and Post Treatment Lessons



H04: There will be no difference among the three treatment groups regarding the number of evaluation questions posed by pupils.

There were no evaluation questions posed by pupils in any of the treatment groups on either the pre or post treatment lessons, therefore no analysis could be made.

#### Summary of H01, H02, H03 and H04

Group C employing the DRA method of instruction

failed to produce any pupil initiated questions on either the pre or post treatment lessons. The MDR-TA, on the other hand, allowed for pupil initiation questions. Pupils in group T<sub>1</sub> posed a total of 32 questions, 13 or 42% of these were in the inference category, 6, or 19% were explanation questions. Thus 61% of all the pupil questions asked in group T<sub>1</sub> were in categories designated as critical thinking. The remaining 13 questions or 39% were literal level questions.

Pupils in group T<sub>2</sub> posed a total of 46 questions, 39 or 85% of these were the inference category, 2 or 4% were explanation questions. Thus 89% of the questions posed by pupils in group T<sub>2</sub> were considered to be critical thinking. The remaining 5 questions or 11% were literal level questions. There were no evaluation questions initiated by pupils in any of the groups.

There were differences between the MDR-TA treatment groups with reference to the average number of questions posed per child. When the total number of questions were considered T<sub>1</sub> produced .64 questions per child while pupils in group T<sub>2</sub> produced 1.9 questions per child.

H05: There will be no difference among the three treatment groups regarding the number of instances of pupil initiated talk.

The term "pupil initiated talk" encompassed all talking initiated by pupils. This included responses and questions and was considered as an indicator of pupil participation.

Table 4:1 summarizes the results of the Cochran Q test for three treatment groups regarding pupil initiated talk for pre and post treatment lessons.

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Table 4:1

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Pupil Initiated Talk: Summary of the Cochran Q Test Among Three Treatment Groups

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	C	T <sub>1</sub>	T <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>
pre	148	95	170	413	170569
post	<u>141</u>	<u>152</u>	<u>254</u>	<u>547</u>	<u>299209</u>
	289	247	424	960	469278

$Q = 7.6^*$

Critical value required for significance at the .05 level,  
df = 2 is 5.99

1

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- 
- l<sub>C</sub> - control group DRA - 25 pupils
  - T<sub>1</sub> - treatment group 1 - DR-TA - 25 pupils
  - T<sub>2s</sub> - treatment group 2 - DR-TA - 12 pupils
  - L<sub>1</sub> - line total
  - L<sub>2</sub> - line total squared
  - Q - calculated value using the Cochran Q statistic
  - df - degrees of freedom

Visual inspection of the table revealed differences among the groups with regard to instances of pupil initiated talk. Group  $T_1$  recorded 95 instances, group C had 148 instances and group  $T_2$  had 170 instances respectively. On the post treatment lessons differences among the groups increased. Group C recorded 141 instances, group  $T_1$  had 152 instances while group  $T_2$  had 254 instances of pupil initiated talk.

Results of the Cochran Q test supported the visual inspection. There was significant difference among the groups regarding pupil initiated talk, therefore the null hypothesis was rejected.

Further analysis revealed within group changes. Group C showed a decrease of 2.4% in pupil initiated talk from pre to post lessons. Both groups  $T_1$  and  $T_2$  demonstrated increases from pre to post treatment. This change represented a 23% increase in pupil initiated for group  $T_1$  and a 20% increase in pupil initiated talk for group  $T_2$ .

These differences were also noted in the average amount of pupil initiated talk for each group. Group C pupils initiated an average of 3.1 statements during the pre treatment and an average of 2.9 statements during the post treatment lesson. Group  $T_1$  initiated an average of 1.9 during pre treatment and an average of 3 during the post treatment. The small group,  $T_2$  initiated an average

of 7.1 statements during the pre treatment and an average of 11 statements during the post treatment lesson.

H06: There will be no difference among the three treatment groups regarding types of responses made by pupils.

For the purpose of analysis this hypothesis was examined in four parts<sup>1</sup>,

H06:1 There will be no difference among the three groups regarding the number of recall responses given by pupils.

Table 4:2 summarizes the results of the Cochran Q test of three treatment groups for pupil recall responses on pre and post treatment lessons. Visual inspection of the table indicated some change between the groups on the pre treatment lesson with group T<sub>1</sub> recording 92 responses, group C recording 108 responses and group T<sub>2</sub> recording 130 responses. There continued to be some difference among the groups on the post treatment lessons. Group T<sub>2</sub> continued to have the greatest number of recall responses with 122 followed by group C with 119 and group T<sub>1</sub> with 57 responses.

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<sup>1</sup>Note only four of the five categories were considered since there were no evaluation responses recorded.



Table 4.2

Pupil Recall Responses: Summary of the  
Cochran Q Test Among Three Treatment Groups

	C	T <sub>1</sub>	T <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>
pre	108	92	130	330	108900
post	<u>119</u>	<u>57</u>	<u>122</u>	<u>298</u>	<u>88804</u>
	227	149	252	628	197704

$$Q = 3.67$$

Critical Value required for significance at the .05 level,  
df = 2 is 5.99

Results of the Cochran Q test supported the visual inspection. There was no significant difference among the groups for recall responses, therefore the null hypothesis was accepted.

Further analysis of the data showed within group changes. Group C had a slight increase in recall responses: 108 to 119; group T<sub>2</sub> showed a slight decrease from pre to post treatment: 130 to 122; group T<sub>1</sub> had a moderate decrease from 92 to 57 responses.

These differences were also reflected in the average number of recall responses made by pupils in each

group. Group  $T_2$  had the highest average for recall responses with 5.4 and 5.1 for pre and post lessons respectively. Group C responded with an average of 2.2 and 2.4 responses per pupil while group  $T_1$  had the lowest average with 1.8 and 1.1 responses per pupil.

H06:2 There will be no difference among the three treatment groups regarding the number of translation responses posed by pupils.

Table 4:3 summarizes the results of the Cochran Q test for three groups regarding the number of translation responses. Visual inspection of the table indicated some change between the groups on the pre treatment lesson. Group  $T_1$  recorded the least number of translation responses, group C recorded 10; while group  $T_2$  recorded 22 responses. During the post treatment lessons there was less difference among the groups. Group C had only one response, group  $T_2$  had 4, while group  $T_1$  had 5 translation responses.

Table 4:3

Pupil Translation Responses: Summary of the Cochran Q Test Among Three Treatment Groups

	C	$T_1$	$T_2$	$L_1$	$L_2$
pre	10	4	22	36	1296
post	<u>1</u>	<u>5</u>	<u>4</u>	<u>10</u>	<u>100</u>
	11	9	26	46	1396

$$Q = 2.95$$

Critical Value required for significance at the .05 level  
df = 2 is 5.99

Results of the Cochran Q test supported the visual observations. There was no significant differences among the groups therefore the null hypothesis was accepted.

Within group changes occurred in group C where responses decreased from 10 to 1 from pre to post treatment. Group T<sub>2</sub> also demonstrated a decrease with 22 and 4 responses respectively. Group T<sub>1</sub> had an increase of 1, from pre to post treatment with 4 and 5 responses respectively.

These differences were also reflected in the average number of translation responses made by pupils in each group. Groups C and T<sub>2</sub> showed a decrease in the average number of translation responses from pre to post treatment while group T<sub>1</sub> had a very slight increase. Group C responded with an average of .21 and .02 translation responses while group T<sub>2</sub> had an average of .9 and .15 respectively. Group T<sub>1</sub> remained about the same with an average of .08 for pre treatment and .01 for the post treatment.

H06:3. There will be no difference among the three treatment groups regarding the number of inference responses posed by pupils.

Table 4:4 summarizes the results of the Cochran Q test regarding the number of inference responses for both pre and post treatment lessons.

Table 4.4

Pupil Inference Responses: Summary  
of the Cochran Q Test Among Three  
Treatment Groups

	C	T <sub>1</sub>	T <sub>2</sub>	L <sub>1</sub>	L <sub>1</sub> <sup>2</sup>
pre	5	0	6	11	121
post	<u>7</u>	<u>25</u>	<u>33</u>	<u>65</u>	<u>4225</u>
	12	25	39	76	4346

$$Q = 5.1$$

Critical value required for significance at the .05 level  $df = 2$  is 5.99

On the pre treatment lessons there was some difference between group T<sub>1</sub> and the other two groups: Group T<sub>1</sub> recorded no responses, while group C had four and group T<sub>2</sub> had six. On the post treatment lesson the difference appeared to have shifted, with group C differing from the other groups. Group C recorded seven responses, Group T<sub>1</sub> had 25, while group T<sub>2</sub> recorded 33 responses.

Results of the Cochran Q test revealed that there was no significant difference among the groups therefore the null hypothesis was accepted. These findings were

supported by the visual inspection which indicated moderate differences among the groups. Groups  $T_1$  and  $T_2$  showed an increase in the number of inference responses from pre to post treatment: A 100% increase in inference responses in group  $T_1$  and a 69% increase in group  $T_2$  whereas there was very little change in group C from pre to post test.

These differences were also reflected in the average number of inference responses made by pupils in each group. Group C remained virtually unchanged with an average of .1 and .15 responses respectively. Group  $T_1$  showed an increase from pre to post treatment with an average of 0 and .5 respectively while group  $T_2$  showed an increase from an average of .25 to 1.4 inference responses per pupil.

Ho6:4 There will be no difference among the three treatment groups regarding the number of explanation responses posed by pupils.

As visual inspection of the table 4:5 showed, there was considerable difference between the groups on the pre treatment lesson in the explanation response category. Group  $T_1$  had no responses,  $T_2$  had 6, while group C had the highest number with 15 responses. On the post treatment lesson the change had shifted and the differences among the group decreased: group C recorded 13 responses, group  $T_1$  recorded 17 responses while group  $T_2$  recorded 21 explanation responses. When these differences were

analyzed statistically the calculated Q value (7.8) indicated that there was significant difference between the groups therefore the null hypothesis was rejected.

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Table 4:5

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Pupil Explanation Responses: Summary of the Cochran Q Test Among Three Treatment Groups

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	C	T <sub>1</sub>	T <sub>2</sub>	L <sub>1</sub>	L <sub>1</sub> <sup>2</sup>
pre	15	0	6	21	441
post	<u>13</u>	<u>17</u>	<u>21</u>	<u>51</u>	<u>2601</u>
	28	17	27	72	3042

$Q = 7.8^*$

Critical value required for significance at the .05 level,  $df = 2$  is 5.99

---

Within group changes occurred in groups T<sub>1</sub> and T<sub>2</sub> where there was a 100% increase and 55.5% respectively from pre to post treatment.

This difference was also reflected in the average number of explanation responses made by pupils in each group. Group C remained almost the same with an average of .3 and .25 responses respectively. Group T<sub>1</sub> showed

an increase in average responses from pre to post treatment with 0 and .35 respectively, while group  $T_2$  increased from an average of .25 to .88 explanation responses per pupil.

#### Summary of H06

The hypothesis stated that there would be no difference in the types of pupil responses between groups C,  $T_1$  and  $T_2$ . This hypothesis was subdivided in four parts for the purpose of analysis. In the categories of recall, translation and inference, the sub-hypotheses were accepted since the difference between groups was not significant.

On the other hand the hypothesis concerning explanation responses was rejected since significant difference between groups was found. The change occurred between group C and the treatment groups  $T_1$  and  $T_2$  as well as within treatment groups from pre to post treatment. While group C changed very little, it did continue to produce a high number of explanation responses in contrast to groups  $T_1$  and  $T_2$  where there was a considerable increase on the post treatment lessons.

H07: There will be no difference among the three treatment groups concerning the total number of questions posed by teachers

Visual inspection of table 4:6 revealed differences among the groups on the pre treatment lessons.

Group  $T_1$  had the least number of teacher questions with 82, group C had 125 while group  $T_2$  had the greatest number with 149. During the post treatment lessons the difference appeared to shift. Group C had the greatest number 123, group  $T_1$  had 61, while group  $T_2$  showed the greatest decrease with 69 questions.

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Table 4:6

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Total Teacher Questions: Summary of the Cochran Q Test Among Three Treatment Groups

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	C	$T_1$	$T_2$	$L_1$	$L_2$
pre	125	82	149	356	126736
post	<u>123</u>	<u>61</u>	<u>69</u>	<u>253</u>	<u>63504</u>
	248	143	218	609	190240

$Q = 7.7^*$

Critical Value required for significance at the .05 level  
df = 2 is 5.99

---

Results of the Cochran Q test indicated that there was a significant difference between groups therefore the null hypothesis regarding total teacher questions was rejected.

Within group changes occurred in groups  $T_1$  and  $T_2$  where teacher questions decreased from pre to post treatment. This represented a 15% decrease in group  $T_1$



and a 37% decrease in group T<sub>2</sub>. There was almost no change in group C from pre to post treatment.

These differences were also reflected in the average number of teacher questions per pupil. Group C remained the same from pre to post treatment with an average of 2.6 teacher questions per pupil. Group T<sub>1</sub> showed a slight decrease from pre to post treatment with an average of 1.6 and 1.2 teacher questions per pupil. Group T<sub>2</sub> showed the greatest decrease from pre to post treatment with averages of 6.2 and 2.9 respectively.

H08: There will be no difference among the three treatment groups concerning the types of questions posed by teachers.

For the purpose of analysis this hypothesis was examined in five parts:<sup>1</sup>

H08:1 There will be no difference among the three treatment groups concerning the number of recall posed by teachers

Visual inspection of table 4:7 revealed that the groups differed slightly on the pre test lessons. Groups C and T<sub>2</sub> recorded 81 questions while group T<sub>1</sub> had only 64. Between group differences increased during the post test lessons: group C recorded 79 questions, group T<sub>1</sub>

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<sup>1</sup>The evaluation category was not analyzed because there were no teacher questions in this category.

recorded 10, and group  $T_2$  recorded 12.

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Table 4:7

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Teacher Recall Questions: Summary of the  
Cochran Q Test Among Three Treatment  
Groups

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	C	$T_1$	$T_2$	$L_1$	$L_1^2$
pre	81	64	81	226	51076
post	<u>79</u>	<u>10</u>	<u>12</u>	<u>101</u>	<u>10201</u>
	160	74	93	327	61277

$Q = 6.8^*$

Critical value required for significance at the .05 level  
df = 2 is 5.99

---

Results of the Cochran Q test confirmed the visual inspection. There was significant difference among the groups, therefore the null hypothesis was rejected.

There was a 73% decrease in recall questions in group  $T_1$  and a 74% decrease in recall questions in group  $T_2$ .

There were also differences in the average number of teacher recall questions per pupil for groups

$T_1$  and  $T_2$  from pre to post treatment. In group  $T_1$  teachers asked averages of 1.3 and .2 questions respectively while in group  $T_2$  teachers had averages of 3.4 and .5 respectively. Group C remained almost the same from pre to post treatment with averages of 1.7 and 1.6 teacher questions per pupil.

It must be noted here that when a comparison between tables 4:2 and 4:7 is made there seems to be a lack of congruency between teacher recall questions and pupil recall responses. Congruency between teacher questions and pupil responses was established by the raters when the data were coded. Thus the visual discrepancy found in the tables is the result of teacher redirect questions and student questions. In other words each redirect question was separated from its original category and was examined from the reference of redirect questions.

Since this analysis occurred for every category of teacher posed questions, the same visual discrepancy is shown in the tables accordingly.

H08:2 There will be no difference among the three treatment groups regarding the number of teacher translation questions.

Visual inspection of table 4:8 revealed that group  $T_1$  differed from groups C and  $T_2$  on the pre treatment lessons. Teachers in group  $T_1$  posed 3 translation questions, while teachers in groups C and  $T_2$  posed 11 and 15 questions

respectively. On the post treatment lessons all teachers asked fewer questions calling for translation. Only one question was asked in each of the three groups. Thus there was no longer a difference among the groups.

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Table 4:8

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Teacher Translation Questions: Summary  
of the Cochran Q Test Among Three Treatment  
Groups

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	C	T <sub>1</sub>	T <sub>2</sub>	L <sub>1</sub>	L <sub>1</sub> <sup>2</sup>
pre	11	3	15	29	841
post	<u>1</u>	<u>1</u>	<u>1</u>	<u>3</u>	<u>9</u>
	12	4	16	32	850

$Q = 4.8$

Critical value required for significance at the .05 level  
df = 2 is 5.99

---

Results of the Cochran Q test support the visual inspection. There was no significant difference among groups therefore the null hypothesis was accepted.

Further visual inspection revealed within group changes in groups C and T<sub>2</sub> where teacher translation questions decreased from 11 to 1, or 83% and from 15 to 1, or 88% respectively. Group T<sub>1</sub> showed a decrease from 3 to 1 or 50%.

There were also decreases in the average number of teacher translation questions for the three groups from pre to post treatment. Teachers in group C asked an average of .22 and .02 translation questions respectively. Teachers in group  $T_1$  asked averages of .06 and .02 translation questions while teachers in group  $T_2$  showed the greatest decrease with averages of .62 and .04 translation questions.

H08:3 There will be no difference among the three treatment groups regarding the number of teacher inference questions.

Visual inspection of table 4:9 revealed that there was very little difference among the groups during the pre treatment lessons. Teachers in group  $T_1$  failed to pose any inference questions while teachers in groups C and  $T_2$  posed 2 and 3 questions respectively. Difference among groups increased on the post treatment lessons. Teachers in group  $T_1$  continued to pose the least number of inference questions with 2, while groups C and  $T_2$  posed 6 and 10 respectively.

Table 4:9

Teacher Inference Questions: Summary  
of the Cochran Q Test Among Three  
Treatment Groups

	C	T <sub>1</sub>	T <sub>2</sub>	L <sub>1</sub>	L <sub>1</sub> <sup>2</sup>
pre	2	0	3	5	25
post	<u>6</u>	<u>2</u>	<u>10</u>	<u>18</u>	<u>324</u>
	8	2	13	23	349

$$Q = 3.75$$

Critical Value required for significance at the .05 level  
df = 2 is 5.99

Results of the Cochran Q test confirm the visual inspection. There was no significant difference among the groups therefore the null hypothesis was accepted.

There were slight increases in the average number of teacher inference questions per pupil for the three groups from pre to post treatment. Teachers in group C had averages of .04 and .12 respectively while teachers in group T<sub>1</sub> had averages of 0 and .04. Teachers in group T<sub>2</sub> had averages of .12 and .41 respectively.

H08:4 There will be no difference among the three treatment groups regarding the number of teacher explanation questions.

Visual inspection of table 4:10 showed some difference among the groups during the pre treatment lessons. Group C had the greatest number of questions with 14. Group T<sub>2</sub> had 5 questions, while group T<sub>1</sub> posed no questions. The difference among the groups decreased on the post treatment lessons: group C continued to have the greatest number of teacher explanation questions with 13, group T<sub>1</sub> had 6 and group T<sub>2</sub> had 4 questions respectively.

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Table 4:10

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Teacher Explanation Questions: Summary of the Cochran Q Test Among Three Groups

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	C	T <sub>1</sub>	T <sub>2</sub>	L <sub>1</sub>	L <sub>1</sub> <sup>2</sup>
pre	14	0	5	19	361
post	<u>13</u>	<u>6</u>	<u>4</u>	<u>23</u>	<u>529</u>
	27	6	9	42	890

$Q = 7.2^*$

Critical Value required for significance at the .05 level  
df = 2 is 5.99

---

Results of the Cochran Q test confirmed the visual inspection. There was a significant difference among the groups, therefore the null hypothesis was rejected.

Within group changes occurred in group  $T_1$  where there was an increase in the number of explanation questions from pre to post treatment. There was very little change in group C and  $T_1$  from pre to post treatment.

There were corresponding changes in the average number of teacher explanation questions per pupil for the three treatment groups. Teachers in group C had averages of .29 and .27 respectively while teachers in group  $T_1$  had averages of 0 and .12. Teachers in group  $T_2$  had averages of .21 and .16 respectively.

H08:5 There will be no difference among the three treatment groups regarding the number of teacher redirect questions.

Visual inspection of table 4:11 showed considerable difference between the groups during the pre treatment lesson. Group  $T_2$  had the greatest number of redirect questions with 45 while groups C and  $T_1$  were very similar with 17 and 15 redirect questions respectively. On the post treatment lessons the difference between groups had shifted. Group  $T_1$  had the greatest number of teacher redirect questions with 42, group  $T_2$  followed with 37 and group C recorded 29 redirect questions.



Table 4:11

Teacher Redirect Questions: Summary of the  
Cochran Q Test Among Three Groups

	C	T <sub>1</sub>	T <sub>2</sub>	L <sub>1</sub>	L <sub>1</sub> <sup>2</sup>
pre	17	15	45	77	5929
post	<u>29</u>	<u>42</u>	<u>37</u>	<u>108</u>	<u>11664</u>
	46	57	82	185	17593

$$Q = 6.3^*$$

Critical Value required for significance at the .05 level  
df = 2 is 5.99

Results of the Cochran Q test confirmed the visual inspection. There was significant difference among the groups therefore the null hypothesis was rejected.

Within group changes also occurred. Group C and T<sub>1</sub> increased the number of redirect questions from pre to post treatment by 26% and 47.4% respectively, while group T<sub>2</sub> had a decrease in redirect questions of 9.8%.

There were corresponding changes in the average number of teacher redirect questions per pupil in each group. Teachers in group C had averages of .36 and .6 for pre and post treatment lesson. Teachers in group T<sub>1</sub> had averages of .3 and .8 while teachers in group T<sub>2</sub> had

averages of 1.9 and 1.5 for pre and post treatment lessons.

#### Summary of H08

The hypothesis stated that there would be no difference in the types of teacher questions between groups C, T<sub>1</sub> and T<sub>2</sub>. This hypothesis was subdivided in five parts for the purpose of analysis. In the categories of translation and inference the null hypotheses were accepted since the difference between groups was not significant.

In the recall category the hypothesis was rejected since groups T<sub>1</sub> and T<sub>2</sub> varied considerably from group C on the post treatment lessons. Teachers in groups T<sub>1</sub> and T<sub>2</sub> asked significantly fewer recall questions than teachers in group C.

Similarly in the category of explanation, the hypothesis was rejected but the difference was in another direction: Teachers in group C asked the greatest number of explanation questions in both pre and post treatment lessons. The category of evaluation was not analyzed because there were no teacher questions initiated in this category.

In the category of redirect questions the hypothesis was rejected since group T<sub>2</sub> varied considerably from groups C and T<sub>1</sub> on the pre treatment lesson by asking the greatest number of redirect questions. During the post treatment

lessons differences continued to exist: group  $T_1$  at this time recorded the greatest number of redirect questions while groups C and  $T_2$  demonstrated the least variation.

H09: The order of pupil and teacher initiated talk patterns produced during reading instruction will be random for the three groups.

This hypothesis was tested on the basis of pre and post treatment sequence patterns. All pre treatment groups were represented by the same interaction pattern as shown in Table 4:12. The table illustrates a fifty item sample of this interaction as well as the analysis of these events when a one sample Runs Test was applied. The level of significance for all data was set at .05.

According to Table A in Siegel - Non - Parametric Statistics for the Behavioral Sciences the probability of occurrence of a Z value of 3.43 is 2 (.0003) or .0006 for the two-tailed test<sup>1</sup>. Thus the occurrence of a calculated Z value of this magnitude by chance is a very rare occurrence. Therefore the null hypothesis for each of the three pre-treatment groups was rejected. It was concluded that the sequence pattern was not random, rather the pre treatment

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<sup>1</sup> Siegel, S. Non-Parametric Statistics, for the Behavioral Sciences, New York, McGraw-Hill, 1956, p.

groups had been exposed to reading instruction which generated a highly structured response pattern.

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Table 4:12

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Sequence of Teacher and Pupil Interaction:  
Summary of the Runs Test for the Three Pre  
Treatment Groups

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T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S	T	S
24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43			
S	T	S	T	S	T	S																
44	45	46	47	48	49	50																

$$N_1 = 25$$

$$N_2 = 25$$

$$r = 50$$

$$\text{Calculated } Z = 3.43^*$$

$$P = .0006$$

1

---

On the other hand, during the post treatment lessons the interaction pattern for group C remained unchanged demonstrating that the events continued to occur in the TS, TS, pattern, thus it was concluded that the pattern of events was not random for group C.

In contrast, during the post treatment lesson, the

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<sup>1</sup>The formula for the Runs Test appears in Appendix G  
Student =  $N_1$  Teacher =  $N_2$  Run =  $r$   
 $Z$  = Z score  $p$  = probability associated with a  
two-tailed test



Table 4:14

Sequence of Pupil, Teacher Interaction:  
Summary of the Runs Test During the Post  
Treatment Lesson for Group T<sub>2</sub>

$\frac{SSSSSSSS}{1}$     $\frac{T}{2}$     $\frac{SSSS}{3}$     $\frac{TT}{4}$     $\frac{SSSSSSSS}{5}$     $\frac{T}{6}$     $\frac{SSSSS}{7}$     $\frac{T}{8}$     $\frac{SS}{9}$     $\frac{T}{10}$   
 $\frac{SSSSSSSS}{11}$     $\frac{T}{12}$     $\frac{S}{13}$     $\frac{TT}{14}$     $\frac{S}{15}$     $\frac{T}{16}$     $\frac{SS}{17}$     $\frac{T}{18}$     $\frac{SS}{19}$     $\frac{T}{20}$     $\frac{SSSSS}{21}$     $\frac{T}{22}$     $\frac{SSSS}{23}$   
 $\frac{T}{24}$     $\frac{SSS}{25}$     $\frac{T}{26}$     $\frac{SS}{27}$     $\frac{T}{28}$     $\frac{SSSSSSSSSS}{29}$     $\frac{T}{30}$     $\frac{SSSSSSSSS}{31}$     $\frac{T}{32}$     $\frac{SS}{33}$     $\frac{T}{34}$     $\frac{SSSS}{35}$   
 $\frac{T}{36}$     $\frac{SSSSS}{37}$

$$N_1 = 83$$

$$N_2 = 20$$

$$r = 37$$

$$\text{calculated } Z = 1.19$$

$$p = .2112$$

For a two-tailed test, the calculated  $Z$  value of 1.19 has a probability of occurring by chance 2 (.1056) = .2112. Consequently the null hypothesis regarding the randomness of the interaction pattern for T<sub>2</sub> was accepted.

#### Summary of H09

H09 stated that the order of pupil and teacher response patterns for the three treatment groups would be random under pre and post treatment conditions. During the pre treatment lessons the interaction patterns were

identical for all three groups revealing that the occurrence of events was highly structured.

During the post treatment lessons the interaction pattern in group C remained unchanged while, changes occurred in groups  $T_1$  and  $T_2$ . The results of the Runs Test indicated that the order of pupil and teacher interaction was random since the probability of the occurrence of the observed  $Z$  values during the post treatment was high. Therefore  $H_{09}$  was rejected.

#### Summary of the Nine Hypotheses

$H_{01}$ .....rejected  
 $H_{02}$ .....rejected  
 $H_{03}$ .....rejected  
 $H_{04}$ .....lack of data prevented analysis  
 $H_{05}$ .....rejected  
 $H_{06:1}$ .....accepted  
 $H_{06:2}$ .....accepted  
 $H_{06:3}$ .....accepted  
 $H_{06:4}$ .....rejected  
 $H_{07}$ .....rejected  
 $H_{08:1}$ .....rejected  
 $H_{08:2}$ .....accepted  
 $H_{08:3}$ .....accepted  
 $H_{08:4}$ .....rejected  
 $H_{08:5}$ .....rejected  
 $H_{09}$ .....rejected

## Chapter V

### SUMMARY, CONCLUSIONS AND IMPLICATIONS

This chapter discusses the findings of a comparison between the directed reading activity (DRA) and the modified directed reading-thinking activity (MDR-TA) regarding the promotion of pupil initiated high level questions and discussion and types of teacher questions and pupil responses. First the summary of the findings will be presented followed by the conclusions and discussion of the findings. Implications for the classroom teacher, teacher inservice training curriculum developers and publishers are then discussed. The chapter concludes with suggestions for further research.

#### Summary of the Study and Key Questions

The purpose of this study was twofold: to develop a strategy for presenting introductory reading lessons which would be consistent with the psycholinguistic theory of reading and then to compare it with the more common or traditional DRA during introductory reading lessons. The strategy identified as the MDR-TA was based on the theory of asking questions and interacting with the author in order to reconstruct the intended message.<sup>1</sup> Therefore the

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<sup>1</sup> Smith, Frank, Understanding Reading, Toronto, Holt, Rinehart and Winston, Inc., 1971, p. 229.



strategy consisted of pupil questioning and peer interaction prior to and after reading.

The main questions for research were:

- a. Will the MDR-TA promote more pupil-initiated questions and discussion than the DRA? and,
- b. Will teacher questions and pupil responses change as the result of using the MDR-TA?

Six second grade classes from a suburban school division were randomly assigned to three treatment groups. Group C consisting of 49 pupils received instruction by means of the DRA, group T<sub>1</sub> consisting of 50 pupils received instruction by means of the MDR-TA, while group T<sub>2</sub> consisting of 24 pupils also received instruction by means of the MDR-TA. The experiment consisted of five introductory reading lessons. The first lesson was taught according to the procedure usually followed by each teacher. The remaining four lessons were taught following either the DRA or the MDR-TA according to assignment. The first and final lessons were transcribed from tapes and analyzed in order to answer the specific questions formulated for the research study.

The two general questions were restated more specifically for the purpose of analysis. The first four questions were summarized as a single question: the remaining six questions follow

- 1 - 4. Will pupils instructed by means of the MDR-TA pose more questions in total, more inference, more explanation and more evaluation questions than pupils instructed by means of the DRA?

Pupils instructed by means of the MDR-TA posed a large number of questions, including inference and explanation questions. More questions were posed by pupils in the smaller MDR-TA than in the larger MDR-TA group.

Pupils instructed by means of the DRA did not pose any questions. There were no evaluation questions posed by pupils in any of the groups.

5. Will there be a difference in the instances of pupil-initiated talk between pupils instructed by means of the MDR-TA and pupils instructed by means of the DRA?

Pupils instructed by means of the MDR-TA initiated more talk than pupils instructed by means of the DRA, especially in the MDR-TA group with fewer pupils.

6. Will pupils instructed by means of the MDR-TA make responses which indicate different types of thinking than the thinking displayed by pupils instructed by means of the DRA?

There was no difference in the quality of responses made by pupils in any of the groups.

7. Will teachers instructing by means of the MDR-TA ask fewer questions than teachers instructing by means of the DRA?

Teachers instructing by means of the MDR-TA asked significantly fewer questions than teachers instructing by means of the DRA. The greatest decrease appeared in the group with the smallest number of pupils.

8. Will teachers instructing by means of the MDR-TA ask different types of questions than teachers instructing by means of the DRA?

There was no difference in the quality of questions posed by teachers in any of the groups.

9. Will teachers instructing by means of the MDR-TA invite pupil participation by extending redirect questions back to the group more frequently than teachers instructing by means of the DRA?

There was no difference among the teachers in any of the groups regarding the number of redirect questions.

10. Will the interaction pattern employed with the MDR-TA differ from the interaction pattern employed with the DRA?

There was a significant difference between the interaction patterns employed by the two methods. The MDR-TA allowed a random pattern, while the DRA had a regular one-to-one, teacher-pupil, teacher-pupil pattern.

### Conclusions

Analysis of the data revealed that the MDR-TA and the DRA were different in the following areas:

1. The MDR-TA promoted pupil initiated questions, especially by those pupils assigned to the smaller group. Most of these questions were in the inference category. By contrast, pupils instructed by means of the DRA did not ask any questions.
2. The MDR-TA allowed for a significant increase in pupil-initiated talk.

3. Teachers instructing by means of the MDR-TA asked significantly fewer questions than teachers instructing by means of the DRA, especially those teachers assigned to the small group.

4. The interaction patterns employed by the MDR-TA and the DRA were significantly different. The MDR-TA employed a random interaction pattern between pupils and teacher, while the DRA employs a regular teacher-pupil pattern.

### Discussion

The two methods differ significantly on pupil-initiated questions. Pupils receiving instruction by means of the MDR-TA posed a number of questions, most of which were in the inference category. Pupils instructed by means of the DRA did not pose any questions.

Studies by Helfeldt<sup>1</sup>, Cheves<sup>2</sup>, Sadker and Cooper<sup>3</sup>

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<sup>1</sup>Helfeldt, John, and Rosary Lalik, "Reciprocal Student-Teacher Questioning," Reading Teacher, December, 1976, pp. 283 - 286.

<sup>2</sup>Cheves, Deborah, "An Experiment in Developing the Ability to Make Inferences and to Ask Questions which require Inference in Sixth Grade Students." Unpublished Ph.D. dissertation, Kansas City, University of Missouri, 1973.

<sup>3</sup>Sadker, Myra, James Cooper, "Increasing Student High-order Questions," Elementary English, Vol. 51:4, Apr. 1974, pp. 502 - 507.

and Singer<sup>1</sup> have demonstrated that elementary students are able to pose questions using a variety of methods. However, it was a study by Torrance<sup>2</sup> which had the greatest influence on the present research. He found that kindergarten children could ask more high level questions in an ambiguous situation which contained gaps in information. A similar situation was created in the MDR-TA by having pupils read only the story title, examine the pictures on the first page and then pose inference questions related to the story. Pupils were required to hypothesize or predict outcomes on the basis of the limited information given.

The MDR-TA itself is not enough to produce pupil questions, for pupils cannot question unless given the opportunity by the teacher. According to Hoetker,<sup>3</sup> Gallagher<sup>4</sup>

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<sup>1</sup>Singer, Harry, "Active Comprehension: From Answering to Asking Questions," The Reading Teacher, Vol. 31, #8, May, 1978, pp. 901 - 908.

<sup>2</sup>Torrance, E. Paul, "Group Size and Question Performance of Pre-primary Children," Journal of Psychology 1970, Vol. 74: pp. 71 - 75.

<sup>3</sup>Hoetker, J., "Teaching Questioning Behavior in Nine Junior High School English Classes," Research in the Teaching of English 2, (1968): pp. 106 - 109.

<sup>4</sup>Gallagher, J., "Productive Thinking of Gifted Children," Cooperative Research Project 965, Urbana, Ill: Institute for Research on Exceptional Children, 1965, p. 102. Ed 001 307.

and Taba,<sup>1</sup> the teacher controls the verbal interaction in the classroom through the questions he/she asks. Dodl<sup>2</sup> and Davis<sup>3</sup> found that there was an inverse relationship between student questioning and teacher domination of the class. Dodl suggested that student questioning would increase as teacher domination decreased.

Flanders<sup>4</sup> found that student participation was linked with teacher role and the classroom interaction pattern. He also discovered that a change in one factor generally caused a change in the other factors, thereby facilitating or inhibiting student verbal interaction. Thus, if a teacher exerts an indirect influence, he/she encourages student participation and stimulates student verbal interaction.

The research study supported the findings cited

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<sup>1</sup>Taba, Hilda, Curriculum Development - Theory and Practice, New York: Harcourt, Brace and World, Inc., 1962 p. 177.

<sup>2</sup>Dodl, Norman Richard, "Pupil Questioning Behavior in the Context of Classroom Interaction," unpublished Ph.D. dissertation, Stanford University, 1965.

<sup>3</sup>Davis, Rose Marie Stevens, "A Study of the Relationship Between Pupil Questions and Selected Variables," unpublished Ph.D. dissertation, University of Oregon, 1970.

<sup>4</sup>Flanders, Ned, "Teacher Influence, Pupil Attitudes, and Achievement," U.S. Office of Education, Cooperative Research Study, Monograph #12, OE-25040, Washington, D.C., 1965, pp. 109 - 115.

above: pupil-initiated questions and talk were found to be closely associated with the role of the teacher and the group interaction pattern. Pupils instructed by means of the MDR-TA, initiated questions and more talk than the DRA group. The role of the teacher in the MDR-TA was that of a moderator and observer: the teacher spoke only when the need arose to keep the group on topic or to change the direction of discussion when necessary. Thus, the pupils had the opportunity to initiate questions and to participate freely in spontaneous discussion.

The interaction pattern employed by the teachers in the MDR-TA groups also promoted pupil interaction. The open channels system is an integral part of MDR-TA and as such has no central position, each member has an equal opportunity to participate in the discussion. This spontaneous discussion was demonstrated by the random pattern of interaction and in the fact that the pupils and the teacher were engaged in a discussion which resulted in more pupil questions and talk, as well as fewer teacher questions. These findings were consistent with those of Lorge<sup>1</sup> and Lewin<sup>2</sup>. They found that when an open channels

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<sup>1</sup>Lorge, Irving, "The Teacher's task in the Development of Thinking," The Reading Teacher, XIII Feb. 1960, pp. 170 - 175.

<sup>2</sup>Lewin, K. et al, "Patterns of Aggressive Behavior in Experimentally Created Social Climates," Journal of Social Psychology, Vol. 10, 1939, pp. 271 - 299.

interaction pattern was used, the group members were more actively involved and there was more opportunity to communicate with other group members.

On the other hand, the role of the teacher in the DRA is that of a director and questioner. The teacher occupies a focal position, directing the flow of interaction. Usually the teacher poses a question and a pupil responds, followed by another teacher question and another single response. This regular teacher-pupil, teacher-pupil interaction pattern was demonstrated in the research study using the Runs Test. Evidence of similar interaction patterns using the DRA was reported in the Guzak<sup>1</sup> study where he found that primary and elementary teachers posed single questions resulting in a teacher-pupil, teacher-pupil interaction pattern. He suggested that teacher questions should be related to one another in order to challenge students' thinking.

Anderson<sup>2</sup> suggested that teachers who dominate the interaction tend to have pupils who are compliant and

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<sup>1</sup> Guzak, Frank, J., "Teacher Questioning and Reading," The Reading Teacher, XXI, Dec., 1967, pp. 227 - 234.

<sup>2</sup> Anderson, H.H., "The Measurement of Domination and Socially Integrative Behavior in Teachers' Contacts with Children," Child Development: Vol. 10:2, 1939, pp. 73 - 89.



quiet. Spache<sup>1</sup> noted that a teacher directed learning situation resulted in less pupil interaction. The findings of the research study were consistent with the studies cited. Pupils in the DRA group did not initiate questions or take part in group discussion. The resulting interaction pattern as demonstrated by the Runs Test was a regular teacher-pupil, teacher-pupil pattern, demonstrating teacher domination.

Thus it would be beneficial to teachers and pupils alike if teachers were to use a less teacher directed approach such as the MDR-TA. In such an approach the pupils are more actively involved in the learning situation. If there is no negative effect upon the quality of teacher initiated questions as was indicated in this study it would seem useful for teachers to incorporate the MDR-TA into their teaching strategies. In this way there may be more pupil involvement at no cost to the quality of teacher input.

Another factor revealed during the current study was the effect of group size on pupil-initiated

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<sup>1</sup>Spache, George, "Contributions of Allied Fields to the Teaching of Reading," Innovation and Change in Reading Instruction, Sixty-Seventh Yearbook of the National Society for the Study of Education, Part 11, Chicago, University of Chicago Press, 1968, p. 248.

questions and pupil interaction. Group size in association with the MDR-TA seemed to affect pupil-initiated talk and questions. Pupils in group T<sub>2</sub> which consisted of twelve pupils per group posed three times as many questions as pupils in group T<sub>1</sub> which was comprised of twenty-five pupils per group. This finding has support from other studies investigating discussion or interaction patterns and group size.

For example, support for the use of smaller groups has been reported by Berkowitz<sup>1</sup>. Studying groups ranging from 3 to 10 members, he found that as group size increased, there was a decreasing contribution by members.

Slater<sup>2</sup> also found that members of larger groups were dissatisfied with their opportunities to participate in the discussion. He found that groups of five were optimum for discussion purposes. Torrance<sup>3</sup> came to similar conclusions about group size working with kindergarten pupils: five-member groups seemed to be optimum for dis-

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<sup>1</sup>Berkowitz, M.I., "An Experimental Study of the Relation between group size and social organization," unpublished Ph.D. dissertation, Yale University, 1958.

<sup>2</sup>Slater, P.E., "Contrasting Correlates of Group Size," Sociometrey, 1958, Vol. 21, pp. 129 - 139.

<sup>3</sup>Torrance, E. Paul, "Group Size and Question Performance of Pre-primary Children," Journal of Psychology 1970, Vol. 74: pp. 71 - 75.

cussion purposes.

Although the quantity of pupil questions can be explained in terms of the interaction pattern and group size, the quality or type of pupil-initiated questions cannot. Quality of pupil questions was considered when making modifications to the DR-TA with the MDR-TA being designed to promote more predicting and hypothesizing. Results of the research study revealed that most of the questions posed by pupils were in the category of inference. This level of thinking is considered to be an example of higher or critical level thinking by such researchers as Wolf<sup>1</sup>, Petre<sup>2</sup> and Davidson<sup>3</sup>. Therefore the MDR-TA appears to foster pupil initiated inference questions but until further modifications are made to the MDR-TA or to the inservice training the other higher levels of thinking appear to be developed equally as well by the DRA.

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<sup>1</sup>Wolf, Wilavena, et al, Critical Reading Ability of Elementary School Children, U.S. Office of Education Cooperative Research Project, No. 5 - 1040, Ohio State University, June, 1967, pp. 131 - 133.

<sup>2</sup>Petre, Richard, "Quantity, Quality and Variety of Pupil Responses During an Open Communication Structured Group Directed Reading-Thinking Activity and a Closed-Communication Structured Group Directed Reading Activity," unpublished Ph.D. dissertation, University of Delaware, 1970, p. 15.

<sup>3</sup>Davidson, Jane, "The Relationship Between Teachers' Questions and Pupils' Responses," unpublished Ph.D. dissertation, University of Michigan, 1970, p. 9.

The importance of having students engage in high level thinking has been promoted by psychologists such as Piaget<sup>1</sup>, Bruner<sup>2</sup> and Taba<sup>3</sup>, for they believe that learning is achieved in a large part through hypothesis testing and prediction. It would appear that the MDR-TA which included hypothesis testing and prediction as part of the definition of inference does in fact reflect this aspect of the psycholinguistic theory. At the pedagogical level, Singer<sup>4</sup> has suggested that students must engage in their own high level questioning during reading instruction to ensure that they are developing the process of reading comprehension. The MDR-TA would seem to be beneficial for the development of reading comprehension. Although due to the time constraints imposed in the study the effects of the MDR-TA as compared with the DRA on reading comprehension were not examined. Four lessons was considered as being too short a time to affect a change

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<sup>1</sup>Piaget, J., "Three Lectures," in Piaget Rediscovered, edited by R. E. Ripple and U.N. Rockcastle, Ithaca, New York, Cornell University Press, 1964, p. 4.

<sup>2</sup>Bruner, Jerome, S.R.R. Oliver & P.M. Greenfield, et al, Studies in Cognitive Growth, New York, John Wiley, 1966, p.

<sup>3</sup>Taba, Hilda, Curriculum Development - Theory and Practice, New York, Harcourt, Brace and World, Inc., 1962, pp. 170 - 171.

<sup>4</sup>Singer, op. cit. 904.

upon such a lasting ability as reading comprehension. However the Singer study suggested that a similar strategy to the MDR-TA over the period of an entire school year did improve comprehension performance.

The two methods of instruction did not vary significantly in the types of responses elicited from pupils. Yet there is a close relationship between the type of question and the subsequent response. Gallagher<sup>1</sup> noted that teacher questions control the type of student responses while Wolf<sup>2</sup> noted that pupils are obligated to answer questions posed by the teacher. Analysis and comparison of both teachers' questions and pupil responses in the present study confirm this close relationship. When teachers posed recall questions the pupils responded with literal level thinking. Similarly, when teachers asked for higher level types of thinking through their questioning pupils responded accordingly. However the MDR-TA did not affect the quality of teacher questions nor the quality of pupil responses. This may have been the result of the approach itself or the inservice training which did not

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<sup>1</sup>Gallagher, J., loc. cit.

<sup>2</sup>Wolf, Wilavene, et al., loc. cit.

emphasize that the quality of teacher questioning affects the quality of pupil responses.

When the number of teacher questions was considered, results showed that teachers instructing by means of the MDR-TA asked significantly fewer questions than teachers instructing by means of the DRA. This finding is consistent with that of Flanders<sup>1</sup>, Dodl<sup>2</sup> and Davis<sup>3</sup> who found that there was an inverse relationship between teacher questions and student interaction. Thus, as student participation increases, teacher questions decrease. If teachers are seeking an approach which reduces the amount of teacher input and increases the pupil involvement, it would appear that the MDR-TA may be useful.

The redirect category requires reconsideration. It was thought that the teachers using the MDR-TA would rely on the redirect question to encourage pupil participation however, the findings indicated that teachers in both the DRA and the MDR-TA groups used this type question and it did not seem to affect pupil participation. It might have been useful to regard the redirect question as a repetition

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<sup>1</sup>Flanders, op. cit. p. 115.

<sup>2</sup>Dodl, op. cit.

<sup>3</sup>Davis, op. cit.

of a particular type of question as Trosky<sup>1</sup> did in her study. By following this coding procedure there might have been a clearer indication of the teachers' use of the various questioning categories.

On the other hand, the redirect question may have affected the results of the study in another way. For example when an inference question was redirected to other group members, it was coded originally as an inference question, then coded as redirect as it was repeated. Once a question was redirected, it was not returned to its original category. This procedure of categorization may have had the effect of depressing the number of questions in some of the categories.

There were no clear cut results obtained when the quality of teacher questions was considered, except in the recall category. Teachers instructing by means of the MDR-TA asked significantly fewer recall questions than teachers instructing by means of the DRA. Though the number was reduced significantly teachers, nevertheless, continued to ask more recall questions than any other type. The MDR-TA does not appear to produce any effect on the quality of teacher questioning. This finding is consistent with other research. Hunkins<sup>2</sup> found that teachers' question-

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<sup>1</sup>Trosky, O.S. "Modification in Teachers Questioning Behavior in the Development of Reading Comprehension and a Series of Supervisory Conferences," unpublished Ph.D. dissertation, University of Toronto, 1971.

<sup>2</sup>Hunkins, Francis, Questioning Strategies and Techniques, Boston, Allyn & Bacon, Inc., 1972, p. 1.

ing behavior was not as effective or as productive as it could be because teachers continue to ask recall questions concerning specific facts.

Further, Guzak<sup>1</sup> noted that in addition to asking recall questions, teachers do not seem to understand the basic reading-thinking skills and they do not understand about questioning to develop these skills. Though an inservice was conducted to ensure that the teachers understood the MDR-TA outline no procedure was undertaken to ascertain whether this understanding included a knowledge of the underlying reading-thinking principles. Thus it may be that the teachers did not in fact understand these underlying principles and so continued to emphasize the recall category. This category is not a part of the MDR-TA approach but it was a part of the previously established strategies of the teachers using the approach.

Support for better teacher understanding of the reading process, in addition to knowledge of a specific strategy, comes from several sources.

The Bullock<sup>2</sup> Report has asserted that:

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<sup>1</sup>Guzak, op. cit. 233.

<sup>2</sup>Bullock, Alan, A Language for Life, London, Her Majesty's Stationery Office, 1975, p. XXX11.



"..... the quality of learning is fashioned in the day-to-day atmosphere of the classroom through the knowledge, intuitions and skills of individual teachers." At an international conference Southgate<sup>1</sup> has suggested that the teacher's ability, beliefs, training and experience are more important than methods, materials and procedures in the teaching of reading. The report published by the United Kingdom Reading Association has stated that the improvement of reading standards would come about as the result of an improvement of the understanding and expertise of teachers at all school levels.

It would appear that greater emphasis must be placed on teacher knowledge and competence rather than on methods and materials. This also implies that teachers need to know how to apply knowledge under various circumstances using a variety of methods and materials. In-service training for teachers seems to be a vital factor in promoting the quality of teacher questions.

In a recent article, Lucking<sup>2</sup> has made some

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<sup>1</sup>Southgate, V., "Formulae for Beginning Reading Tuition," reported in *Teacher Competence in Reading Tuition*, by John Gray, Educational Research, Vol. 19, #2, 1976, p. 113.

<sup>2</sup>Lucking, Robert A., "Developing Question-Conscious Language Arts Teachers," Language Arts, Vol. 55, #5, May, 1978, pp. 578 - 581.

suggestions regarding preservice and inservice training for teachers. He noted that teachers have firmly established and often poor questioning strategies. Therefore, inservice training must consider the difficulties involved in changing established behaviors and in relearning more appropriate strategies. He also noted that preservice training should establish sound questioning strategies from the beginning. Lucking's article concurs with the findings of several research studies which dealt with modifying teachers questioning behavior. Trosky<sup>1</sup>, Ebert<sup>2</sup>, Smith<sup>3</sup> and Davidson<sup>4</sup> found that teachers' questioning practices could be modified but only after intensive training and individualized feedback. It would tend to follow that if the quality of teacher questions is to improve attention will have to be given to the quality of inservice as well.

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<sup>1</sup>Trosky, O.S., loc. cit.

<sup>2</sup>Ebert, Marilyn, Jane, "The Effect of Modeling and Feedback on the Learning of Questioning Behavior by Teacher Candidates in Nursing Utilizing a Microteaching Practice Setting," unpublished Ph.D. dissertation, University of California, Berkeley, 1970.

<sup>3</sup>Smith, Marilyn, Marie, "Dialectical and Didactic Instruction Methods: Their Relationship to Changes in Kindergarten Teachers Questioning Behavior," unpublished Ph.D. dissertation, George Peabody College for Teachers, 1970.

<sup>4</sup>Davidson, Roscoe, L., "Teacher Influence and Children's Levels of Thinking," The Reading Teacher XXII, May, 1969, pp. 702 - 704.

### Assumptions

The findings must be viewed in the light of the following assumptions. The study was based on the assumption that there is a relationship between the types of questions asked by teachers and reading comprehension performance of pupils.

It was also assumed that there is a relationship between pupil initiated questions and discussion or interaction and their critical reading performance.

There was also an assumption that the inservice training provided during the research study was sufficient to convey an understanding of the reading process, the basic underlying principles of the DRA and MDR-TA, the relationship between types of teacher questions and pupils reading comprehension performance and the relationship between pupil initiated questions and discussion and pupils' critical reading performance.

Finally there was an assumption that the Ohio Scales were adequate in measuring the various levels of thinking.

### Limitations

The findings must also be examined in the light of a number of limitations.

The actual study was only five weeks in duration. Therefore, time must be considered as a limiting factor in affecting change in the pupils.

The sample in the study consisted of second grade pupils randomly chosen from one suburban school district. Caution should be exercised in generalizing these findings to other second grade pupils who may vary in socio-economic background.

The reading material used in the study was taken from only one reader in a particular series. Any effects attributed to method must be limited to the specific type of material used in the study.

Two group sizes were used in the study, whole classes and half classes. While the MDR-TA appears to be useful with any group size, the findings must be viewed in the light of the group sizes employed in this study.

The most important limitation of the study was that the pupils were not administered a reading test to determine what effects each of the two approaches had upon the pupils' performance in reading comprehension.

### Implications

#### For the Classroom Teacher

The study has implications for practicing classroom teachers. The MDR-TA provides an alternate way of using basal readers. It is a strategy which can be used without incurring any expenses for special materials, for it employs materials readily available in most classrooms.

Teachers who wish to develop student-initiated questions and interaction at no cost to the quality of their input might find this method beneficial.

In addition, the study indicated that the MDR-TA can be used with large and small heterogeneous groups of children though it would appear that it is more effective with small groups.

Finally, teachers who wish to use an indirect approach in which the teacher encourages group participation by acting as a guide and observer rather than the director, may find the MDR-TA a viable approach.

#### For Teacher Inservice Training

This study and others suggest that teachers may require more information in order to understand the reading process. Specifically, teachers need to understand how their own questions, pupil questions and pupil discussions are related to the reading process. Further, it seems that inservice training must not only take into account reading theory but also the application of this theory to specific classroom strategies.

It is recommended that more time be devoted to activity involving teachers in the acquisition of knowledge about the reading process and its application using various methods or approaches and materials. Thus quality of inservice training should be an important priority for those involved in planning such services.

For Curriculum Developers and Publishers

The study has several implications for publishers and curriculum developers in their selection or development of reading materials and curricula suitable for promoting pupil initiated questioning and discussion.

Curriculum developers need to consider Piaget's theory regarding active involvement by pupils in order to facilitate learning to read and interaction with peers to facilitate the development and clarification of concepts.

Curriculum developers also need to consider psycholinguistic theory regarding the importance of promoting pupil initiated questions and interaction during reading instruction in order to help children predict story content and reconstruct the author's intended message.

Furthermore the open channels communication network could be considered in situations where increased pupil participation and less teacher domination are desirable.

Curriculum developers should also seek materials which meet the requirement of Piaget's theory and psycholinguistic theory. These materials should provide opportunities for active involvement by pupils through questioning and discussing. In addition materials which enhance prediction of story content, contain ambiguities and leave gaps in in-

formation should be considered in situations where pupil initiated questions are desirable.

### Suggestions for Further Research

This study must be considered as a preliminary investigation into the development of primary pupil questioning and discussion during various types of reading lessons.

One weakness in the present study was that there was no effort made to improve the participating teachers' understanding of the reading process or of questioning practices. Replication is needed, placing greater emphasis on the understanding of the reading process and how teacher questioning influences this process. By developing this understanding, teachers should be able to ask higher level questions and also to recognize higher level thinking in pupils.

Another problem which requires further investigation concerns the ratio of pupil and teacher participation. The present study increased pupil participation and decreased teacher participation; however, there needs to be further investigation into the ratio of teacher and pupil participation to determine which best facilitates reading instruction.

Further investigation is required regarding the redirect category. In the research study, the redirect question was considered as an invitation to participate and

was removed from its original category. Replication of the study replacing these redirect questions in their original categories would likely clarify the results.

The study should be replicated at other grade levels using a variety of reading materials. Library and research books could be used in order to determine how these materials affect the modified DR-TA strategy on children of differing ages and varying interests.

Further investigation is required concerning group size and make-up. The modified DR-TA was effective with whole class groups and even more effective with groups of twelve pupils. Perhaps other group sizes would produce better results.

Finally the effect of the MDR-TA as compared to the DRA on pupils' reading comprehension was not considered in this study. Future research into the use of these two approaches must consider this question and administer a valid reading test.



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**APPENDICES**

## APPENDIX A

### SUMMARY OF PILOT STUDY RESULTS

Summary of Pupil and Teacher Recall Questions For Three Groups at First Grade Level

Summary of Pupil and Teacher Inference Questions for Three Groups at First Grade Level

Summary of Pupil and Teacher Explanation Questions for Three Groups at First Grade Level

Summary of Pupil and Teacher Recall Questions for Three Groups at Second Grade Level

Summary of Pupil and Teacher Inference Questions for Three Groups at Second Grade Level

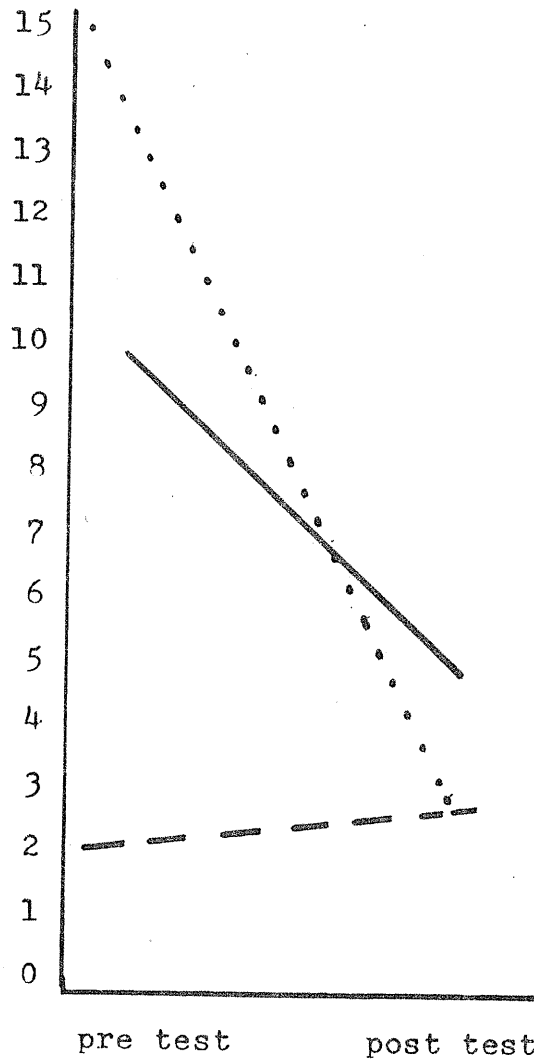
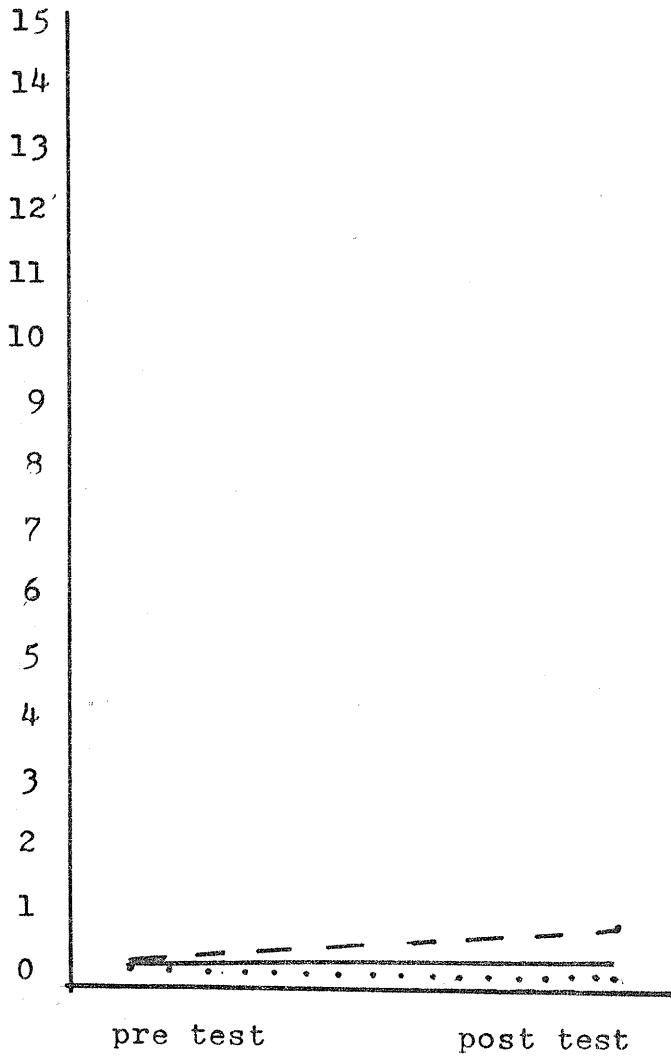
Summary of Pupil and Teacher Explanation Questions for Three Groups at Second Grade Level

APPENDIX A

SUMMARY OF PUPIL AND TEACHER RECALL QUESTIONS FOR  
THREE GROUPS AT FIRST GRADE LEVEL

Grade I Pupil Recall Questions  
for Three Groups

Grade I Teacher Recall  
Questions for Three Groups



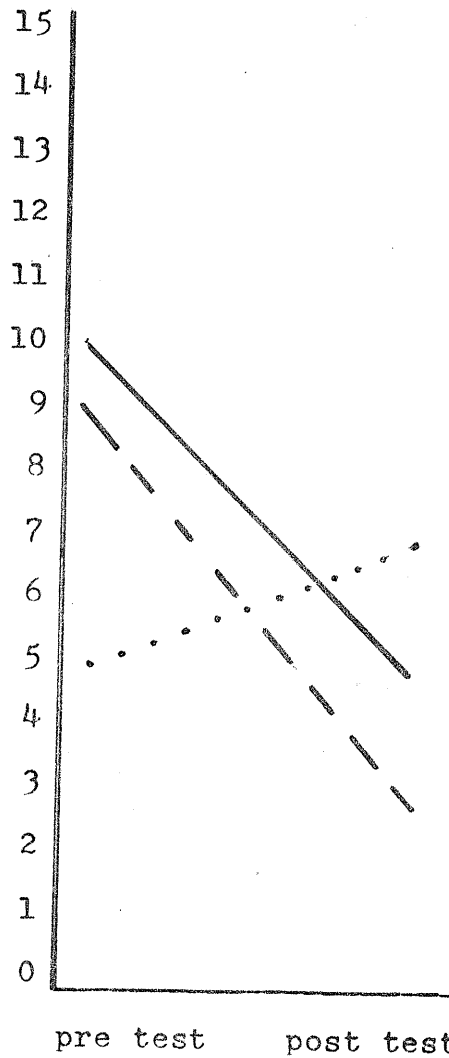
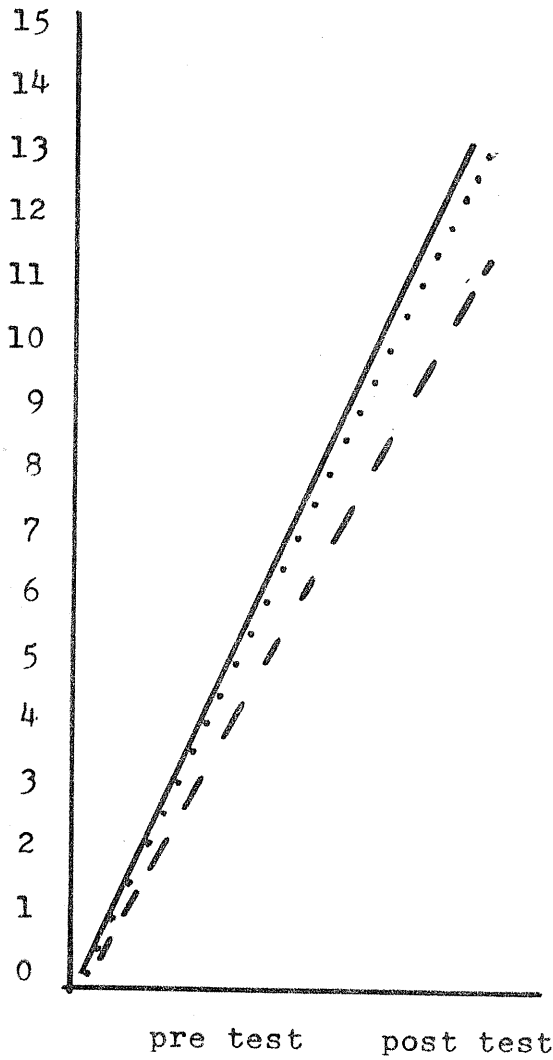
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APPENDIX A

SUMMARY OF PUPIL AND TEACHER INFERENCE QUESTIONS FOR THREE GROUPS AT FIRST GRADE LEVEL

Grade I Pupil Inference Questions

Grade I Teacher Inference Questions



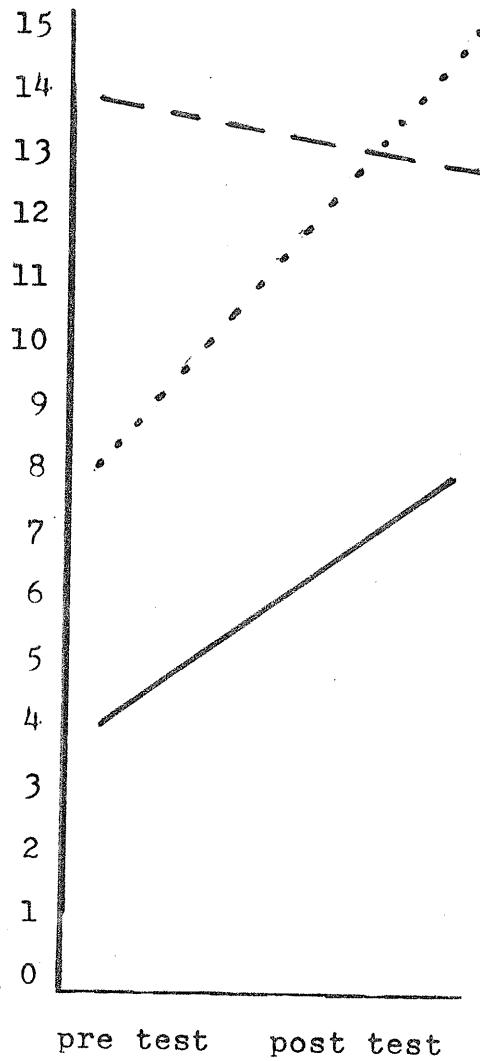
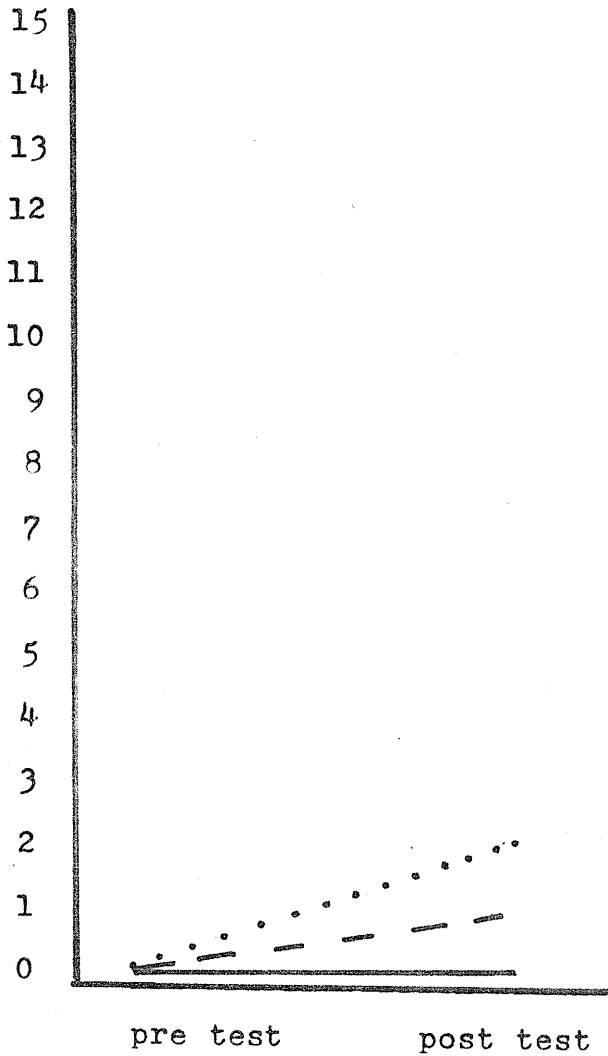
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APPENDIX A

SUMMARY OF PUPIL AND TEACHER EXPLANATION QUESTIONS FOR THREE GROUPS AT FIRST GRADE LEVEL

Grade I Pupil Explanation Questions

Grade I Teacher Ex-planation Questions



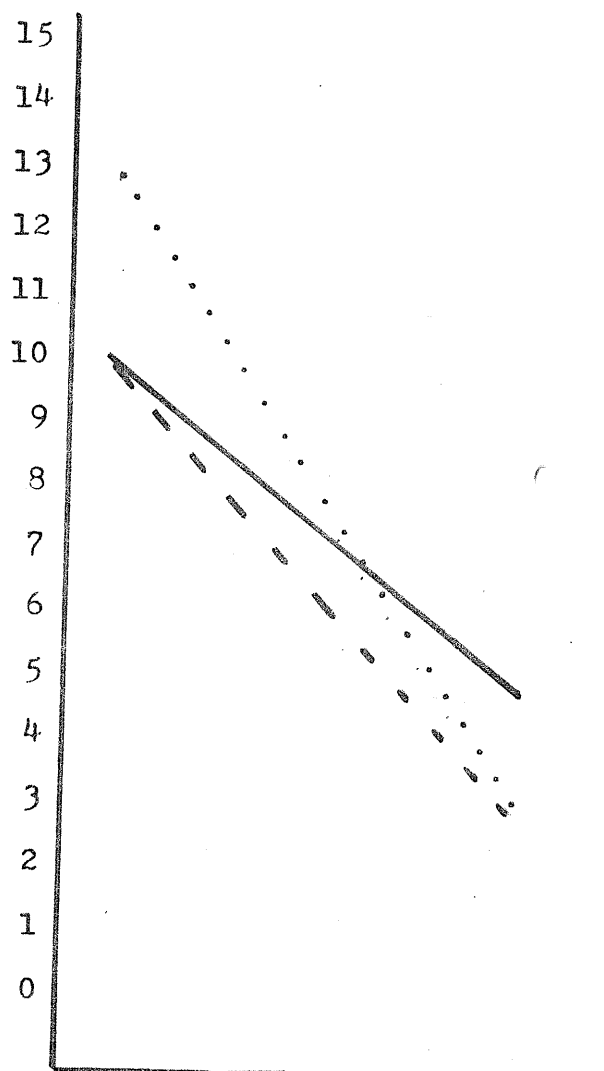
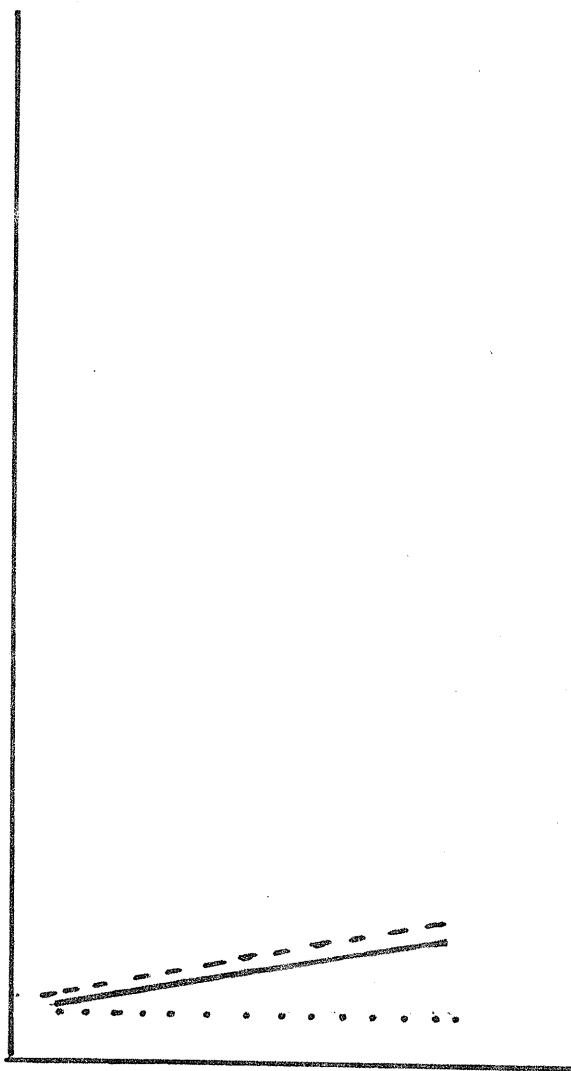
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APPENDIX A

SUMMARY OF PUPIL AND TEACHER RECALL QUESTIONS FOR  
THREE GROUPS AT SECOND GRADE LEVEL

Grade IIPupil Recall Ques-  
tions for Three Groups

Grade IITeacher Recall Ques-  
tions for Three Groups



pre test

post test

pre test

post test

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- - - - -

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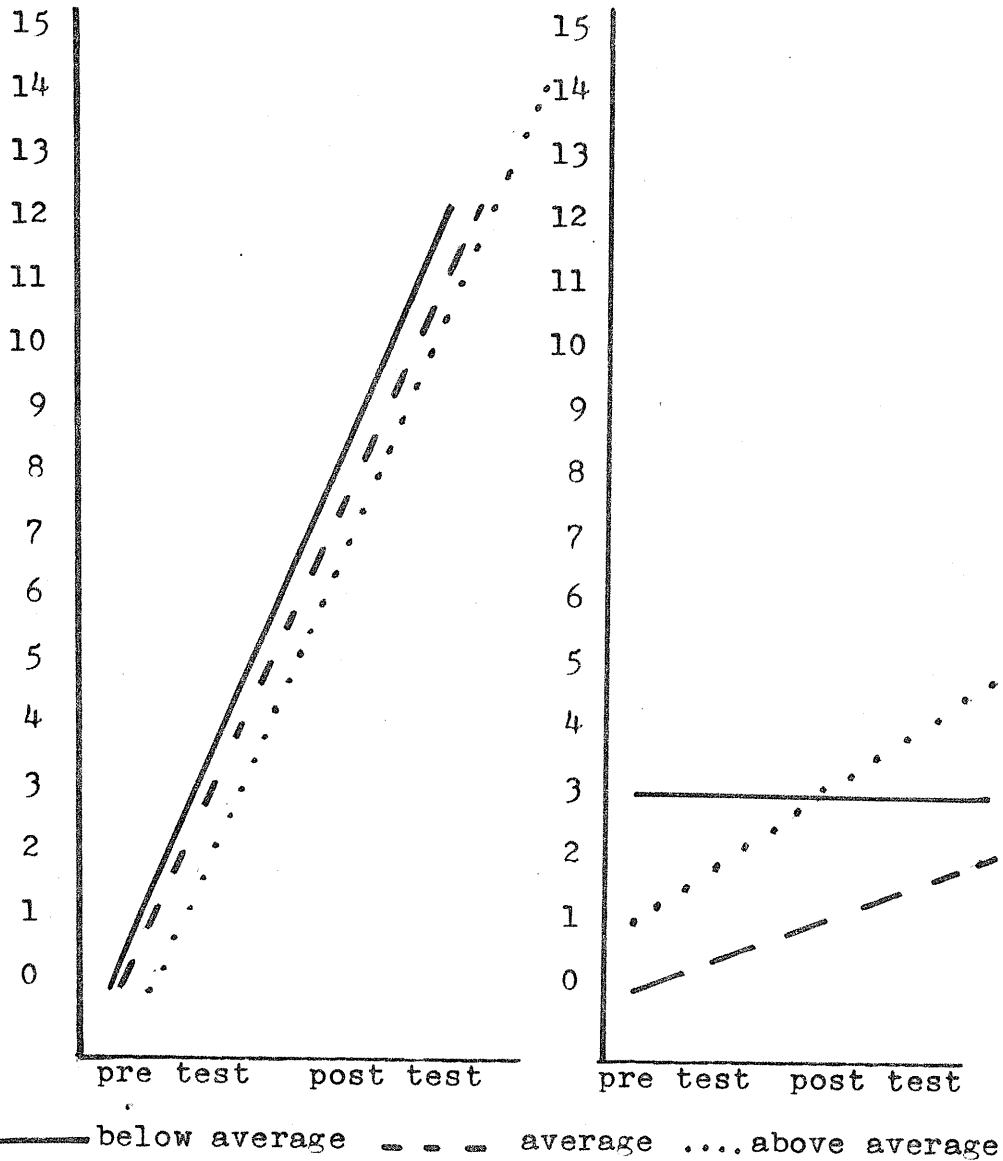


APPENDIX A

SUMMARY OF PUPIL AND TEACHER INFERENCE QUESTIONS FOR THREE GROUPS AT SECOND GRADE LEVEL

Grade II Pupil Inference Questions

Grade II Teacher Inference Questions

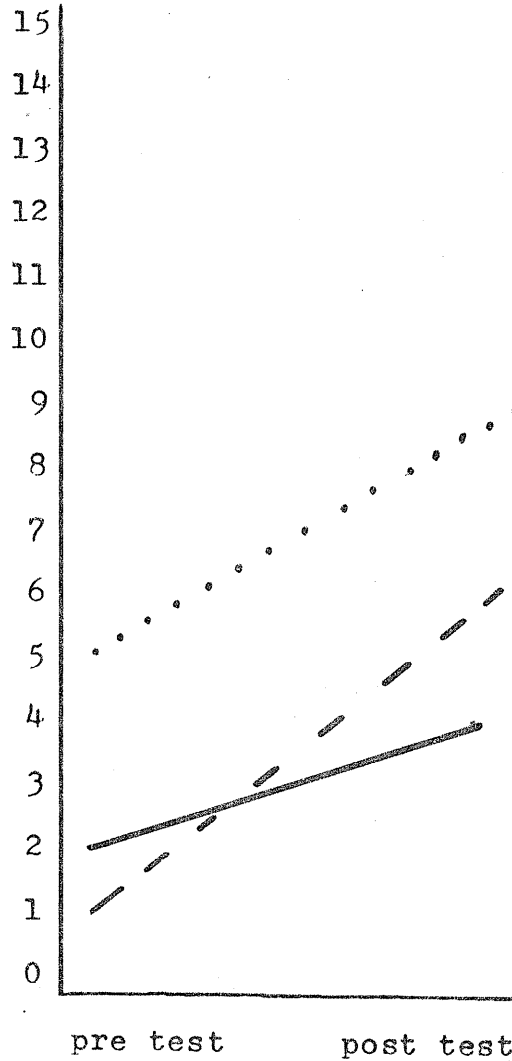
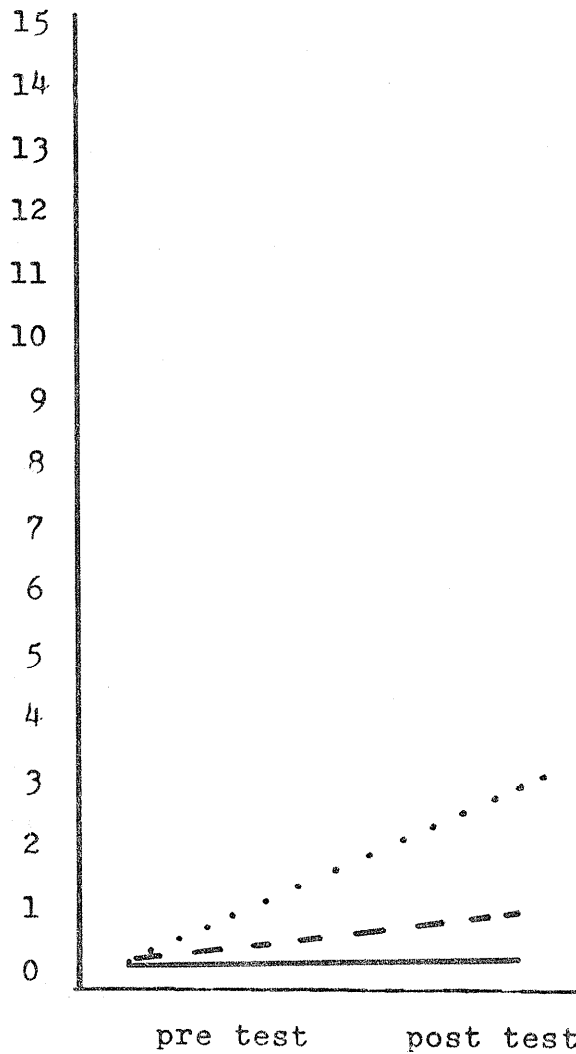


APPENDIX A

SUMMARY OF PUPIL AND TEACHER EXPLANATION QUESTIONS FOR THREE GROUPS AT SECOND GRADE LEVEL

Grade II Pupil Explanation Questions

Grade II Teacher Explanation Questions



\_\_\_\_\_ below average    - - - - average    ....above average

APPENDIX B

INSTRUMENTS OF MEASURE

Ohio Scales

The Modified Ohio Scales

OHIO SCALE

	Gives Statement	Asks Questions	LEVEL 1 Unsupported Guessing Random Response	LEVEL 2 Literal Recall Memory Cognition	LEVEL 3 Making Inferences Giving Illustration Applying Information Interpreting Convergent	LEVEL 4 Theorizing Hypothesizing Divergent	LEVEL 5 Evaluating Judging Giving Support for Stand Using Criteria
Gathering Specific Facts							
Clarifying							
Interpreting Inferring From Facts							
Analyzing							
Applying							
Summarizing Concluding							
Evaluating							

MODIFIED OHIO SCALE

Teacher Statement    Teacher Question    Student Responses    Student Questions    Group Interaction Patterns

Redirection						
Recall						
Translation						
-----						
Inferring						
Explanation						
Evaluation						
TOTAL						

LOW LEVEL THINKING

HIGHER LEVEL THINKING  
OR  
CRITICAL THINKING

APPENDIX C

TIME LINE FOR THE EXPERIMENT

October 24th - November 25th, 1977

TIME LINE FOR EXPERIMENT

<u>Date</u>	<u>Control Group (C)</u>	<u>Date</u>	<u>Experimental Groups T<sub>1</sub>, T<sub>2</sub></u>
<u>Week 1 - Oct. 24-28/77</u>			
- Tues.	Metropolitan Reading Test Primary 2 Form F	- Wed.	Metropolitan Reading Test Primary 2 Form F
- Thurs.	Gather pre treatment data	- Thurs.	Gather pre treatment data
<u>Week 2 - Oct. 31 - Nov. 4/77</u> <u>12:00 - 12:30</u>			
- Tues.	Half hour inservice to discuss DRA procedure as outlined in <u>Ginn 360</u> guide book	- Tues. 4 - 4:30	Half hour inservice to instruct and discuss the MDR-TA
	Present time line for experiment, lesson outlines and story materials given out		Present time line for experiment, lesson outlines and story materials given out
- Thurs.	Lesson 1 Pat's School Picture	- Thurs.	Lesson 1 Pat's School Picture
<u>Week 3 - Nov. 7-10/77</u>			
	Lesson 2 Pork Chops and Applesauce	- Thurs.	Lesson 2 Pork Chops and Applesauce
<u>Week 4 - Nov. 14-18/77</u>			
	Lesson 3 Kay	- Thurs.	Lesson 3 Kay
<u>Week 5 - Nov. 21-25/77</u>			
	Lesson 4 Snow	- Thurs.	Lesson 4 Snow

APPENDIX D

INSERVICE MATERIALS

1. Inservice I for Teachers in Treatment Groups T<sub>1</sub> and T<sub>2</sub>
  - A. Discussion materials
  - B. Games
  - C. Open channel communication material



## INSERVICE MATERIALS

### Discussion Procedure

Before a successful discussion can take place the teacher must become aware of the criteria of a goal directed discussion as well as the basic ground rules necessary to maintain such a group. The materials in this Appendix were discussed then given to the participating teachers for reference.

### Criteria: Drawn from Learning Thru Discussion and Learning Discussion Skills Through Games<sup>1</sup>

1. Prevalence of a warm, accepting nonthreatening climate.
2. Learning is approached as a cooperative enterprise.
3. Learning is accepted as the reason for forming the group.
4. Everyone participates and interacts.
5. Leadership is the function of the teacher.
6. Group sessions and the learning task are enjoyable.
7. The material is adequately and efficiently covered.
8. Participants are encouraged to examine their own feelings and ideas and change them without fear of losing face.

Ground Rules: (to be discovered by the group)

1. Only one person speaks at a time.
2. Address questions and discussion to any group member not to the teacher.
3. If you do not understand the speaker ask for an explanation.

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<sup>1</sup>Hill, William Fawcett, Learning Thru Discussion Beverly Hills, Calif.: Sage Publications, 1969, p. 41.  
Sanford, Gene, Barbara Dodds Stanford, Learning Discussion Skills Through Games New York: Citation Press 1969, p. 15 - 25.

## Games to Teach Discussion Skills:

### Going on a Trip

The class is divided into two equal groups. A team scores a point for each different answer that is accompanied by an explanation. The game proceeds as follows, "I am going on a trip to the beach what shall I take?" Children must listen carefully to make sure their answers are different. To make the game move quickly a timer can be set for a short time. This game can be played several times taking a new trip. After playing the game assess what has happened and what further steps are needed to establish ground rules.

This game will also develop:

- a. total participation,
- b. listening,
- c. ability to focus attention on the last speaker.

### I Spy

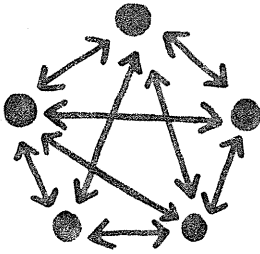
This second game is used to reinforce the ground rules and to learn additional discussion skills. The student who is "it" thinks of something in the classroom and gives only the initial consonant as a clue to its identity. The other class members must guess what "it" is by asking questions to help them zero in on the answer.

(eg. Is it smaller than my desk? or Can I write with it?) Each question asked should build on the previous information.

These games will develop the students' ability to;

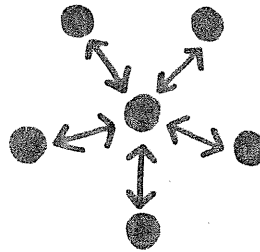
- a. initiate questions,
- b. listen carefully,
- c. rely on a total group effort in order to come to a solution.

TWO GROUP COMMUNICATION STRUCTURES



All channels open or circle structure

1. There is no one dominant leader, all participants are equal.
2. Allows full feedback for each member.
3. This system is used in the DR-TA.



Closed wheel or star

1. There is a definite leader all interaction flows through the leader in the central position.
2. Allows full feedback for the leader only.
3. This system is used in the DRA.

ALL CHANNELS OPEN COMMUNICATION

The Role of the Teacher is to:

1. give up centralized leadership position,
2. become an equal group member,
3. become an observer whenever possible,
4. keep the discussion moving by redirecting questions and comments to various group members,

The Role of the Student is to:

1. interact freely with all group members,
2. demand explanations for statements made by other group members,
3. listen carefully so that comments will be meaningful,
4. assume the responsibility for discussing the topic thoroughly,

APPENDIX E

(MDR-TA)

MDR-TA

Step 1. Setting the Purpose - the teacher begins the discussion and reading by:

- a. printing the title of the story on the blackboard,
- b. posing an open-ended question, eg.  
"What are you wondering as you read the title?"

Step 2. Pre-reading:

- a. children read the title and look at the pictures on the title page,
- b. group members predict what the story might be about, interact and question each other,
- c. the group decides on the wording of questions and which questions they wish recorded,
- d. the teacher acts as a - recorder, and catalyst, asking for explanations, proof and redirecting questions back to the group,

Step 3. Silent Reading -

- a. pupils read story silently,
- b. teacher helps pupils apply word recognition and comprehension skills,

Step 4. Post reading discussion - a comprehension is developed by:

- a. discussion of the recorded questions,
- b. oral rereading to support or refute,
- c. developing and refining concepts through discussion,

Note Steps 2, 3 and 4 can be repeated for a long story.

APPENDIX F

INSERVICE MATERIALS FOR THE CONTROL GROUP

Materials for the Control Group Inservice

An Example of the Specific Lesson Outline  
to be used in Lesson 4

SAMPLE OF A DRA LESSON"TED AND THE TELEPHONE"Teaching the SelectionStory Summary

Ted is a small boy who likes to use the telephone. Unfortunately he is unable to relay messages correctly. This causes two humorous but upsetting incidents. At last Ted's older brother prepares for him a memorandum pad to keep near the telephone so that messages can be properly recorded and delivered.

Specific Objectives

## Literary understanding

Realization that story interest and humor are sometimes achieved by telling about people's mistakes

## Literal comprehension

Ability to remember directions

## Sensitivity to social moral values

Awareness of responsibility for delivering messages correctly

Special Materials

Two toy telephones or two real telephones if possible.

Preparation for ReadingIntroducing the Vocabulary

NOTE: Words in which the letter n, occurring before g and k, stands for the sound / ŋ /, as in think and King, are considered decodable because most children automatically make the change in sounds from /n/to /ŋ/.

Have a telephone on a small table in front of the children. Conduct a general discussion about telephones



and the ways in which they help people. Write the word telephone on the chalkboard. Ask children to tell what they do when the telephone rings. Bring out the importance of taking messages accurately. Illustrate this point by asking pupils what they would note if they were taking a message from their grandmother, asking them to come over at 10 o'clock. Write the words grandmother and o'clock on the chalkboard.

To introduce the word answer write these sentences on the board:

Please answer the telephone.  
Do you know the answer to my question?

Pupils should be able to decode fish, milk, and Andy. Say for the group the word please as you write it on the chalkboard.

The original numerals with th ending may be briefly introduced at this time: 4th, 5th, 6th, 7th, 8th, and so on.

### Leads to Motivation

Ask the children if there is a special way in which members of their family are expected to answer the phone. If a family has a special way, have the child tell how his family handles it and why they do it that way. If the father were a plumber, or the mother a nurse, the reason would be obvious. Lead the conversation to the importance of relaying a message correctly.

Have the title "Ted and the Telephone" read, and encourage the children to talk briefly about the picture on page 29. They say that this story is about a boy who had some difficulty in taking a message correctly on the telephone.

### Reading the Story

#### Purpose for Reading

Suggest that the story be read to find the answer to this question: What happened in Ted's family when Ted mixed up two telephone messages?

#### Guided Reading

Before Reading Page 30

What happens when Mother and Dad try to meet?

Before Reading Page 31

What happens when Mother and Dad get home?

After Reading

Was it as serious as you expected? What did Ted say he would do?

EXAMPLE OF A SPECIFIC LESSONLesson IV Snow

Vocabulary - Introduce any words that may give the pupils some difficulty.

Teaching the Selection

Story Summary - Snow fell on the city all night. It was a problem for the motorists trying to get to work, and for the policeman who wanted to keep the traffic moving. The children had a different feeling about the snow. They enjoyed it very much as they walked to school.

Motivation for Reading - Discuss the last snow storm with the children. Point out the problem as well as the fun. Indicate that this story is about what happens in a big city when there is a heavy snowfall.

Guided Reading - Have the children read page 95 to find out what the city looked like after the snow. Read page 96 to find out what happened to the snow. After reading page 97 ask How did the policeman and the people in cars feel about the snow? After reading page 98 ask What did the children think about the snow?

After Reading Discussion - Discuss the idea that the storm affects different people in different ways. For example the children liked it while it was a problem for the adults in the story.

Follow-up - A worksheet to categorize ideas

APPENDIX G  
FORMULAE USED FOR THE STATISTICAL ANALYSIS  
OF THE RESEARCH STUDY

Formula for Cochran Q statistic

$$Q = \frac{(k-1) \left[ k \sum_{j=1}^k G_j^2 - \left( \sum_{j=1}^k G_j \right)^2 \right]}{k \sum_{i=1}^N L_i - \sum_{i=1}^N L_i^2}$$

where K = columns                      n = rows  
 G<sub>1</sub> = control group                    L<sub>1</sub> = total of G<sub>1</sub>+G<sub>2</sub>+G<sub>3</sub>  
 G<sub>2</sub> = T<sub>1</sub> (treatment one)            L<sub>2</sub> = square of G<sub>1</sub>+G<sub>2</sub>+G<sub>3</sub>  
 G<sub>3</sub> = T<sub>2</sub> (treatment two)

Formula for one sample runs test

$$z = \frac{r - \mu_r}{\sigma_r} = \frac{r - \left( \frac{2n_1n_2}{n_1 + n_2} + 1 \right)}{\sqrt{\frac{2n_1n_2(2n_1n_2 - n_1 - n_2)}{(n_1 + n_2)^2(n_1 + n_2 - 1)}}}$$

where r = runs, n<sub>1</sub> = elements of one kind, n<sub>2</sub> = elements of another kind